ACADEMIC CALENDAR
ODD 2022-23

SL. NO.	EVENTS / ACTIVITIES	1ST SEMESTER (2022-23) UG & PG / 3RD SEMESTER (LE) / 3RD SEMESTER UG (2022-23)	5TH SEMESTER UG / 3RD / 5TH SEMESTER PG (2022-23)	7TH SEMESTER B.TECH / B.PHARM / B.ARCH / 9TH SEMESTER B.ARCH / 5TH SEMESTER MCA (OLD BACK) 7TH / 9TH SEMESTER I.MSC. / IMBA
1	Date of Starting of Instructions / Classes for Odd Semester - 2022-23	15-11-2022 - 05-12-2022	12-12-2022	30-09-2022
2	Date of Online Entry for Odd Semester - 2022-23 Examination Registration (without Fine) and Branch Change [Regular / Back]	04-01-2023 - 11-01-2023	11-01-2023 - 18-01-2023	31-10-2022 - 05-11-2022
3	Date of Online Entry for Odd Semester - 2022-23 Examination Registration (with Fine @Rs.500/-) and Branch Change [Regular / Back]	12-01-2023 - 18-01-2023	19-01-2023 - 25-01-2023	07-11-2022 - 14-11-2022
4	Last Date of deposit of Fees by Colleges in BPUT Examination Fund for registration with letter (list of candidates) to Director, Examinations of BPUT in both Hard Copy and Soft Copy through E-Mail for registration Odd Semester - 2022-23	25-01-2023 - 02-02-2023	02-02-2023 - 09-02-2023	21-11-2022 - 28-11-2022
5	Display of List of Registered Students / Candidates in the University Portal for Odd Semester - 2022-23	30-01-2023	06-02-2023	29-11-2022
6	Date of Conduct of Class Test - I by the Colleges	19-01-2023 - 24-01-2022	19-01-2023 - 24-01-2022	14-11-2022 - 19-11-2022
7	Date of Display of Marks of Class Test - I by the Colleges in College Website	25-01-2022	25-01-2022	29-11-2022
8	Date of Conduct of Class Test - II by the Colleges	17-02-2023 - 22-02-2023	17-02-2023 - 22-02-2023	02-01-2023 - 07-01-2023
9	Date of Display of Marks of Class Test - II by the Colleges in College Website	23-02-02023	23-02-02023	09-01-2023
10	Odd Semester (1st, 3rd, 5th Semester) Examinations, 2022 Schedule to be declared by the Director, Examinations, BPUT in BPUT Official Website i.e. www.bput.ac.in	24-02-2023	24-02-2023	16-01-2023
11	Last Date of uploading of Internal Marks (Class Test - I&II, Lab., Sessional, Projects, Seminars, etc.) for Odd Semester - 2022-23 by the Colleges to the Director, Examinations of BPUT through Online	27-02-2023	06-03-2023	19-01-2023
12	Date of Closing Odd (1st and 7th Semester 2022) Classes	28-02-2023	09-03-2023	21-01-2023
13	Last Date of receipt of signed Report from the Principals of the Colleges by the Director, Examinations, BPUT by E-Mail for debarring defaulting students (if any) from the Odd Semester examinations who do not fulfill attendance requirements as per rules.	28-02-2023	09-03-2023	21-01-2023
14	Last Date of Online despatch of Admit Cards for Odd Semester - 2022-23 Examination from the Director, Examinations, BPUT to Centre Superindentents / Principals	10-03-2023	10-03-2023	01-02-2023
15	Date of Conduct of Odd Semester - 2022-23 Examinations	14-03-2023 - 10-04-2023	14-03-2023 - 10-04-2023	06-02-2023 - 16-02-2023
16	Semester Break	-	-	-
17	Date of Commencement of Classes for Next Even Semester, 2022-23	11-04-2023	11-04-2023	20-02-2023

DIRECTOR EXAMINATION

DIRECTOR CD & CDC

PIC R&D

REGISTRAR

ACADEMIC CALENDAR
ODD 2022-23

SL. NO.	EVENTS / ACTIVITIES	1ST SEMESTER (2022-23) UG & PG / 3RD SEMESTER (LE) / 3RD SEMESTER UG (2022-23)	5TH SEMESTER UG / 3RD / 5TH SEMESTER PG (2022-23)	7TH SEMESTER B.TECH / B.PHARM / B.ARCH / 9TH SEMESTER B.ARCH / 5TH SEMESTER MCA (OLD BACK) 7TH / 9TH SEMESTER I.MSC. / IMBA
18	Date of Publication of Odd Semester, 2022-23 Results in the University Official Website, Students Login and College Login by the Director Examination, BPUT	08-05-2023	08-05-2023	16-03-2023
19	Date of Online Registration for Re-Checking of Odd Semester, 2022-23 results.	09-05-2023 - 12-05-2023	09-05-2023 - 12-05-2023	17-03-2023 - 21-03-2023
20	Deposit of Fees in BPUT Examination Fund by the Colleges for Re-Checking of Odd Semester, 2022-23	15-05-2023	15-05-2023	22-03-2023
21	Date of Publication of Re-Checking of Results of Odd Semester, 2022-23 and display in BPUT Official Website, Students Login and College Login by the Director, Examinations, BPUT	29-05-2023	29-05-2023	04-04-2023
22	Proposed Month for holding Even Semester (2nd, 4th & 6th Semester) Examination, 2022-23	17-07-2023 - 05-08-2023	17-07-2023 - 05-08-2023	22-05-2023 - 30-05-2023
23	Proposed Month for Publication of Even Semester (2nd, 4th & 6th Semester) Examination, 2022-23	05-09-2023	05-09-2023	17-06-2023* 15-07-2023**

*** 8th B.Tech; ** Rest (Except 1st year B.Pharm & M.Pharm Courses)**

DIRECTOR EXAMINATION

DIRECTOR CD & CDC

PIC R&D

REGISTRAR

PART – II (Ph.D.), (Research & Development)

Sl.	Events/Activities	Dates
1.	Last date of Receipt of Applications for Recognition as Ph. D Supervisor/Co-Supervisor for 2023-24 in the prescribed format by the PIC, R&D, BPUT.	30.05.2023
2.	Date of notification of vacancy position for Ph.D. (Category Wise) with the name of Supervisors in different disciplines & list of NCR for 2023-24 academic year.	30.06.2023
3.	Date of Web Notification& advertisement through 02 Nos. of Odia Newspapers for conduct of Ph.D. Entrance Test (Written) by the Director, Examinations of BPUT.	13.07.2023
4.	Last Date of Receipt of Applications for the Ph.D. Entrance Test by the Director of Examination, BPUT.	14.08.2023
5.	Date of conduct of Entrance Examination (written) for the Ph.D. programme of the University by the Director, Examinations of BPUT.	27.08.2023 (Sunday)
6.	Date of Publication of Ph.D. Entrance Test (Written) Results by the Director, Examinations of BPUT in University website i.e. www.bput.ac.in	07.09.2023
7.	Date of conduct of interviews (Viva voce) for the enrolment to Ph.D. programme of the BPUT by PIC, R&D, BPUT.	14.09.2023 to 21.09.2023
8.	Last date of Publication of list of successful candidates and the list of Recommended Supervisors for enrolment to Ph.D. programme of the University by the PIC, R&D, BPUT in University website www.bput.ac.in	25.09.2023
9.	Last of date of Receipt of Applications from the successful candidates for enrolment to Ph.D. programme of the University with the choice of Supervisors/Co-Supervisors& NCRs by PIC, R&D, BPUT. (By Speed Post).	20.10.2023

DIRECTOR EXAMINATION DIRECTOR, CD & CDC PIC R&D REGISTRAR

10.	Date of notification on allotment of Supervisors and Co-Supervisors,&formation of DSC by PIC, R&D, BPUT.	30.10.2023
11.	Date of Reporting at NCR.	31.10.2023
12.	Date of first DSC meeting for allotment of Course Works by the DSC (out of the subjects offered in that particular NCR at Masters level & Course work/ SWAYAM-MOOCs).	14.11.2023
13.	Last Date of sending programme of 1st DSC & Course Work allotment to BPUT by Nodal Centres of Research. (PhD Scholars can also be allotted course works from SWAYAM-NPTEL MOOCs)	21.11.2023
14.	Last Date of declaration of the Schedules for the Ph.D.Course Work Examinations (same as per Master Degree Programmes) by the Director, Examination of BPUT / Controller of Examinations of the Autonomous Colleges.	Same as per Master Degree Programme of Odd/Even Semester 2023/ SWAYAM-NPTEL Calendar for 2023
15.	Date for Course Work examination.	Same as per Master Degree Programme of Odd/Even Semester 2023/ SWAYAM-NPTEL Calendar for 2023
16.	Date of Publication of Course Work examination results.	Same as per Master Degree Programme of Odd/Even Semester 2023
17.	Date of On-line applications for the rechecking of Ph.D. Course Work examinations results by the Director, Examinations/Controller of Examinations of the Autonomous Colleges as per the Masters degree papers.	Same as per Master Degree Programme of Odd/Even Semester 2023
18.	Date of Publication of rechecked results of Ph.D. Course Work and generation of signed On-line Grade Sheets by the Director, Examinations of BPUT / Controller of Examinations of the Autonomous Colleges and issue of Course Completion Certificates to the eligible students with a copy to PIC, R&D, BPUT by the Director, Examinations of BPUT /Controller of Examinations of Autonomous Colleges.	Same as per Master Degree Programme of Odd/Even Semester 2023
19.	Date of 2nd DSC meeting for each Scholar for recommendation for the registration to Ph.D. after verification of all requirements at the concerned NCR by the PIC, R&D, BPUT.	16.04.2024 to 30.04.2024

DIRECTOR EXAMINATION DIRECTOR, GD & CDC PIC R&D REGISTRAR

20.	Last date of receipt of all the documents from NCRs by PIC, R&D, BPUT for Registration.	01.05.2024 to 10.05.2024
21.	Date of Scrutiny of applications and recommendations of DSC for Ph.D. Registration by PIC, R&D, BPUT.	10.05.2024 to 18.05.2024
22.	Date of Notifications in the official website of the BPUT regarding the list of Registered Candidates for Ph.D. programmes of the BPUT by PIC, R&D, BPUT.	20.05.2024

DIRECTOR EXAMINATION DIRECTOR, CD & CDC PIC R&D REGISTRAR

BIJU PATNAIK UNIVERSITY OF TECHNOLOGY, ODISHA
ROURKELA

Academic Calendar Even Semester, 2022-23

(Subject to approval of the Academic Council & Board of Management)

PART - I (EXAMINATIONS)

Sl. No.	Events/Activities	2nd / 4th Semester (2022-23) UG (All courses) & 2nd Semester (2022-23) PG (All courses) (Date) (Except B.Pharm & M.Pharm)	6th Semester UG (All courses) / 4th Semester B.Arch / 4th Semester MCA / MBA / 6th Sem Integrated MBA & 6th Sem M.Sc.(Integrated) (Date)	4th Semester (2022-23) M.Tech & M.Pharm (Date)	8th B.Tech (Internship/Major Project)/8th Sem B. Pharm/6th Sem MCA(Old)/8th & 10th Semester (Arch) & 8th Sem MBA (Integrated) (Date)
1	Date of Starting of Instructions / Classes for Even Semester 2022-23.	18-04-2023 to 28-04-2023	06-04-2023 to 18-04-2023	03-04-2023	21-02-2023 to 07-03-2023
2	Date of Registration for Even Semester Regular & Back 2022-23	22-05-2023 to 27-05-2023	22-05-2023 to 27-05-2023	24-04-2023 to 06-05-2023	24-04-2023 to 06-05-2023
3	Date of Registration for Even Semester Regular & Back 2022-23 (with fine @ Rs. 500/-)	29-05-2023 to 03-06-2023	29-05-2023 to 03-06-2023	08-05-2023 to 12-05-2023	08-05-2023 to 12-05-2023
4	Last Date of deposit of fees by the colleges in BPUT through SB Collect or in "University Examination Fund" under intimation to Director, Examination in hard and soft copy through email in prescribed formats as Annexure-1 for Even Semester Examination 2022-23.	05-06-2023 to 07-06-2023	05-06-2023 to 7-06-2023	15-05-2023 to 19-05-2023	15-05-2023 to 19-05-2023
5	Date of conduct of Class Test-I by the colleges.	29-05-2023 to 03-06-2023	29-05-2023 to 03-06-2023		10-04-2023 to 15-04-2023
6	Date of display of Marks of Class Test-I by the colleges in College Website.	05-06-2023 to 07-06-2023	05-06-2023 to 07-06-2023		15-04-2023 to 17-04-2023
7	Date of conduct of Class Test-II by the colleges.	26-06-2023 to 01-07-2023	26-05-2023 to 01-07-2023		11-05-2023 to 18-05-2023
8	Date of display of Marks of Class Test-II by the colleges in college website.	10-07-2023	10-07-2023		19-05-2023
9	Date of Notifications of detailed Even Semester Examinations 2022-23 schedule by the Director, Examination, BPUT in BPUT official website i.e. www.bput.ac.in	02-07-2023	02-07-2023		20-05-2023
10	Date of uploading of Internal Marks (Class Test-I&II, Lab., Sessional, Projects, Seminars, etc.) for Even Semester 2022-23 by the Colleges to the Director, Examination of BPUT through online.	20-07-2023	20-07-2023		05-06-2023 to 10-06-2023 (Except 8th Semester B.Tech) 03-06-2023 to 08-06-2023
11	Date of closing of Even Semester Classes 2022-23	15-07-2023 to 28-07-2023	15-07-2023 to 28-07-2023	03-07-2023 (Thesis submission date)	25-5-2023 to 05-06-2023
12	Date of receipt of signed Report from the Principals of the colleges by the Director, Examinations, BPUT by Email for debarring defaulting students (if any) from the Even Semester 2022-23 examinations who do not fulfil attendance requirments as per rules.	28-06-2023 to 01-07-2023 (Attendance Calculate upto 29-06-2023 to 02-07-2023)	28-06-2023 to 01-07-2023 (Attendance Calculate upto 29-06-2023 to 02-07-2023)		
13	Date of on-line despatch of Admit Cards for Even Semester 2022-23 Examination from the Director, Examinations, BPUT to Centre Superintendents / Principals.	15-07-2023 onwards	10-07-2023		05-06-2023 to 09-06-2023
14	Date of Conduct of Even Semester Examinations 2022-23	17-07-2023 to 20-08-2023	17-07-2023 to 20-08-2023	10-07-2023 to 15-07-2023 (Thesis Evaluation)	05-06-2023 to 22-06-2023
15	Duration of Semester Break (for Internship / Sports etc.) for the students.				
16	Date of commencement of classes for ODD Semester 2023-24.	07-08-2023 to 28-08-2023	07-08-2023 to 28-08-2023		
17	Date of Publication of Even Semester 2022-23 results in the University official website, Student Login and College Login by the Director, Exam., BPUT.	21-09-2023 to 30-09-2023	21-09-2023 to 30-09-2023	17-07-2023	16-06-2023 to 29-06-2023(For 8th Sem B.Tech) 10-07-2023 -31-07-2023
18	Date of online registration for rechecking of Even Semester 2022-23 results.	Within 5 days after the start of Online registration	Within 5 days after the start of Online registration		Immediately after the publication of the result.
19	Deposit of Fees through SB Collect to BPUT by the Colleges for rechecking of Even Semester 2022-23 scripts.	30-09-2023 to 07-10-2023	30-09-2023 to 07-10-2023		
20	Date of Publication of rechecking of results of Even Semester-2022-23 and display in BPUT official website, Student Login and College Login by the Director, Examinations, BPUT.	16-10-2023	16-10-2023		By 16-08-2023
21	Proposed month for holding Convocation for the 2022-23 pass out batch				Dec-23

DIRECTOR, EXAMINATIONS

DIRECTOR I/C, CD & CDC

PIC (R&D)

REGISTRAR

Director, Examination
Biju Patnaik University of Technology
Odisha, Rourkela

DIRECTOR, CD & CDC

PART - II (Ph.D.), (Research & Development)

(All Notifications shall be in University Website only. No separate letter shall be sent to anybody by the University)

Sl.	Events/Activities	Dates
1	Last date of Receipt of Applications for Recognition as Ph. D Supervisor/Co-Supervisor for 2023-24 in the prescribed format by the PIC, R&D, BPUT.	30.05.2023
2	Date of notification of vacancy position for Ph.D. (Category Wise) with the name of Supervisors in different disciplines & list of NCR for 2023-24 academic year.	16.06.2023
3	Date of Web Notification& advertisement through 02 Nos. of Odia Newspapers for conduct of Ph.D. Entrance Test (Written) by the Director, Examinations of BPUT.	30.05.2023
4	Last Date of Receipt of Applications for the Ph.D. Entrance Test by the Director of Examination, BPUT.	29.06.2023
5	Date of conduct of Entrance Examination (written) for the Ph.D. programme of the University by the Director, Examinations of BPUT.	09.07.2023 (Sunday)
6	Date of Publication of Ph.D. Entrance Test (Written) Results by the Director, Examinations of BPUT in University website i.e. www.bput.ac.in	10.07.2023
7	Date of conduct of interviews (Viva voce) for the enrolment to Ph.D. programme of the BPUT by PIC, R&D, BPUT.	17.07.2023 to 29.07.2023
8	Last date of Publication of list of successful candidates and the list of Recommended Supervisors for enrolment to Ph.D. programme of the University by the PIC, R&D, BPUT in University website www.bput.ac.in	02.08.2023
9	Poster Presentation of Publications by Research Scholars at BPUT - Nodal Centre of Research	03.08.2023 to 11.08.2023
10	Last of date of Receipt of Applications from the successful candidates for enrolment to Ph.D. programme of the University with the choice of Supervisors/Co-Supervisors& NCRs by PIC, R&D, BPUT. (By Speed Post).	02.09.2023
11	Date of notification on allotment of Supervisors and Co-Supervisors ,& formation of DSC by PIC, R&D, BPUT.	15.09.2023
12	Date of Reporting at NCR.	23.09.2023
13	Date of first DSC meeting for allotment of Course Works by the DSC (out of the subjects offered in that particular NCR at Masters level & Course work/ SWAYAM-MOOCs).	30.10.2023
14	Last Date of sending programme of 1st DSC & Course Work allotment to BPUT by Nodal Centres of Research. (PhD Scholars can also be allotted course works from SWAYAM-NPTEL MOOCs)	04.11.2023
15	Last Date of declaration of the Schedules for the Ph.D.Course Work Examinations (same as per Master Degree Programmes) by the Director, Examination of BPUT / Controller of Examinations of the Autonomous Colleges.	Same as per Master Degree Programme of Odd/Even Semester 2023/ SWAYAM-NPTEL Calendar for 2023
16	Date for Course Work examination.	Same as per Master Degree Programme of Odd/Even Semester 2023/ SWAYAM-NPTEL Calendar for 2023
17	Date of Publication of Course Work examination results.	Same as per Master Degree Programme of Odd/Even Semester 2023
18	Date of On-line applications for the rechecking of Ph.D. Course Work examinations results by the Director, Examinations/Controller of Examinations of the Autonomous Colleges as per the Masters degree papers.	Same as per Master Degree Programme of Odd/Even Semester 2023
19	Date of Publication of rechecked results of Ph.D. Course Work and generation of signed On-line Grade Sheets by the Director, Examinations of BPUT / Controller of Examinations of the Autonomous Colleges and issue of Course Completion Certificates to the eligible students with a copy to PIC, R&D, BPUT by the Director, Examinations of BPUT /Controller of Examinations of Autonomous Colleges.	Same as per Master Degree Programme of Odd/Even Semester 2023
20	Date of 2nd DSC meeting for each Scholar for recommendation for the registration to Ph.D. after verification of all requirements at the concerned NCR by the PIC, R&D, BPUT.	16.03.2024 to 30.03.2024
21	Last date of receipt of all the documents from NCRs by PIC, R&D, BPUT for Registration.	01.04.2024 to 10.04.2024
22	Date of Scrutiny of applications and recommendations of DSC for Ph.D. Registration by PIC, R&D, BPUT.	10.04.2024 to 18.04.2024
23	Date of Notifications in the official website of the BPUT regarding the list of Registered Candidates for Ph.D. programmes of the BPUT by PIC, R&D, BPUT.	20.05.2024

DIRECTOR, EXAMINATIONS | DIRECTOR I/C, CD & CDC | PIC (R&D) | REGISTRAR

INSTITUTE OF PHARMACY & TECHNOLOGY, SALIPUR, CUTTACK.

TIME TABLE to be Effective from 06.06.2022 for D.Pharm- I & II, B.Pharm 6th & 8th Semester by Offline (physical) mode only

TIME/ DAY	Class	10.00am-11.00am	11.00am-12.00pm	12.00pm-1.00pm	1.00pm-2.00pm	2.00pm-3.00pm	3.00pm-4.00pm	4.00pm-5.00pm	
MON	D.Ph-I	Ph.zeutics-I/SP	Soc.Pharm./MA	Ph.cognosy/SD	RECESS	Ph.zeutics I Pr./Gr. I/Lab 2/SP & Soc. Pharmacy Pr./Gr. I/Lab 11/SMA			
	D.Ph-II	DSBM/MKS	Ph.col_Tox./BM	HCP/PKS		HCP Pr./Gr. I/Lab 12/PKS & Ph.col_Tox Pr./Gr. I/Lab 4/BM			
	6th Sem_A	HDT/DKH	Med.Chem-II/PASM	Ph.Biotech/AKP		Ph.Cology-II/RKG	QA/SAP	Comm (T)/MSH	
	6th Sem_B	Med.Chem-II/PASM	Ph.Biotech/AKP	HDT/DKH		Comm (T)/BSN	Ph.Cology-II/RKG	QA/SAP	
	8th Sem	Soc. Prev. Pharm/DSB	Bios_Res.Meth./BMN	Cosmetic Science/SKB		Project work			
TUE	D.Ph-I	Ph.Chem-I/SKS	HAP/RKG	Ph.zeutics I/SKB		Ph.chemistry I Pr./Gr. I/Lab 13/SKS & HAP Pr./Gr. I/Lab 17/RKG			
	D.Ph-II	Ph.chemistry-II/SSK	Ph.col_Tox./BM	DSBM/MKS		Ph.chemistry II Pr./Gr. I/Lab 18/SSK & Ph.zeutics II Pr./Gr. II/Lab 2/SKB			
	6th Sem_A	Med.Chem-III (T)/SKK	HDT/SD	BPPK/ACS		Med.Chem-III Pr./Gr. I/Lab 11/PASM & HDT Pr./Gr. I/Lab 8/DKH			
	6th Sem_B	HDT/SD	BPPK/ACS	Med.Chem-III (T)/SKK		HDT Pr./Gr. III/Lab 5/SD & Ph.Cology-III Pr./Gr. II/Lab 8/CSB			
	8th Sem	Soc. Prev. Pharm/AKS	Cosmetic Science/SP	Ph.Mark.Mang./BSM		Project work			
WED	D.Ph-I	Ph.cognosy/SD	Soc.Pharm./SKK	Ph.Chem-I/HKS	RECESS	HAP/RKG	Ph.Chem-I/MR		
	D.Ph-II	HCP/PKS	Ph.zeutics-II/SKB	Ph.chemistry-II/SKD					
	6th Sem_A	PhCology-II/CSB	Med.Chem-II/SSK	BPPK/BSN		HDT Pr./Gr. I/Lab 6/DKH & Med.Chem-II Pr./Gr. II/Lab 11/PASM			
	6th Sem_B	BPPK/BSN	PhCology-II/CSB	Med.Chem-II/SSK		Ph.Cology-III Pr./Gr. III/Lab 8/CSB & Med.Chem-III Pr./Gr. II/Lab 13/SKS			
	8th Sem	Bios_Res.Meth./HKS	Ph.Mark.Mang./SKM	Soc. Prev. Pharm/BM		Project work			
THUR	D.Ph-I	Ph.zeutics-I/SP	Soc.Pharm./SKK	Ph.cognosy/SD		Ph.cognosy Pr./Gr. I/Lab 5/SD & & Ph.zeutics I Pr./Gr. II/Lab 2/SP			
	D.Ph-II	HCP/PKS	Ph.col_Tox./BM			Ph.col_Tox Pr./Gr. I/Lab-4/BM & HCP Pr./Gr. II/Lab 1/PKS			
	6th Sem_A	PhCology-II (T)/CSB	BPPK/ACS	QA (T)/SAP		Med.Chem-II/SKS	Ph.Biotech (T)/AKP	HDT (T)/DKH	
	6th Sem_B	QA (T)/SAP	PhCology-II (T)/CSB	BPPK/ACS		Ph.Biotech (T)/AKP	HDT (T)/DKH	Med.Chem-II/SKS	
	8th Sem	Bios_Res.Meth (T)/HKS	Ph.Mark.Mang./BSM	Cosmetic Science (T)/SP		Project work			
FRI	D.Ph-I	Soc.Pharm./BSN	HAP/RKG	Ph.Chem-I/SKS	RECESS	Soc. Pharmacy Pr./Gr. I/Lab 11/SKK & Ph.chemistry I Pr./Gr. II/Lab 13/SKS			
	D.Ph-II	Ph.chemistry-II/SKS	DSBM/MKS	Ph.zeutics-II/ACS		Ph.Juris/SJP			
	6th Sem_A	PhCology-II/MKS	QA/BRM	Ph.Biotech/AKP		Ph.Cology-III Pr./Gr.I/Lab-4/RKS			
	6th Sem_B	Ph.Biotech/AKP	PhCology-II/MKS	QA/BRM		HDT Pr./Gr.II/Lab-5/SD			
	8th Sem	Bios_Res.Meth./SJP	Ph.Mark.Mang.(T)/BSM			Project work			
SAT	D.Ph-I	Ph.zeutics-I/SKB	HAP/RKG	Ph.cognosy/SD		HAP Pr./Gr. I/Lab-15/RKG & Ph.cognosy Pr./Gr. II/Lab 5/SD			
	D.Ph-II	Ph.chemistry-II/SSK	Ph.Juris/SJP	Ph.zeutics-II/SKB		Ph.zeutics-II Pr./Gr.-I/Lab-2/SKB & Ph.chemistry-II Pr./Gr.-II/Lab-14/SSK			
	6th Sem_A	QA/SP	HDT/DKH	Ph.Biotech/AKP		Ph.Cology-III Pr./Gr.II/Lab-4/RKS			
	6th Sem_B	HDT/DKH	Ph.Biotech/AKP	QA/SP		Med.Chem-III Pr./Gr.II/Lab-13/SKS			
	8th Sem	Soc. Prev. Pharm (T)/AKS	Cosmetic Science/BRM			Project work			

for Time Table I/c 13.06.2022

PRINCIPAL

TIME TABLE to be Effective from 06.06.2022 for D.Pharm- I & II, B.Pharm 6th & 8th Semester by Offline (physical) mode only

TIME / DAY	Class	10.00am-11.00am	11.00am-12.00pm	12.00pm-1.00pm	1.00pm-2.00pm	2.00pm-3.00pm	3.00pm-4.00pm	4.00pm-5.00pm	

Abbreviation

SKM: Dr. Santosh Kumar Mahapatra
SKB: Dr. Sunil Kumar Bansinge
PKSM: Dr. Prabhat Kumar Sinhamahapatra
NKP: Dr. Naresh Kumar Panni
AKS: Dr. Aswini Kumar Sahoo
SKB: Dr. Sudarsan Kumar Behera
AKP: Dr. Amaya Kumar Prusty
MB: Dr. Mrityunjay Banerjee
CSB: Dr. Chandra Sekhar Biswal
RKG: Dr. Ranjan Kumar Giri
BM: Dr. Bishwanath Mishra
MKS: Dr. Mahaketan Sahoo
ACS: Dr. Amaresh Chandra Sahoo
SD: Dr. Sudi Dash
HKS: Dr. H.K. Sundara Kumar
PKS: Dr. Pravat Kumar Sahoo
SP: Mr. Sasadhi Panda
SKS: Dr. Sujit Kumar Sahu
DKN: Mr. Deepak Kumar Nath
BB: Mrs. Bipasha Behera
BSM: Dr. Biswajeet Mishra
VSK: Dr. Sudhartha Shankar Rai
SJP: Dr. Satyajit Pande
BRM: Dr. Biswaranjan Mohanty
BSN: Dr. Bhakara Shankar Nayak
SB: Mr. Saroj Kumar Behera
BKD: Mr. Basantkanta Das
SS: Dr. Sakuntala Swain

Class : **Class Rooms:** **Practical Group**

D Pharm 1st Year	Academic Block 1st Floor (LH III)	Group-I (01-30) Group-II (31-60)
D Pharm 2nd Year	Academic Block 1st Floor (LH I)	Group-I (01-30) Group-II (31-onwards)
B Pharm 6th Sem	Lab Block 1st Floor (CLR-3)	Group-I (01-30) Group-II (31-60)
	Lab Block 2nd Floor (PGCR-2)	Group-III (61-90) Group-IV (91-105 & LT)
B Pharm 8th Sem	Animal House Block 1st Floor	Not Available

Laboratories:

Lab-1	Pharmaceutics (Old Lab Block Ground Floor)
Lab-2	Pharmaceutics (Old Lab Block Ground Floor)
Lab-3	Microbiology (Old Lab Block 1st Floor)
Lab-4	Pharmacology (Old Lab Block 1st Floor)
Lab-5	Pharmacognosy (Old Lab Block 2nd Floor)
Lab-6	Pharmacognosy (Old Lab Block 2nd Floor)
Lab-7	Machine Room (Lab Block Ground Floor)
Lab-8	PG Pharmaceutics (Lab Block Ground Floor)
Lab-9	Instrument Room (Lab Block Ground Floor)
Lab-10	PG Pharma Analysis (Lab Block Ground Floor)
Lab-11	Pharmachemistry (Lab Block 1st Floor)
Lab-12	Pharma Analysis (Lab Block 1st Floor)
Lab-13	Pharmachemistry (Lab Block 1st Floor)
Lab-14	Pharmachemistry (Lab Block 1st Floor)
Lab-15	Pharmacology (New Lab Block 2nd Floor)
Lab-16	Pharmaceutics (New Lab Block 2nd Floor)
Lab-17	Pharmachemistry (PG Lab Block 1st Floor)
Lab-18	Pharma Analysis (PG Lab Block 2nd Floor)
Lab-19	Pharmaceutics (PG Lab Block 2nd Floor)
Lab-20	Computer (Library Block 1st Floor)

Time Table I/c

PRINCIPAL

INSTITUTE OF PHARMACY & TECHNOLOGY, SALIPUR, CUTTACK.

TIME TABLE to be Effective from 14.07.2022 for D.Pharm Part- I & Part II, B.Pharm 2nd, 4th & 6th Semester and M.Pharm 2nd Semester

Days		9.00am-10.00am	10.00am-11.00am	11.00am-12.00pm	12.00pm-1.00pm	1.00pm-2.00pm	2.00pm-3.00pm	3.00pm-4.00pm	4.00pm-5.00pm
MON	D.Ph-I		Ph.chemistry-I Pr./Gr.-I/Lab-2/SP & Soc. Pharmacy Pr./Gr.-II/Lab-16/SP				Ph.chemistry I/SP	[illegible]	[illegible]
	D.Ph-II		Ph.col. Tox./BRS	HCP/PKS	Ph.chemistry-II/SKB		HCP Pr./Gr.-I/Lab-1/ACS & Ph.col. Tox. Pr./Gr.-II/Lab-4/BM		
	2nd Sem_A	Comp. Appl./RKD	Comp. Appl. Pr./Gr.-I/Lab-C1/RKD				Ph.Org.Chem-I/MB	Biochem./BB	HAP-II/CSB
	2nd Sem_B		HAP-II Pr./Gr.-II/Lab-15/CSB				HAP-II/CSB	Ph.Org.Chem-I/MB	Biochem./BB
	4th Sem_A		Ph.Cog_Phyto./SD	Med. Chem.-I/SKS	Ph.Col-I./BM		Ph.Org.Chem-II/HKS	Ph.Cog_Phyto./DKH	Phy.Pharm-II/PKS
	4th Sem_B		Med. Chem.-I/SKS	Ph.Col-I./BM	Ph.Cog_Phyto./SD		Phy.Pharm-I/PKS	Ph.Org.Chem-II/HKS	Ph.Cog_Phyto./DKH
	6th Sem_A		Med.Chem-III (T)/SKK	QA/SKP	HDT/DKH		PhCology-II/RKG	Ph.Biotech/AKP	BPPK (T)/BSN
	6th Sem_B		QA/SKP	HDT/DKH	Med.Chem-III (T)/SKK		BPPK (T)/BSN	PhCology-II/RKG	Ph.Biotech/AKP
	M.Ph-II_PCeu		CADDS/SRM	ABPPK/ACS			Mol. Pharm./SLP	Comp.Cos.smuli./SKB	
	M.Ph-II_PChm		Adv.Org.Chem-II/HKS	CADD/MB			Adv.Spec.Ana./PKSM	Ph.Proc.Chem./SSK	
	M.Ph-II_PA		Adv.Inst.Ana./MKS	Her.Comm.Ana./BB			QCQA/SKP		
TUE	D.Ph-I		Ph.Chem-I/SKS	HAP/BRN	Ph.zoology-I/SP	R E C E S S	Ph.chemistry-I Pr./Gr.-I/Lab-11/SKS & HAP Pr./Gr.-II/Lab-15/BRN		
	D.Ph-II		Ph.zoology-II/BSM	Ph.col. Tox./BM	DSBM/MKS		Ph.chemistry-II Pr./Gr.-I/Lab-14/SSK & Ph.zoology-II Pr./Gr.-II/Lab-2/SKB		
	2nd Sem_A		Ph.Org.Chem-I Pr./Gr.-I/Lab-12/MB & HAP-II Pr./Gr.-II/Lab-15/CSB				Biochem./AKP	HAP-II/CSB	Pathophysio./BM
	2nd Sem_B	Comp. Appl./RKD	Comp. Appl. Pr./Gr.-II/Lab-C1/RKD & Biochem. Pr./Gr.-IV/Lab-11/AKP				HAP-II/CSB	Pathophysio./BM	Biochem./AKP
	4th Sem_A		Med. Chem.-I Pr./Gr.-I/Lab-13/SKK & Phy.Pharm-II Pr./Gr.-IV/Lab-3/PKS				Ph.Col-I./AKS	Phy.Pharm-II/PKS	
	4th Sem_B	Comp. Appl./RKD [illegible]	Ph.Col-I Pr./Gr.-III/Lab-4/AKS & Ph.Cog_Phyto Pr./Gr.-IV/Lab-6/DKH				Phy.Pharm-II/PKS	Ph.Col-I./AKS	
	6th Sem_A		Med.Chem-III/SSK	HDT/SD	BPPK/ACS		Med.Chem-III Pr./Gr.-I/Lab-13/PKSM & HDT Pr./Gr.-II/Lab-6/DKH		
	6th Sem_B		HDT/SD	BPPK/ACS	Med.Chem-III/SSK		HDT Pr./Gr.-II/Lab-5/SD & Ph.Zoology-II Pr./Gr.-III/Lab-4/RKG		
	M.Ph-II_PCeu		Pharmaceutics-II Pr./Lab-18/BSM				Pharmaceutics-II Pr./Lab-18/BSM		
	M.Ph-II_PChm		Ph.Chemistry-II Pr./Lab-17/SSK				Ph.Chemistry-II Pr./Lab-17/SSK		
	M.Ph-II_PA	Mol.Biol.Ap.Tech./BM	Ph.Analysis-II Pr./Lab-10/BRN				Ph.Analysis-II Pr./Lab-10/BRN		
WED	D.Ph-I		Ph.Chem-I/PKS	Soc.Pharm./SLP	HAP/RKG		Ph.copiony/SD	HAP/BRN	Ph.zoology-I/SP
	D.Ph-II		DSBM/SP	HCP/ACS	Ph.chemistry-II/SSK				
	2nd Sem_A	Comp. Appl./RKD	Biochem. Pr./Gr.-I/Lab-12/BB & Ph.Org.Chem-I Pr./Gr.-II/Lab-13/MB				Ph.Org.Chem-I/MB	Biochem./BB	Env. Science/SKB
	2nd Sem_B		Biochem. Pr./Gr.-II/Lab-11/AKP & HAP-II Pr./Gr.-IV/Lab-15/AKS				Env. Science/SKB	Ph.Org.Chem-I/MB	Biochem./BB
	4th Sem_A		Ph.Col-I Pr./Gr.-I/Lab-4/BM & Ph.Cog_Phyto Pr./Gr.-III/Lab-5/SD				Phy.Pharm-II/BSM	Ph.Col-I./AKS	Ph.Org.Chem-II/HKS
	4th Sem_B		Ph.Cog_Phyto Pr./Gr.-III/Lab-6/DKH & Phy.Pharm-II Pr./Gr.-IV/Lab-2/BSM				Ph.Col-I./AKS	Ph.Org.Chem-II/HKS	Phy.Pharm-II/BSM
	6th Sem_A		PhCology-II/CSB	Med.Chem-III/SKS	BPPK/BSN		HDT Pr./Gr.-I/Lab-6/DKH & Med.Chem-III Pr./Gr.-II/Lab-13/PKSM		
	6th Sem_B		BPPK/BSN	PhCology-II/CSB	Med.Chem-III/SKS		Ph.Cology-II Pr./Gr.-III/Lab-4/RKG & Med.Chem-III Pr./Gr.-IV/Lab-14/SKS		
	M.Ph-II_PCeu		Pharmaceutics-II Pr./Lab-18/BRN				Pharmaceutics-II Pr./Lab-18/BRN		
	M.Ph-II_PChm		Ph.Chemistry-II Pr./Lab-17/SSK				Ph.Chemistry-II Pr./Lab-17/SSK		
	M.Ph-II_PA	Adv.Inst.Ana./MKS	Ph.Analysis-II Pr./Lab-10/MKS				Ph.Analysis-II Pr./Lab-10/MKS		

Principal

Institute of Pharmacy & Technology

INSTITUTE OF PHARMACY & TECHNOLOGY, SALIPUR, CUTTACK.

TIME TABLE to be Effective from 14.07.2022 for D.Pharm Part- I & Part II, B.Pharm 2nd, 4th & 6th Semester and M.Pharm 2nd Semester

Day	Class	9.00 am-10.00 am	10.00am-11.00am	11.00am-12.00pm	12.00pm-1.00pm	1.00pm-2.00pm	2.00pm-3.00pm	3.00pm-4.00pm	4.00pm-5.00pm
THUR	D.Ph-I		Ph Chem I/SKS	Ph cognosy/SD	Soc Pharm /SP		Ph cognosy Pr /Gr I/Lab 5/SD & Ph ceutics I Pr /Gr II/Lab 3/SP		
	D.Ph-II		Ph Juris/SP	HCP/PKS	Ph col Tox /BM		Ph col Tox Pr /Gr I/Lab 4/BM & HCP Pr /Gr II/Lab 2/PKS		
	2nd Sem_A		Biochem Pr /Gr II/ Lab 11/BB				Ph Org Chem I/SKS	HAP II/AKS	Pathophysio /RKG
	2nd Sem_B	Comp Appl /RKD	Ph Org Chem I Pr /Gr II/ Lab 13/MB & Comp Appl Pr /Gr I/ Lab CL/RKD				HAP II/AKS	Pathophysio /RKG	Ph Org Chem I/SKS
	4th Sem_A		Ph Cog_Phyto Pr /Gr II/ Lab 6/DKH & Med Chem I Pr /Gr I/ Lab 12/PKSM				Ph Org Chem III/SKS	Med Chem I/SKP	
	4th Sem_B	Comp Appl /RKD 4th Sem II	Med Chem I Pr /Gr III/ Lab 14/PKS & Ph Col I Pr /Gr IV/ Lab 4/AKS				Med Chem I/SKP	Ph Org Chem III/SKS	
	6th Sem_A		Ph Cology III T/CSB	BPPK/ACS	Med Chem III/PKSM		QA IT/SKP	Ph Biotech IT/AKP	HDT IT/DKH
	6th Sem_B		Med Chem III/PKSM	Ph Cology III T/CSB	BPPK/ACS		Ph Biotech IT/AKP	HDT IT/DKH	QA IT/SKP
	M.Ph-II_PCeu		Mol Pharm /BRM	CADDS/BSN	Cosm_Cos ceuti /SKB		ABPPK/BSM	CADDS/BRM	
	M.Ph-II_PChm						Ph Proc Chem /SSK	CADDS/BKN	Adv Spec Ana /PKSM
	M.Ph-II_PA		Mod BioAn Tech /SKP	Her Cosm Ana /AKS			QCQA/BB	Adv Inst Ana /AKS	
FRI	D.Ph-I		Ph ceutics I/SP	Soc Pharm /SP	Ph Chem I/SKS		Soc Pharmacy Pr /Gr I/ Lab 16/SP & Ph chemistry I Pr /Gr II/ Lab 11/SKS		
	D.Ph-II		Ph chemistry II/SKS	Ph ceutics II/BSM	DSBM/SP	RECESS			
	2nd Sem_A		HAP II/CSB	Pathophysio /RKG	Env Science/SKB		HAP II Pr /Gr I/ Lab 15/CSB & Comp Appl Pr /Gr II/ Lab CL/RKD		
	2nd Sem_B		Env Science/SKB	HAP II/CSB	Pathophysio /RKG		Ph Org Chem I Pr /Gr II/ Lab 13/MB		
	4th Sem_A			Ph Cog_Phyto /SD	Med Chem I/SKK		Ph Org Chem III/SSK	Phy Pharm II/BSM	
	4th Sem_B	Comp Appl II/RKD 4th Sem II (9.00-10.00)	Comp Appl /RKD 4th Sem II	Med Chem I/SKK	Ph Cog_Phyto /SD		Phy Pharm II/BSM	Ph Org Chem III/SSK	
	6th Sem_A		QA/BRM	Ph Cology III/BM	Ph Biotech/AKP		Ph Cology III Pr /Gr I/Lab 4/RKG		
	6th Sem_B		Ph Biotech/AKP	QA/BRM	Ph Cology III/BM		HDT Pr /Gr II/Lab 5/[illegible]		
	M.Ph-II_PCeu		Mol Pharm /BSA	[illegible]	Cosm_Cos ceuti /SKM				
	M.Ph-II_PChm		Ph Proc Chem /SSK	CADD/SB	Adv Org Chem II/PKS		Adv Spec Ana /PKSM	Adv Org Chem II/PKS	
	M.Ph-II_PA		Mod BioAn Tech /SKP	QCQA/BB			QCQA/SKP	Her Cosm Ana /AKS	
SAT	D.Ph-I			HAP/BKS	Ph cognosy/SD		HAP Pr /Gr I/ Lab 15/BKS & Ph cognosy Pr /Gr II/ Lab 5/SD		
	D.Ph-II		Ph chemistry II/SKS	Ph Juris/SP	Ph chemistry II/SSB		Ph ceutics II Pr /Gr I/Lab 2/SKB & Ph chemistry II Pr /Gr II/Lab 18/SSP		
	2nd Sem_A			Pathophysio /RKG	Env Science/SKB		Biochem /BB	Comp Appl /RKD	Ph Org Chem I/MB
	2nd Sem_B			Env Science/SKB	Pathophysio /RKG		Ph Org Chem I/MB	Biochem /BB	Comp Appl /RKD
	4th Sem_A		Phy Pharm II Pr /Gr I/ Lab 3/PKS & Ph Col I Pr /Gr II/ Lab 4/AKS				Ph Col I /AKS	Med Chem I/PKSM	Ph Cog_Phyto /DKH
	4th Sem_B		Phy Pharm II Pr /Gr III/ Lab 2/BSM & Med Chem I Pr /Gr IV/ Lab 14/PKS				Ph Cog_Phyto /DKH	Ph Col I /AKS	Med Chem I/PKSM
	6th Sem_A		QA/SP	HDT/DKH	Ph Biotech IT/AKP		Ph Cology III Pr /Gr II/Lab 4/RKG		
	6th Sem_B		HDT/DKH	Ph Biotech IT/AKP	QA/SP		Med Chem III Pr /Gr III/Lab 14/SKS		
	M.Ph-II_PCeu		Mol Pharm /BRM	CADDS/BSN			ABPPK/ACS	Cosm_Cos ceuti /PKS	
	M.Ph-II_PChm		Adv Spec Ana /PKSM	CADD/MB			Ph Proc Chem /SKK	Adv Org Chem II/PKS	
	M.Ph-II_PA		Her Cosm Ana /AKS	Adv Inst Ana /BB	Mod BioAn Tech /SKP				

Dr. S. Mishra
Time Table In-charge

Principal
Institute of Pharmacy & Technology

INSTITUTE OF PHARMACY & TECHNOLOGY, SALIPUR, CUTTACK.

TIME TABLE to be Effective from 14.07.2022 for D.Pharm Part- I & Part II, B.Pharm 2nd, 4th & 6th Semester and M.Pharm 2nd Semester

Days	9.00 am-10.00 am	10.00am-11.00am	11.00am-12.00pm	12.00pm-1.00pm	1.00pm-2.00pm	2.00pm- 3.00pm	3.00pm-4.00pm	4.00pm-5.00pm
Days								

Abbreviation

SKM : Dr. Santosh Kumar Mahapatra
SKS : Dr. Sunil Kumar Sahu[illegible]
PKSM : Dr. Prabir Kumar Sinha[illegible]
SKP : Dr. Sanjay Kumar Patro
AKS : Dr. Ajaya Kumar Samanta
SKB : Dr. Susanta Kumar Behera
AKP : Dr. Amiya Kumar Pitala
MB : Dr. Mrityunjay Banerjee

CSB : Dr. Chandra Sekhar Barik
RKG : Dr. Ranjan Kumar Giri
BM : Dr. Bishnuprasad Mishra
MKS : Dr. Manoharlan Sahoo
ACS : Dr. Amaresh Chandra Sahoo
SD : Dr. Sujit Dash
HKL : Dr. H.K. Sandeep Kumar
PKS : Dr. Prasut Kumar Sahoo

SP. Ms. Sasmita Parija
SKS : Dr. Sunil Kumar Sahu
DKM. Mr. Dompati Kumar Mali
BB: Mrs. Bijaylaxmi Behera
BBM: Dr. Bibekanand Mishra
SSB : Dr. Sidhartha Shankar Bal
SJP: Dr. Satyajit Panda
SBM : Dr. Shiva ranjan Mohanty

BSN: Dr. Bhabani Shankar Nayak
BKN: Mr. Braj Kumar Nayak
SB: Mr. Sunil Kumar Behera
RKD: Mr. Rajendra Kumar Dei
SS: Dr. Subrat Kala Swain

Class	Section	Class Room	Practical Group
D Pharm 1st Year	No Section	Academic Block 1st Floor (LH-10)	Group I [01-30] Group II [31-60]
D Pharm 2nd Year	No Section	Academic Block 1st Floor (LH-9)	Group I [01-30] Group II [31 onwards]
B Pharm 6th Semester	Sec-A	Lab Block 1st Floor (NLB-108)	Group I [1903175001 to 1903175031] Group II [1903175031A to 1903175057] Group III [1903175063 to 1903175092]
	Sec-B	Lab Block 2nd Floor (PG/CR-3)	Group IV [1903175093 to 1903175208 & 2023175801 to 2023175811]
B Pharm 4th Semester	Sec-A	Lab Block 1st Floor (NLB-105)	Group I [2003175008, 2003175001 to 2003175019] Group II [2003175018 to 2003175049] Group III [2003175050A to 2003175085] Group IV [2003175086 to 2003175144 & 2123175801 to 2123175811]
	Sec-B	Lab Block 2nd Floor (PG/CR-2)	
B Pharm 2nd Semester	Sec-A	Animal House Block 1st Floor	Group I [2103175001 to 2103175031] Group II [2103175039 to 2103175060] Group III [2103175061 to 2103175080] Group IV [2103175081 to 2103175105]
	Sec-B	Animal House Block 2nd Floor	
M Pharm 2nd Semester	No Section	Respective Department	

Lab. No.	Name of the Laboratory & Location
Lab-1	Research Lab (Old Lab Block Ground Floor)
Lab-2	Pharmaceutics (Old Lab Block Ground Floor)
Lab-3	Microbiology (Old Lab Block 1st Floor)
Lab-4	Pharmacology (Old Lab Block 1st Floor)
Lab-5	Pharmacognosy (Old Lab Block 2nd Floor)
Lab-6	Pharmacognosy (Old Lab Block 2nd Floor)
Lab-7	Machine Room (Lab Block Ground Floor)
Lab-8	PG Pharmaceutics (Lab Block Ground Floor)
Lab-9	Instrument Room (Lab Block Ground Floor)
Lab-10	PG Pharma Analysis (Lab Block 1st Floor)
Lab-11	Pharmaceutical Biochemistry (Lab Block 1st Floor)
Lab-12	Pharma Analysis (Lab Block 1st Floor)
Lab-13	Pharmacheutics (Lab Block 1st Floor)
Lab-14	Pharmachemistry (Lab Block 1st Floor)
Lab-15	Pharmacology (New Lab Block 2nd Floor)
Lab-16	Pharmaceutics (New Lab Block 2nd Floor)
Lab-17	Pharmachemistry (PG Lab Block 1st Floor)
Lab-18	Pharma Analysis (PG Lab Block 2nd Floor)
Lab-19	Pharmaceutics (PG Lab Block 2nd Floor)
Lab-20	Computer (Library Block 1st Floor)

Dr. B. Mishra
Time Table In-charge

PRINCIPAL
Institute of Pharmacy & Technology
Salipur, Dist-Cuttack-754202, Odisha

INSTITUTE OF PHARMACY & TECHNOLOGY, SALIPUR, CUTTACK.

Time Table for D.Pharm Part-I & Part-II and B.Pharm 7th Semester w.e.f. 13.10.2022

DAY	Class	9:00 am-10:00 am	10:00 am-11:00 am	11:00 am-12:00 noon	12:00 noon-1:00 pm	1:00 pm-2:00 pm	2:00 pm- 3:00 pm	3:00 pm- 4:00 pm	4:00 pm- 5:00 pm
MON	D.Ph-I		Ph.ceutics I/SP	Ph.cognosy/SD	Soc Pharm./SP	R	Ph.ceutics I Pr./Gr -I/ Lab 2/SP & Soc. Pharmacy Pr./Gr -I/ Lab-16/SP		
	D.Ph-II		D5BM/BKN	Ph.col. Tox./MS	HCP/PKS	E	Ph.col_Tox Pr./Gr. II/Lab-4/BM(2.00PM-4.00PM) & HCP Pr./Gr -I/Lab-3/PKS (2.00PM-4.00PM)		
	B.Ph-VII		NDDS/SP	Ind. Meth Ana./SKP	Pharm Practice/SP	C	Practice School/All Groups		
TUE	D.Ph-I		HAP/RKG	Soc Pharm./SP	Ph.ceutics I/SKB	E	Ph.chemistry-I Pr./Gr -I/ Lab-11/SKS & HAP Pr./Gr -I/ Lab-15/RKG		
	D.Ph-II		Ph.chemistry II/SSK	Ph.col_Tox./BM	D5BM/MKS	S	Ph.chemistry II Pr./Gr. II/ Lab-14/SSK & Ph.ceutics I Pr./Gr -I/ Lab-2/SKB		
	B.Ph-VII		NDDS/BSM	Pharm Practice/CSB		S	Ind. Meth Ana. Pr./Gr-II/Lab-10/BB & Practice School/Gr-I & II		
WED	D.Ph-I		Soc Pharm./BKN	Ph.Chem-I/MKS	HAP/RKG	R	Ph.ceutics-I/SP	Ph.Chem-I/SKS	
	D.Ph-II		Ph.chemistry II/SSK	Ph.ceutics II/SKB	HCP/MCS	E			
	B.Ph-VII		Ind. Pharm.II/BSN	Ind Meth Ana./BB	NDDS/BSM	C	Practice School/All Groups		
THUR	D.Ph-I		Ph.Chem-I/SSK	Ph.cognosy/SD	Soc Pharm./BKN	E	Ph.cognosy Pr./Gr -I/ Lab-5/SD & Ph.ceutics I Pr./Gr -I/ Lab-2/SP		
	D.Ph-II		Ph.ceutics II/BSM	Ph.Juris/SP	Ph.col_Tox./BM	S	HCP Pr./Gr -II/Lab 3/MCS(2.00PM-4.00PM) & Ph.col_Tox. Pr./Gr -II/Lab-4/BM(2.00PM-4.00PM)		
	B.Ph-VII			NDDS/BSM	Ind. Pharm-II/SBM	S	Ind Meth Ana. Pr./Gr-I/Lab-10/SKP & Practice School/Gr- II & IV		
FRI	D.Ph-I		Ph.Chem-I/SKS	HAP/RKG	Ph.cognosy/SD	R	Soc. Pharmacy Pr./Gr -I/ Lab-16/SP & Ph.chemistry-I Pr./Gr -I/ Lab-11/SKS		
	D.Ph-II		HCP/PKS	Ph.ceutics II/SKB	Ph.chemistry II/SKS	E	Ph.chemistry-II Pr./Gr. II/ Lab-14/SSK & Ph.ceutics II Pr./Gr -II/ Lab-2/BSM		
	B.Ph-VII		Ind Meth Ana./SKP	Pharm Practice/SP	Ind. Pharm-II/PKS	C	Ind.Meth.Ana. Pr./Gr-II/Lab-10/BB & Practice School/Gr-I & II		
SAT	D.Ph-I		Ph.ceutics I/SP	HAP/RKG	Ph.cognosy/SD	E	HAP Pr./Gr. -I/ Lab-15/RKG & Ph.cognosy Pr./Gr. -I/ Lab-5/SD		
	D.Ph-II		D5BM/BKN	Ph.Juris/SP	Ph.chemistry II/SSK	S			
	B.Ph-VII		Ind Meth Ana./SKP	Ind. Pharm II/BSN	Pharm Practice/CSB	S	Ind Meth Ana. Pr./Gr-I/Lab-10/SKP & Practice School/Gr-II & IV		

Dr. B. Mishra
Time Table I/C

Principal
IPT, Salipur

Principal
Institute of Pharmacy & Technology

INSTITUTE OF PHARMACY & TECHNOLOGY, SALIPUR, CUTTACK.

Time Table for D.Pharm Part-I & Part-II and B.Pharm 7th Semester w.e.f. 13.10.2022

Class	9:00 am-10:00 am	10:00 am-11:00 am	11:00 am-12:00 noon	12:00 noon-1:00 pm	1:00 pm-2:00 pm	2:00 pm- 3:00 pm	3:00 pm- 4:00 pm	4:00 pm- 5:00 pm

Abbreviation

SKM: Dr. Santosh Kumar Mahapatra
SKB: Dr. Sunil Kumar Kanungo
BRM: Dr. Biswa Ranjan Mohanty
PKSM: Dr. Prabir Kumar Sinhamahapatra
SKP: Dr. Saroja Kumar Patro
MB: Dr. Mrityunjay Banerjee
BSN: Dr. Bhabani Shankar Nayak
SKB: Dr. Susanta Kumar Behera
AKS: Dr. Aswini Kumar Senapati
ANP: Dr. Anuya Kumar Prusty
RKG: Dr. Ranjan Kumar Giri
CSB: Dr. Chandra Sekhar Bank
BM: Dr. Bishwanath Mishra
MKS: Dr. Miraketan Sahoo

ACS: Dr. Amaresh Chandra Sahoo
SD: Dr. Sujit Dash
HKS: Dr. H.K. Sundeep Kumar Nayak
PKS: Dr. Prabhat Kumar Sahoo
SP: Mr. Swapan Parija
SS: Dr. Sujit Kumar Saha
DKH: Mr. Deepak Kumar Hati
BB: Mrs. Bipasha Behera
BSM: Dr. Bibaswan Mishra
SSK: Dr. Sidhartha Shankar Kar
SJP: Dr. Satyajit Panda
RKN: Mr. Biraj Kumar Nayak
SB: Mr. Saroj Kumar Behera
SS: Dr. Sukuntala Swain

Class	Theory Section	Class Rooms	Practical Group
D.Pharm 1st Year	No Section	Academic Block 1st Floor (LH-II)	Group-I (01-30) Group-II (31-60)
D.Pharm 2nd Year	No Section	Academic Block 1st Floor (LH-I)	Group-I (01-30) Group-II (31-onwards)
B.Pharm 1st Sem.	Sec-A: Roll 01-60	Animal House Block 1st Floor	Group-I (01-30) Group-II (31-60)
	Sec-B: Roll 61-105	Animal House Block 2nd Floor	Group-III (61-90) Group-IV (91-105)
B.Pharm 3rd Sem.	Sec-A: Regd. 01-60	Lab Block 2nd Floor (NLB-205)	Group-I (01-30) Group-II (31-60)
	Sec-B: Regd. 61-105 & LE	Lab Block 2nd Floor (NLB-208)	Group-III (61-90) Group-IV (91-105 & LE)
B.Pharm 5th Sem.	Sec-A: Regd. 01-60	Lab Block 1st Floor (NLB-105)	Group-I (01-30) Group-II (31-60)
	Sec-B: Regd. 61-105 & LE	Lab Block 1st Floor (NLB-108)	Group-III (61-90) Group-IV (91-105 & LE)
B.Pharm 7th Sem.	No Section	Animal House Block 2nd Floor	Group-I (01-30) Group-II (31-60) Group-III (61-90) Group-IV (91-105 & LE)
M.Pharm 1st Sem.		Old PG Block (Respective Dept.)	
M.Pharm 3rd Sem.		Old PG Block (Respective Dept.)	

Lab. No.	Name of the Laboratory & Location
Lab-1	Research Lab. (Old Lab Block Ground Floor)
Lab-2	Pharmaceutics Lab. (Old Lab Block Ground Floor)
Lab-3	Microbiology Lab. (Old Lab Block 1st Floor)
Lab-4	Pharmacology Lab. (Old Lab Block 1st Floor)
Lab-5	Pharmacognosy Lab. (Old Lab Block 2nd Floor)
Lab-6	Pharmacognosy Lab. (Old Lab Block 2nd Floor)
Lab-7	Machine Room (New Lab Block Ground Floor)
Lab-8	PG Pharmaceutics Lab. (New Lab Block Ground Floor)
Lab-9	Instrument Room (New Lab Block Ground Floor)
Lab-10	PG Pharma. Analysis Lab.(New Lab Block Ground Floor)
Lab-11	Pharma. Chemistry Lab. (New Lab Block 1st Floor)
Lab-12	Pharma. Analysis Lab. (New Lab Block 1st Floor)
Lab-13	Pharma. Chemistry Lab. (New Lab Block 1st Floor)
Lab-14	Pharma. Chemistry Lab.(New Lab Block 1st Floor)
Lab-15	Pharmacology Lab. (New Lab Block 2nd Floor)
Lab-16	Pharmaceutics Lab.(New Lab Block 2nd Floor)
Lab-17	Pharma. Chemistry Lab. (PG Lab Block 1st Floor)
Lab-18	Pharmaceutics Lab. (PG Lab Block 2nd Floor)
Lab-19	Pharma. Analysis Lab. (PG Lab Block 2nd Floor)
Lab-20	Computer Lab. (Library Block Ground Floor)

Dr. B. Mishra
Time Table I/C

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INSTITUTE OF PHARMACY & TECHNOLOGY, SALIPUR, CUTTACK.

Time Table for D.Pharm Part-I & Part-II, B.Pharm 3rd, 5th & 7th Semester and M.Pharm 3rd Semester w.e.f. 05.12.2022

TIME/ DAY	Class	9:00 am- 10:00 am	10:00 am- 11:00 am	11:00 am- 12:00 noon	12:00 noon- 1:00 pm	1:00 pm- 2:00 pm	2:00 pm- 3:00 pm	3:00 pm- 4:00 pm	4:00 pm- 5:00 pm
MON	D.Ph-I		Ph.ceutics-I/SP	Ph.Chem-I/SKS	Soc.Pharm./SJP	RECESS	Ph.ceutics-I Pr./Gr.-I/ Lab 2/SP & Soc. Pharmacy Pr./Gr.-II/ Lab-16/SJP		
	D.Ph-II		DSBM/BKN	Ph.col_Tox./AKS	HCP/PKS.		Ph.col_Tox. Pr./Gr.-II/Lab-4/BM(12.00PM-4.00PM) & HCP Pr./Gr.-I/Lab-1/PKS (2.00PM-4.00PM)		
	B.Ph-III_A		Phy.Pharm-I Pr./Gr.-I/ Lab-8/BSM & Ph.Micro. Pr./Gr.-II/ Lab-3/AKP				Phy.Pharm.I/BSM	Ph.Microb./AKP	Pharm.Eng./SKB
	B.Ph-III_B		Ph.Engg. Pr./Gr.-II/ Lab-2/SKB & Ph.Org.Chem-II Pr./Gr.-IV/ Lab-13/MKS				Pharm.Eng./SKB	Phy.Pharm-I/BSM	Ph.Microb./AKP
	B.Ph-V_A		Ind. Pharm.I/ACS	Ph. Juris/BM	Ph. Cog. Phytoc./SD				
	B.Ph-V_B		Ph. Cog. Phytoc./SD	Ind. Pharm.I/ACS	Ph. Juris/BM		Ind. Pharmacy-I Pr./Gr.-II/ Lab-8/BRM & Ph. Cog. Phytoc. Pr./Gr.-IV/ Lab-6/DKH		
	B.Ph-VII		NDDS/SJP	Inst.Math.Ana./SKP	Pharm Practice/SP		Practice School/All Groups		
	M.Ph-III			Res.Meth./SKK					
TUE	D.Ph-I		HAP/RKG	Soc.Pharm./SJP	Ph.ceutics-I/SKB		Ph.chemistry I Pr./Gr.-I/ Lab-11/SKS & HAP Pr./Gr.-II/ Lab-15/RKG		
	D.Ph-II		Ph.chemistry-II/SSK	Ph.col_Tox./BM	DSBM/MKS		Ph.chemistry II Pr./Gr.-II/ Lab-14/SSK & Ph.ceutics II Pr./Gr.-I/ Lab-2/SKB		
	B.Ph-III_A						Ph.Microb./AKP	Ph.Org.Chem-II/MB	Phy.Pharm.I/PKS.
	B.Ph-III_B		Phy.Pharm-IV./Gr.-II/ Lab-8/PKS. & Ph.Engg. Pr./Gr.-IV/ Lab-2/BSN				Phy.Pharm.I/PKS.	Ph.Microb./AKP	Ph.Org.Chem-II/MB
	B.Ph-V_A		Ph.cology-II/AKS	Ph. Cog. Phytoc./SD	Ind. Pharm.I/BRM		Ph. Cog. Phytoc. Pr./Gr.-I/ Lab-5/SD		
	B.Ph-V_B		Ind. Pharm.I/BRM	Ph.cology-II/AKS	Ph. Cog. Phytoc./SD		Ph.cology-I Pr./Gr.-II/ Lab-4/AKS & Ind. Pharmacy-I Pr./Gr.-IV/ Lab-8/BRM		
	B.Ph-VII		NDDS/BSM	Pharm Practice/CSB			Inst.Math.Ana. Pr./Gr-II/Lab-10/BB & Practice School/Gr-I & II		
	M.Ph-III			Res.Meth./SKK					
WED	D.Ph-I		Soc.Pharm./BKN	Ph.Chem-I/HKS	HAP/RKG	REC	Ph.ceutics-I/SP	Ph.cognosy/SD	
	D.Ph-II		Ph.chemistry-II/SSK	Ph.ceutics-II/SKB	HCP/ACS				
	B.Ph-III_A		Ph.Org.Chem-II Pr./Gr.-I/ Lab-13/MB				Pharm.Eng./SKB	Phy.Pharm-I/PKS.	
	B.Ph-III_B	Comm. Skills. LE/SB	Ph.Micro. Pr./Gr.-II/ Lab 3/AKP & Phy.Pharm-I Pr./Gr.-IV/ Lab-8/PKS.				Phy.Pharm.I/PKS.	Pharm.Eng./SKB	
	B.Ph-V_A		Ph.cology-II/AKS	Ph. Juris/BM	Med. Chem-II/SKS		Ph.cology-I Pr./Gr.-I/ Lab-4/AKS & Ind. Pharmacy-I Pr./Gr.-II/ Lab-8/ACS		
	B.Ph-V_B		Med. Chem-II/SKS	Ph.cology-II/AKS	Ph. Juris/BM				
	B.Ph-VII		Ind. Pharm.II/BSN	Inst.Math.Ana./BB	NDDS/BSM		Practice School/All Groups		
	M.Ph-III				Res.Meth./BSN				

Dr. B. Mishra
Time Table I/C

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INSTITUTE OF PHARMACY & TECHNOLOGY, SALIPUR, CUTTACK.

Time Table for D.Pharm Part-I & Part-II, B.Pharm 3rd, 5th & 7th Semester and M.Pharm 3rd Semester w.e.f. 05.12.2022

TIME/ DAY	Class	9:00 am- 10:00 am	10:00 am- 11:00 am	11:00 am- 12:00 noon	12:00 noon- 1:00 pm	1:00 pm- 2:00 pm	2:00 pm- 3:00 pm	3:00 pm- 4:00 pm	4:00 pm- 5:00 pm
THUR	D.Ph-I		Ph.Chem-I/SSK	Ph.cognosy/SD	Soc.Pharm./BKN	E S S	Ph.cognosy Pr./Gr.-I/ Lab-5/SD & Ph.ceutics-I Pr./Gr.-II/ Lab-3/SP		
	D.Ph-II		Ph.ceutics-II/BSM	Ph.Juris/SJP	Ph.col_Tox./BM		HCP Pr./Gr-II/Lab-1/ACS(1.00PM-4.00PM) & Ph.col_Tox. Pr./Gr.-I/Lab-4/BM(1.00PM-4.00PM)		
	B.Ph-III_A		Ph.Engg. Pr./Gr.-I/ Lab-2/BSN & Ph.Org.Chem-II Pr./Gr.-II/ Lab-13/MB				Ph.Org.Chem-II/HKS	Pharm.Eng./SKB	
	B.Ph-III_B						Pharm.Eng./SKB	Ph.Org.Chem-II/HKS	
	B.Ph-V_A		Med. Chem-II/SKS	Ph.cology-II/CSB	Ind. Pharm.I/ACS		Ph. Cog. Phytoc./DKH	Ph. Juris/BSM	
	B.Ph-V_B		Ph.cology-II/CSB	Ind. Pharm.I/ACS	Med. Chem-II/SKS		Ph. Juris/BSM	Ph. Cog. Phytoc./DKH	
	B.Ph-VII		NDDS/BRM	Ind. Pharm.II/SKM			Inst.Meth.Ana. Pr./Gr-I/Lab-10/SKP & Practice School/Gr-III & IV		
	M.Ph-III		Bas.Meth./HKS						
FRI	D.Ph-I		Ph.Chem-I/SKS	HAP/RKG	Ph.cognosy/SD	R E C E S S	Soc. Pharmacy Pr./Gr.-I/ Lab-16/SJP & Ph.chemistry-I Pr./Gr.-II/ Lab-11/SKS		
	D.Ph-II		HCP/PKS.	Ph.ceutics-II/SKB	Ph.chemistry-II/SKS		Ph.chemistry-II Pr./Gr.-I/ Lab-14/SSK & Ph.ceutics-II Pr./Gr.-II/ Lab-2/BSM		
	B.Ph-III_A		Ph.Micro. Pr./Gr.-I/ Lab-3/AKP & Phy.Pharm-I Pr./Gr.-II/ Lab-8/BSM				Ph.Org.Chem-II/MB	Ph.Microb./AKP	Pharm.Eng./BSN
	B.Ph-III_B						Pharm.Eng./BSN	Ph.Org.Chem-II/MB	Ph.Microb./AKP
	B.Ph-V_A		Ph.cology-II/AKS	Ph. Juris/BM	Med. Chem-II/SSK		Ind. Pharmacy-I Pr./Gr.-I/ Lab-8/ACS & Ph. Cog. Phytoc. Pr./Gr.-II/ Lab-5/SD		
	B.Ph-V_B		Med. Chem-I/SSK	Ph.cology-II/AKS	Ph. Juris/BM		Ph.cology-I Pr./Gr.-IV/ Lab-4/BM		
	B.Ph-VII		Inst.Meth.Ana./SKP	Pharm Practice/SP	Ind. Pharm.II/PKS.		Inst.Meth.Ana. Pr./Gr-IV/Lab-10/BB & Practice School/Gr-I & II		
	M.Ph-III								
SAT	D.Ph-I		Ph.ceutics-I/SP	HAP/RKG	Ph.cognosy/SD		HAP Pr./Gr.-I/ Lab-15/RKG & Ph.cognosy Pr./Gr.-II/ Lab-5/SD		
	D.Ph-II		DSBM/BKN	Ph.Juris/SJP	Ph.chemistry-II/SSK				
	B.Ph-III_A		Ph.Engg. Pr./Gr.-II/ Lab-2/SKB				Ph.Microb./AKP	Ph.Org.Chem-II/MB	Phy.Pharm.I/BSM
	B.Ph-III_B		Ph.Org.Chem-II Pr./Gr.-III/ Lab-13/SKS & Ph.Micro. Pr./Gr.-IV/ Lab-3/AKP				Ph.Org.Chem-II/MB	Phy.Pharm.I/BSM	Ph.Microb./AKP
	B.Ph-V_A		Ph. Cog. Phytoc./DKH	Ind. Pharm.I/ACS	Med. Chem-II/SKS		Ph.cology-I Pr./Gr.-II/ Lab-4/AKS		
	B.Ph-V_B		Med. Chem-I/SKK	Ph. Cog. Phytoc./DKH	Ind. Pharm.I/ACS		Ph. Cog. Phytoc. Pr./Gr.-III/ Lab-6/DKH		
	B.Ph-VII		Inst.Meth.Ana./SKP	Ind. Pharm.II/BSN	Pharm Practice/CSB		Inst.Meth.Ana. Pr./Gr-II/Lab-10/SKP & Practice School/Gr-III & IV		
	M.Ph-III								

Dr. B. Mishra
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INSTITUTE OF PHARMACY & TECHNOLOGY, SALIPUR, CUTTACK.

Time Table for D.Pharm Part-I & Part-II, B.Pharm 3rd, 5th & 7th Semester and M.Pharm 3rd Semester w.e.f. 05.12.2022

TIME/ DAY	Class	9:00 am- 10:00 am	10:00 am- 11:00 am	11:00 am- 12:00 noon	12:00 noon- 1:00 pm	1:00 pm- 2:00 pm	2:00 pm- 3:00 pm	3:00 pm- 4:00 pm	4:00 pm- 5:00 pm

Abbreviation

SKM: Dr. Santosh Kumar Mahapatra
SKK: Dr. Sunil Kumar Karungo
BRM: Dr. Biswa Ranjan Mohanty
PKSM: Dr. Prabir Kumar Sinhamahapatra
SKP: Dr. Sarada Kumar Patro
MB: Dr. Mrutyunjay Banerjee
BSN: Dr. Bhabani Shankar Nayak
SKB: Dr. Susanta Kumar Behera
AKS: Dr. Aswini Kumar Senapati
AKP: Dr. Amiya Kumar Prusty
RKG: Dr. Ranjan Kumar Giri
CSB: Dr. Chandra Sekhar Bank
BM: Dr. Bishwanath Mishra
MKS: Dr. Minaketan Sahoo

ACS: Dr. Amalesh Chandra Sahoo
SD: Dr. Sujit Dash
HKS: Dr. H.K. Sundeep Kumar Nayak
PKS: Dr. Prabhat Kumar Sahoo
SP: Mr. Swalin Parija
SS: Dr. Sujit Kumar Saha
DKH: Mr. Deepak Kumar Hati
BB: Mrs. Biswsha Behera
BSM: Dr. Bibaswan Mishra
SSK: Dr. Sidhartha Shankar Kar
SJP: Dr. Satyajit Panda
BKN: Mr. Biraj Kumar Nayak
SB: Mr. Saroj Kumar Behera
SS: Dr. Sakuntala Swain

Class	Theory Section	Class Rooms	Practical Group
D.Pharm 1st Year	No Section	Academic Block 1st Floor (LH-II)	Group-I (01-30)
			Group-II (31-60)
D.Pharm 2nd Year	No Section	Academic Block 1st Floor (LH-I)	Group-I (01-30)
			Group-II (31-onwards)
B.Pharm 3rd Sem.	Sec-A: Regd. 01-60	Lab Block 2nd Floor (NLB-205)	Group-I (01-30)
			Group-II (31-60)
	Sec-B: Regd. 61-105 & LE	Lab Block 2nd Floor (NLB-208)	Group-III (61-90)
			Group-IV (91-105 & LE)
B.Pharm 5th Sem.	Sec-A: Regd. 01-60	Lab Block 1st Floor (NLB-105)	Group-I (01-30)
			Group-II (31-60)
	Sec-B: Regd. 61-105 & LE	Lab Block 1st Floor (NLB-108)	Group-III (61-90)
			Group-IV (91-105 & LE)
B.Pharm 7th Sem.	No Section	Animal House Block 2nd Floor	Group-I (01-30)
			Group-II (31-60)
			Group-III (61-90)
			Group-IV (91-105 & LE)
M.Pharm 3rd Sem.		Old PG Block (Respective Dept.)	

Lab. No.	of the Laboratory & Location
Lab-1	Research Lab. (Old Lab Block Ground Floor)
Lab-2	Pharmaceutics Lab. (Old Lab Block Ground Floor)
Lab-3	Microbiology Lab. (Old Lab Block 1st Floor)
Lab-4	Pharmacology Lab. (Old Lab Block 1st Floor)
Lab-5	Pharmacognosy Lab. (Old Lab Block 2nd Floor)
Lab-6	Pharmacognosy Lab. (Old Lab Block 2nd Floor)
Lab-7	Machine Room (New Lab Block Ground Floor)
Lab-8	PG Pharmaceutics Lab. (New Lab Block Ground Floor)
Lab-9	Instrument Room (New Lab Block Ground Floor)
Lab-10	PG Pharma. Analysis Lab (New Lab Block Ground Floor)
Lab-11	Pharma. Chemistry Lab. (New Lab Block 1st Floor)
Lab-12	Pharma. Analysis Lab. (New Lab Block 1st Floor)
Lab-13	Pharma. Chemistry Lab. (New Lab Block 1st Floor)
Lab-14	Pharma. Chemistry Lab. (New Lab Block 1st Floor)
Lab-15	Pharmacology Lab. (New Lab Block 2nd Floor)
Lab-16	Pharmaceutics Lab (New Lab Block 2nd Floor)
Lab-17	Pharma. Chemistry Lab. (PG Lab Block 1st Floor)
Lab-18	Pharmaceutics Lab. (PG Lab Block 2nd Floor)
Lab-19	Pharma. Analysis Lab. (PG Lab Block 2nd Floor)
Lab-20	Computer Lab

Dr. B. Mishra
Time Table I/C

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Institute of Pharmacy & Technology
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INSTITUTE OF PHARMACY & TECHNOLOGY, SALIPUR, CUTTACK.

Interim Time Table for D.Pharm Part-II w.e.f. 06.12.2022

TIME/ DAY	Class	10:00 am-11:00 am	11:00 am-12:00 noon	12:00 noon-1:00 pm	1:00 pm-2:00 pm	2:00 pm- 3:00 pm	3:00 pm- 4:00 pm	4:00 pm- 5:00 pm
MON	D.Ph II	DSBM/BKN	Ph.col. Tox /AKS	HCP/PKS	R	Ph.ceutics-II/BSN	Ph.col_Tox./CSB	
TUE	D.Ph II	Ph.chemistry II/SSK	Ph.col. Tox./BM	DSBM/MKS	E	Ph.ceutics-II/BSN	HCP/SP	
WED	D.Ph II	Ph.chemistry II/SSK	Ph.ceutics-II/SKB	HCP/ACS	C	Ph.ceutics-II/BRM	Ph.col_Tox./CSB	
THUR	D.Ph II	Ph.ceutics II/BSM	Ph.Juris/SJP	Ph.col_Tox /BM	E	Ph.col_Tox./RKG	DSBM/BKN	
FRI	D.Ph II	HCP/PKS	Ph.ceutics II/SKB	Ph.chemistry II/SKS	S	Ph.col_Tox./RKG	HCP/SP	
SAT	D.Ph II	DSBM/BKN	Ph.Juris/SJP	Ph.chemistry II/SSK	S	Ph.ceutics-II/BRM	DSBM/BKN	

Abbreviation

BRM: Dr. Biswa Ranjan Mohanty
BSN: Dr. Bhabani Shankar Nayak
SKB: Dr. Susanta Kumar Behera
AKS: Dr. Ananta Kumar Sahapati
RKG: Dr. Ranjan Kumar Giri
CSB: Dr. Chandra Sekhar Barik
BM: Dr. Biswanath Mishra
MKS: Dr. Minakshi Sahoo
ACS: Dr. Amaresh Chandra Sahoo
PKS: Dr. Prabhat Kumar Sahoo
SP: Mr. Swathi Parija
SS: Dr. Sujit Kumar Sahu
BSM: Dr. Bibaswari Mishra
SSK: Dr. Sidhartha Shankar Kar
SJP: Dr. Satyajit Parida
BKN: Mr. Biraj Kumar Nayak

Dr. B. Mishra
Time Table I/C

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INSTITUTE OF PHARMACY & TECHNOLOGY, SALIPUR, CUTTACK.

Time Table for B.Pharm 1st Semester and M.Pharm 1st Semester for the session 2022-23 w.e.f 20.02.2023

Tentative

TIME/ DAY	Class	9:00 am- 10:00 am	10:00 am- 11:00 am	11:00 am- 12:00 noon	12:00 noon- 1:00 pm	1:00 pm- 2:00 pm	2:00 pm- 3:00 pm	3:00 pm- 4:00 pm	4:00 pm- 5:00 pm
MON	B.Ph-I_A	Comm. Skills/SB	HAP-I Pr./Gr.-I/ Lab-15/CSB & Ph.Ino.Chem. Pr./Gr.-II/ Lab-14/PKSM				HAP-I/BRG	Ph Analysis-I/BR	Ph.Ing Chem./MKS
	B.Ph-I_B		Ph.Analysis-I Pr./Gr.-III/ Lab-12/BB & Rem. Bio Pr./Gr.-IV/ Lab-5/DKH (10am to 12 pm)				Ph.Ing.Chem./MKS	HAP-I/BRG	Ph. Analysis-I/BR
	M.Ph-I_PCeu		Pharmaceutics Pr./ Lab-18/BSN			R	Pharmaceutics Pr./ Lab-18/BSN		
	M.Ph-I_PChm		Ph. Chemistry Pr./ Lab-10/SSK			E	Ph. Chemistry Pr./ Lab-10/SSK		
	M.Ph-I_PA		Ph. Analysis Pr./ Lab-10/SSK			C	Ph. Analysis Pr./ Lab-10/SSK		
TUE	B.Ph-I_A		Ph.Ino.Chem. Pr./Gr.-I/ Lab-14/PKSM & Ph.ceutics-I Pr./Gr.-II/ Lab-16/SP			E	HAP-I/CSB	Ph.Ing.Chem./PKSM	Ph.Ceutics-I/SP
	B.Ph-I_B	Comm. Skill Pr./Gr.-III & IV/ AHCL/SB		Rem. Math./SS	Rem. Math./SS	S	Ph.Ceutics-I/SP	HAP-I/CSB	Ph.Ing Chem./PKSM
	M.Ph-I_PCeu			MAT/SKP	DDS/ACS	S	Reg. Aff./BSN		
	M.Ph-I_PChm		AMC/SKS		AQC-I/SSK		CNP/HKS		
	M.Ph-I_PA		Food Ana./MKS		Ph. Valid./BB		APA/SKP		
WED	B.Ph-I_A		Ph.Analysis-I Pr./Gr.-I/ Lab-12/MKS & Rem. Bio Pr./Gr.-II/ Lab-5/DKH (10am to 12 pm)				Rem. Biology/DKH	Ph.Analysis-I/MKS	Ph.Ing Chem./PKSM
	B.Ph-I_B	Comm. Skills/SB	HAP-I Pr./Gr.-III/ Lab-15/CSB & Ph.ceutics-I Pr./Gr.-IV/ Lab-16/SJP				Ph.Analysis-I/MKS	Ph./Ing.Chem./PKSM	Rem. Biology/DKH
	M.Ph-I_PCeu		Pharmaceutics Pr./ Lab-18/BRM			R	Pharmaceutics Pr./ Lab-18/BRM		
	M.Ph-I_PChm		Ph. Chemistry Pr./ Lab-17/SKK			E	Ph. Chemistry Pr./ Lab-17/SRR		
	M.Ph-I_PA		Ph. Analysis Pr./ Lab-10/SKP			C	Ph. Analysis Pr./ Lab-10/SKP		
THUR	B.Ph-I_A	Comm. Skills/SB	Ph.ceutics-I Pr./Gr.-I/ Lab-16/SP & Ph.Analysis-I Pr./Gr.-II/ Lab-12/MKS			E	HAP-I/BRG	Ph.Analysis-I/BR	Ph.Ceutics-I/SP
	B.Ph-I_B		Rem. Bio Pr./Gr.-III/ Lab-5/DKH (10am to 12 pm) & HAP-I Pr./Gr.-IV/ Lab-15/BRG			S	Ph.Ceutics-I/SP	HAP-I/BRG	Ph.Analysis-I/BR
	M.Ph-I_PCeu		MAT/SKP			S	Reg. Aff./BRM	DDS/BSN	Med. Pharm./PKS
	M.Ph-I_PChm			AMC/SKK	CNP/PKSM		AMC/SSK	AQC-I/MB	
	M.Ph-I_PA			Ph. Valid./BB	APA/SKP			Food Ana./MKS	
FRI	B.Ph-I_A		Rem. Bio Pr./Gr.-I/ Lab-5/DKH (10am to 12 pm) & HAP-I Pr./Gr.-II/ Lab-15/CSB				HAP-I/CSB	Ph.Ceutics-I/SP	Rem. Biology/DKH
	B.Ph-I_B	Comm. Skills/SB	Ph.ceutics-I Pr./Gr.-III/ Lab-16/SJP & Ph.Ino.Chem. Pr./Gr.-IV/ Lab-14/HKS				Rem. Biology/DKH	HAP-I/CSB	Ph.Ceutics-I/SP
	M.Ph-I_PCeu		MAT/PKSM	Reg. Aff./SKM	DDS/ACS	R	Med. Pharm./BRM		
	M.Ph-I_PChm			AQC-I/MB	AMC/SRR	E	CNP/HKS		
	M.Ph-I_PA			Ph. Valid./BB	APA/SKP	C		Food Ana./MKS	
SAT	B.Ph-I_A	Comm. Skill Pr./Gr.-I & II/ AHCL/SB		Rem. Math./SS	Rem. Math./SS	E	Ph.Ing.Chem./SKS	Ph.Analysis-I/MKS	Ph.Ceutics-I/SJP
	B.Ph-I_B		Ph.Ino.Chem. Pr./Gr.-III/ Lab-14/HKS & Ph.Analysis-I Pr./Gr.-IV/ Lab-12/BB			S	Ph.Ceutics-I/SJP	Ph./Ing.Chem./SKS	Ph.Analysis-I/MKS
	M.Ph-I_PCeu		MAT/PKSM	Med. Pharm./BRM		S	DDS/BSN	Reg. Aff./BRM	Med. Pharm./SP
	M.Ph-I_PChm			AQC-I/SSK			CNP/HKS		
	M.Ph-I_PA			Food Ana./MKS	APA/SKP		Ph. Valid./BB		

Dr. B. Mishra
Time Table I/C

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INSTITUTE OF PHARMACY & TECHNOLOGY, SALIPUR, CUTTACK.

Time Table For B Pharm 1st Semester and M Pharm 1st Semester for the session 2021-22 w.e.f. 01.01.2022

TIME / DAY	Class	9.00 am - 10.00 am	10.00 am - 11.00 am	11.00 am - 12.00 pm	Lunch 12.00 - 1.00 pm	1.00 pm - 2.00 pm	2.00 pm - 3.00 pm	3.00 pm - 4.00 pm	4.00 pm - 5.00 pm

Abbreviation

Class	Theory Section	Class Rooms	Practical Group
B Pharm 1st Sem	Sec A Roll no. to Sec B Roll no. to	Animal House Block 1st Floor Animal House Block 2nd Floor	Group I (01 to) Group II (01 to) Group III (01 to)
M Pharm 1st Sem		Old Pg Block (Pharm Pra Dept.)	

Lab No	Name of the Laboratory & Location
Lab 1	Pharmacy Lab. (Old Lab Block Ground Floor)
Lab 2	Pharmaceutics Lab. (Old Lab Block Ground Floor)
Lab 3	Microbiology Lab. (Old Lab Block 1st Floor)
Lab 4	Pharmacology Lab. (Old Lab Block 1st Floor)
Lab 5	Pharmacognosy Lab. (Old Lab Block 2nd Floor)
Lab 6	Pharmacognosy Lab. (Old Lab Block 2nd Floor)
Lab 7	Medical Room (New Lab Block Ground Floor)
Lab 8	PG Pharmaceutics Lab. (New Lab Block Ground Floor)
Lab 9	Instrument Room (New Lab Block Ground Floor)
Lab 10	PG Pharma Analysis Lab. (New Lab Block Ground Floor)
Lab 11	Pharma Chemistry Lab. (New Lab Block 1st Floor)
Lab 12	Pharma Analysis Lab. (New Lab Block 1st Floor)
Lab 13	Pharma Chemistry Lab. (New Lab Block 1st Floor)
Lab 14	Pharma Chemistry Lab. (New Lab Block 1st Floor)
Lab 15	Pharmacology Lab. (New Lab Block 2nd Floor)
Lab 16	Pharmaceutics Lab. (New Lab Block 2nd Floor)
Lab 17	Pharma Chemistry Lab. (PG Lab Block 1st Floor)
Lab 18	Pharmaceutics Lab. (PG Lab Block 2nd Floor)
Lab 19	Pharma Analysis Lab. (PG Lab Block 2nd Floor)
Lab 20	Computer Lab.

Dr. B. Mishra
Time Table I/C

Principal
Institute of Pharmacy & Technology
Salipur, Dist Cuttack, 754202, Odisha

INSTITUTE OF PHARMACY & TECHNOLOGY, SALIPUR, CUTTACK.

Time Table for B.Pharm 1st Semester and M.Pharm 1st Semester for the session 2022-23 w.e.f 20.02.2023

Tentative

Class	9:00 am- 10:00 am	10:00 am- 11:00 am	11:00 am- 12:00 noon	12:00 noon- 1:00 pm	1:00 pm- 2:00 pm	2:00 pm- 3:00 pm	3:00 pm- 4:00 pm	4:00 pm- 5:00 pm

Abbreviation

MKM: Dr. Santosh Kumar Mahapatra
SKK: Dr. Sunil Kumar Kanungo
BKM: Dr. Biswa Ranjan Mohanty
PKSM: Dr. Prabir Kumar Somamahapatra
SKP: Dr. Sarojo Kumar Patro
MB: Dr. Mrutyunjay Banerjee
BSN: Dr. Bhabani Shankar Nayak
SKB: Dr. Susanta Kumar Behera
AKS: Dr. Aswini Kumar Senapati
AKP: Dr. Amiya Kumar Pruthi
RKG: Dr. Ranjan Kumar Giri
CSB: Dr. Chandra Sekhar Barik
BM: Dr. Bishwanath Mishra
MKS: Dr. Mrinalekan Sahoo

ACS: Dr. Amaresh Chandra Sahoo
SD: Dr. Sujit Dash
HKS: Dr. H.K. Sundeep Kumar Nayak
PKS: Dr. Prashnjit Kumar Sahoo
SP: Dr. Swakir Panja
SS: Dr. Sujit Kumar Sahu
DKH: Mr. Deepak Kumar Hati
BB: Mrs. Basanta Behera
BSM: Dr. Bibaswan Mishra
SSK: Dr. Sidhartha Shankar Kar
SJP: Dr. Sanjeet Panda
BKN: Mr. Biraj Kumar Nayak
SB: Mr. Saroj Kumar Behera
SS: Dr. Sakuntala Swain

Class	Theory Section	Class Rooms	Practical Group
B.Pharm 1st Sem.	Sec-A, Roll 01-60	Animal House Block 1st Floor	Group-I (01-30)
			Group-II (31-60)
	Sec-B, Roll 61-105	Animal House Block 2nd Floor	Group-III (61-90)
			Group-IV (91-105)
M.Pharm 1st Sem.		Old PG Block (Respective Dept.)	

Lab. No.	Name of the Laboratory & Location
Lab-1	Research Lab. (Old Lab Block Ground Floor)
Lab-2	Pharmaceutics Lab. (Old Lab Block Ground Floor)
Lab-3	Microbiology Lab. (Old Lab Block 1st Floor)
Lab-4	Pharmacology Lab. (Old Lab Block 1st Floor)
Lab-5	Pharmacognosy Lab. (Old Lab Block 2nd Floor)
Lab-6	Pharmacognosy Lab. (Old Lab Block 2nd Floor)
Lab-7	Machine Room (New Lab Block Ground Floor)
Lab-8	PG Pharmaceutics Lab. (New Lab Block Ground Floor)
Lab-9	Instrument Room (New Lab Block Ground Floor)
Lab-10	PG Pharma. Analysis Lab (New Lab Block Ground Floor)
Lab-11	Pharma. Chemistry Lab. (New Lab Block 1st Floor)
Lab-12	Pharma. Analysis Lab. (New Lab Block 1st Floor)
Lab-13	Pharma. Chemistry Lab. (New Lab Block 1st Floor)
Lab-14	Pharma. Chemistry Lab.(New Lab Block 1st Floor)
Lab-15	Pharmacology Lab. (New Lab Block 2nd Floor)
Lab-16	Pharmaceutics Lab.(New Lab Block 2nd Floor)
Lab-17	Pharma. Chemistry Lab. (PG Lab Block 1st Floor)
Lab-18	Pharmaceutics Lab. (PG Lab Block 2nd Floor)
Lab-19	Pharma. Analysis Lab. (PG Lab Block 2nd Floor)
Lab-20	Computer Lab.

Dr. B. Mishra
Time Table I/C

Principal
IPT, Salipur
Institute of Pharmacy & Technology
Salipur, Dist-Cuttack-754202, Odish

INSTITUTE OF PHARMACY & TECHNOLOGY, SALIPUR, CUTTACK.

Time Table for B.Pharm 1st & 8th Semester and M.Pharm 1st Semester for the session 2022-23 w.e.f 20.03.2023

TIME/ DAY	Class	9:00 am- 10:00 am	10:00 am- 11:00 am	11:00 am- 12:00 noon	12:00 noon- 1:00 pm	1:00 pm- 2:00 pm	2:00 pm- 3:00 pm	3:00 pm- 4:00 pm	4:00 pm- 5:00 pm
MON	B.Ph-I_A	Comm. Skills/SB	HAP-I Pr./Gr.-I/ Lab-15/CSB & Ph.Ino.Chem. Pr./Gr.-II/ Lab-14/PKSM				HAP-I/RKG	Ph.Analysis-I/BB	Ph.Ing Chem./HKS
	B.Ph-I_B		Ph.Analysis-I Pr./Gr.-III/ Lab-12/BB & Rem. Biology Pr./Gr.-IV/ Lab-6/DKH				Ph.Ing Chem./HKS	HAP-I/RKG	Ph.Analysis-I/BB
	B.Ph-VIII		Bios_Res.Meth./SJP	Ph.Mark.Mang./SKM	Cosmetic Science/SP		Project Work for all students		
	M.Ph-I_PCeu		Pharmaceutics Pr./ Lab-18/BSN				Pharmaceutics Pr./ Lab-18/BSN		
	M.Ph-I_PChm		Ph. Chemistry Pr./ Lab-10/SSK				Ph. Chemistry Pr./ Lab-10/SSK		
	M.Ph-I_PA		Ph. Analysis Pr./ Lab-10/SSK				Ph. Analysis Pr./ Lab-10/SSK		
TUE	B.Ph-I_A		Ph.Ino.Chem. Pr./Gr.-I/ Lab-14/PKSM & Ph.ceutics-I Pr./Gr.-II/ Lab-16/SP				HAP-I/CSB	Ph.Ing Chem./PKSM	Ph.Ceutics-I/SP
	B.Ph-I_B	Comm. Skill Pr./Gr.-III & IV/ AHCL/SB		Rem. Math./SS	Rem. Math./SS		Ph.Ceutics-I/SP	HAP-I/CSB	Ph.Ing Chem./PKSM
	B.Ph-VIII		Ph.Mark.Mang./BSM	Soc. Prev. Pharm/CSB	Bios_Res.Meth./HKS		Project Work for all students		
	M.Ph-I_PCeu		Reg. Aff./BRM	MAT/SKP	QDS/ACS		Reg. Aff./BSN		
	M.Ph-I_PChm		AMC/SKS		AQC-I/SSK		CNP/HKS		
	M.Ph-I_PA		Food Ana./MKS		Ph. Valid./BB		APA/SKP		
WED	B.Ph-I_A		Ph.Analysis-I Pr./Gr.-I/ Lab-12/MKS & Rem. Biology Pr./Gr.-II/ Lab-5/DKH				Rem. Biology/DKH	Ph.Analysis-I/MKS	Ph.Ing Chem./PKSM
	B.Ph-I_B	Comm. Skills/SB	HAP-I Pr./Gr.-III/ Lab-15/CSB & Ph.ceutics-I Pr./Gr.-IV/ Lab-16/SJP				Ph.Analysis-I/MKS	Ph.Ing Chem./PKSM	Rem. Biology/DKH
	B.Ph-VIII		Soc. Prev. Pharm/AKS	Bios_Res.Meth./BSN	Ph.Mark.Mang./BSM		Project Work for all students		
	M.Ph-I_PCeu		Pharmaceutics Pr./ Lab-18/BRM				Pharmaceutics Pr./ Lab-18/BRM		
	M.Ph-I_PChm		Ph. Chemistry Pr./ Lab-17/SKK				Ph. Chemistry Pr./ Lab-17/SKK		
	M.Ph-I_PA		Ph. Analysis Pr./ Lab-10/SKP				Ph. Analysis Pr./ Lab-10/SKP		

RECESS

Dr. B. Mishra
Time Table I/C

Principal
Institute of Pharmacy & Technology
Salipur, Dist-Cuttack

INSTITUTE OF PHARMACY & TECHNOLOGY, SALIPUR, CUTTACK.

Time Table for B.Pharm 1st & 8th Semester and M.Pharm 1st Semester for the session 2022-23 w.e.f 20.03.2023

TIME/ DAY	Class	9:00 am- 10:00 am	10:00 am- 11:00 am	11:00 am- 12:00 noon	12:00 noon- 1:00 pm	1:00 pm- 2:00 pm	2:00 pm- 3:00 pm	3:00 pm- 4:00 pm	4:00 pm- 5:00 pm
THUR	B.Ph-I_A	Comm. Skills/SB	Ph.ceutics-I Pr./Gr.-I/ Lab-16/SP & Ph.Analysis-I Pr./Gr.-II/ Lab-12/MKS			E	HAP-I/RKG	Ph.Analysis-I/BB	Ph.Ceutics.I/SJP
	B.Ph-I_B		Rem. Biology Pr./Gr.-III/ Lab-5/DKH & & HAP-I Pr./Gr.-IV/ Lab-15/RKG			S	Ph.Ceutics.I/SJP	HAP-I/RKG	Ph.Analysis-I/BB
	B.Ph-VIII		Cosmetic Science/BRM	Soc. Prev. Pharm /AKS	Bios_Res.Meth./HKS	S	Project Work for all students		
	M.Ph-I_PCeu		MAT/SKP				Reg. Aff./BRM	DDS/BSN	Mod. Pharm./PKS
	M.Ph-I_PChm			AMC/SKK	CNP/PKSM		AMC/SSK	ADC-I/MB	
	M.Ph-I_PA			Ph. Valid./BB	APA/SKP			Food Ana./MKS	
FRI	B.Ph-I_A		Rem. Biology Pr./Gr.-I/ Lab-6/DKH & HAP-I Pr./Gr.-II/ Lab-15/CSB				HAP-I/CSB	Ph.Ceutics.I/SP	Rem. Biology/DKH
	B.Ph-I_B	Comm. Skills/SB	Ph.ceutics-I Pr./Gr.-III/ Lab-16/SJP & Ph.Ino.Chem. Pr./Gr.-IV/ Lab-14/HKS				Rem. Biology/DKH	HAP-I/CSB	Ph.Ceutics.I/SP
	B.Ph-VIII		Cosmetic Science/SP	Soc. Prev. Pharm/BM			Project Work for all students		
	M.Ph-I_PCeu	Mod. Pharm./BRM	MAT/PKSM	Reg. Aff./SKM	DDS/ACS				
	M.Ph-I_PChm			ADC-I/MB	AMC/SKK	R	CNP/HKS		
	M.Ph-I_PA			Ph. Valid./BB	APA/SKP	E		Food Ana./MKS	
SAT	B.Ph-I_A	Comm. Skill Pr./Gr.-I & II/ AHCI/SB		Rem. Math./SS	Rem. Math./SS	C	Ph.Ing.Chem./SKS	Ph.Analysis-I/MKS	Ph.Ceutics.I/SJP
	B.Ph-I_B		Ph.Ino.Chem. Pr./Gr.-III/ Lab-14/HKS & Ph.Analysis-I Pr./Gr.-IV/ Lab-12/BB			E	Ph.Ceutics.I/SJP	Ph.Ing.Chem./SKS	Ph.Analysis-I/MKS
	B.Ph-VIII		Ph.Mgnt.Mang./BSM	Cosmetic Science/SKB		S	Project Work for all students		
	M.Ph-I_PCeu		MAT/PKSM	Mod. Pharm./BRM		S	DDS/BSN	Mod. Pharm./SP	
	M.Ph-I_PChm			ADC-I/SSK			CNP/HKS		
	M.Ph-I_PA			Food Ana./MKS	APA/SKP		Ph. Valid./BB		

16/3/23

Dr. B. Mishra
Time Table I/C

16/3/23

Principal
Institute of Pharmacy & Technology
IPT, Salipur

INSTITUTE OF PHARMACY & TECHNOLOGY, SALIPUR, CUTTACK.

Time Table for B.Pharm 1st & 8th Semester and M.Pharm 1st Semester for the session 2022-23 w.e.f 20.03.2023

DAY / DAY	Class	8:00 am - 10:00 am	10:00 am - 11:00 am	11:00 am - 12:00 noon	12:00 noon - 1:00 pm	1:00 pm - 2:00 pm	2:00 pm - 3:00 pm	3:00 pm - 4:00 pm	4:00 pm - 5:00 pm

Abbreviation

SKM: Dr. Santosh Kumar Mahapatra
SKR: Dr. Sunil Kumar Ranajagi
BRM: Dr. Bima Ranjan Mohanty
PKSM: Dr. Prabir Kumar Sethi Mahapatra
SKP: Dr. Sanjay Kumar Patro
NM: Dr. Mrutyunjay Barangia
BSN: Dr. Bhabani Shankar Nayak
SKB: Dr. Susanta Kumar Behera
AKS: Dr. Awanish Kumar Srivastava
AKP: Dr. Amaya Kumar Pradhan
RKJ: Dr. Ranjan Kumar Jyoti
CSB: Dr. Chandra Sekhar Barik
BM: Dr. Brahmananda Mishra
MKS: Dr. Mrutunjaya Sahoo
ACS: Dr. Amarnath Chandra Sahoo
SD: Dr. Sujit Das
HKS: Dr. H.K. Satchidanand Kumar Nayak
PKS: Dr. Prabhat Kumar Sahoo
SP: Dr. Sasadhar Panga
SS: Dr. Sajit Kumar Sahu
DKH: Mr. Deepak Kumar Hati
RB: Mrs. Rupasha Behera
BSM: Dr. Bibhuprasad Mishra
SSA: Dr. Satheesha Shankar Adiga
SP: Dr. Satyajit Panda
BKN: Mr. Bijay Kumar Nayak
SB: Mr. Saroj Kumar Behera
SS: Dr. Sakuntala Swain

Class	Theory Section	Class Rooms	Practical Group
B.Pharm 1st Sem.	Sec. A Roll 01-60	Animal House Block 1st Floor	Group-I (01-30) Group-II (31-60)
	Sec. B Roll 61-120	Animal House Block 2nd Floor	Group-III (61-90) Group-IV (91-120)
B.Pharm 8th Sem.	Sec Section	Animal House Block 2nd Floor	
M.Pharm 1st Sem.		Old PG Block (Pharmaceutics Dept.)	

Lab. No.	Name of the Laboratory & Location
Lab-1	Research Lab. (Old Lab Block Ground Floor)
Lab-2	Pharmaceutics Lab. (Old Lab Block Ground Floor)
Lab-3	Microbiology Lab. (Old Lab Block 1st Floor)
Lab-4	Pharmacology Lab. (Old Lab Block 1st Floor)
Lab-5	Pharmacognosy Lab. (Old Lab Block 2nd Floor)
Lab-6	Pharmacognosy Lab. (Old Lab Block 2nd Floor)
Lab-7	Machine Room (New Lab Block Ground Floor)
Lab-8	(PG Pharmaceutics Lab. (New Lab Block Ground Floor)
Lab-9	Instrument Room (New Lab Block Ground Floor)
Lab-10	PG Pharma. Analysis Lab (New Lab Block Ground Floor)
Lab-11	Pharma. Chemistry Lab. (New Lab Block 1st Floor)
Lab-12	Pharma. Medico Lab. (New Lab Block 1st Floor)
Lab-13	Pharma. Chemistry Lab. (New Lab Block 1st Floor)
Lab-14	Pharma. Chemistry Lab. (New Lab Block 1st Floor)
Lab-15	Pharmacology Lab. (New Lab Block 2nd Floor)
Lab-16	Pharmaceutics Lab. (New Lab Block 2nd Floor)
Lab-17	Pharma. Chemistry Lab. (PG Lab Block 1st Floor)
Lab-18	Pharmaceutics Lab. (PG Lab Block 2nd Floor)
Lab-19	Pharma. Medico Lab. (PG Lab Block 2nd Floor)
Lab-20	Computer Lab

Dr. B. Mishra
Time Table I/c

Principal
Institute of Pharmacy & Technology
Salipur, Cuttack

INSTITUTE OF PHARMACY & TECHNOLOGY, SALIPUR, CUTTACK.

Time Table for D. Pharm Part-I & Part-II, B.Pharm 1st & 8th Semester and M.Pharm 1st Semester for the session 2022-23 w.e.f 10.04.2023

TIME/ DAY	Class	9:00 am- 10:00 am	10:00 am- 11:00 am	11:00 am- 12:00 noon	12:00 noon- 1:00 pm	1:00 pm- 2:00 pm	2:00 pm- 3:00 pm	3:00 pm- 4:00 pm	4:00 pm- 5:00 pm
MON	D.Ph-I		Ph.Ics/SP	Ph.Chem./SKS	Soc.Pharm./CP		Ph.Chem-I Pr./Gr.-I/ Lab-2/SP & Soc. Pharmacy Pr./Gr.-II/ Lab-16/CP		
	D.Ph-II		CP&M/CP	Pharmacology/MS	Pharm. Law & Ethics/SP		Pharm. Law & Ethics/BSM	Pharmacology Pr./Gr.-I/ Lab-4/BM & BCP Pr./Gr.-II/Lab-11/MP	
	B.Ph-I_A	Comm. Skills/SB	HAP-I Pr./Gr.-I/ Lab-15/CSE & Ph.Inc.Chem. Pr./Gr.-II/ Lab-14/PKSM				HAP-I/BNS	Ph.Analysis-I/BB	Ph.Org.Chem./MS
	B.Ph-I_B		Ph.Analysis-I Pr./Gr.-II/ Lab-11/BB & Rem. Biology Pr./Gr.-I/ Lab-6/SKH				Ph.Org.Chem./MS	HAP-I/BNS	Ph.Analysis-I/BB
	B.Ph-VIII		Bios_Res.Meth./SJP	Ph. Mark.Mang./SKM	Cosmetic Science/MCS		Project Work for all students		
	M.Ph-I_PCiu		Pharmaceutics Pr./ Lab-18/BSN				Pharmaceutics Pr./ Lab-08/BSN		
	M.Ph-I_PChm		Ph. Chemistry Pr./ Lab-19/SKP				Ph. Chemistry Pr./ Lab-10/SKP		
	M.Ph-I_PA		Ph. Analysis Pr./ Lab-20/SKP				Ph. Analysis Pr./ Lab-20/SKP		
TUE	D.Ph-I		HAP/BNS	Soc.Pharm./SJP	Ph.Ics/SKS		Ph.chemistry-I Pr./Gr.-I/ Lab-13/SKS & HAP Pr./Gr.-II/ Lab-15/BKN		
	D.Ph-II		Pharmacology/BM	CP&M/CP	BCP/MKS		Ph. Therapeutics/MS	Ph. Therapeutics Pr./ Gr-I/Lab-16/MS & HCP Pr./Gr.-II/ Lab-3/SKS	Ph. Therapeutics Pr./ Gr-II/Lab-06/MS & HCP Pr./Gr.-I/ Lab-3/PKS
	B.Ph-I_A		Ph.Inc.Chem. Pr./Gr.-I/ Lab-14/PKSM & Ph.Chem-I Pr./Gr.-II/ Lab-04/SP				HAP-I/CSE	Ph.Org.Chem./PKSM	Ph.Chem./SP
	B.Ph-I_B	Comm. Skill Pr./Gr.-III & IV/ AHCL/SB		Rem. Math./SS	Rem. Math./SS		Ph.Chem./SP	HAP-I/CSE	Ph.Org.Chem./PKSM
	B.Ph-VIII		Ph.Mark.Mang./BSM	Soc. Prev. Pharm/CSE	Bios_Res.Meth./NKS		Project Work for all students		
	M.Ph-I_PCiu		Reg. Aff./BRM	MAT/SKP	DDS/ACI		Reg. Aff./BSN		
	M.Ph-I_PChm		AMC/SKS		ADC-I/SSK		CNP/NKS		
	M.Ph-I_PA		Food Ana./MKS		Ph. Valid./SB		APA/SKP		
WED	D.Ph-I		Soc.Pharm./CP	Ph.Chem./SSK	HAP/BKN		Ph.Ics/SKS	Ph.Inorg/SD	
	D.Ph-II		BCP/SKS	HCP/SKS	Pharmacology/BM		Comm. Pharmacy & Mgt. Pr./Gr-I/Lab-16/CP		
	B.Ph-I_A		Ph.Analysis-I Pr./Gr.-I/ Lab-12/MKS & Rem. Biology Pr./Gr.-II/ Lab-5/SKH				Rem. Biology/SKH	Ph.Analysis-I/MKS	Ph.Org.Chem./PKSM
	B.Ph-I_B	Comm. Skills/SB	HAP-I Pr./Gr.-II/ Lab-15/CSE & Ph.Analysis-I Pr./Gr.-I/ Lab-16/SJP				Ph.Analysis-I/MKS	Ph.Org.Chem./PKSM	Rem. Biology/SKH
	B.Ph-VIII		Soc. Prev. Pharm/BKS	Bios_Res.Meth./SSN	Ph.Mark.Mang./BSM		Project Work for all students		
	M.Ph-I_PCiu		Pharmaceutics Pr./ Lab-18/BKM				Pharmaceutics Pr./ Lab-08/BKM		
	M.Ph-I_PChm		Ph. Chemistry Pr./ Lab-17/SKK				Ph. Chemistry Pr./ Lab-17/SKK		
	M.Ph-I_PA		Ph. Analysis Pr./ Lab-20/SKP				Ph. Analysis Pr./ Lab-20/SKP		

RECESS

INSTITUTE OF PHARMACY & TECHNOLOGY, SALIPUR, CUTTACK.

Time Table for D. Pharm Part-I & Part-II, B.Pharm 1st & 8th Semester and M.Pharm 1st Semester for the session 2022-23 w.e.f 10.04.2023

TIME/ DAY	Class	9:00 am- 10:00 am	10:00 am- 11:00 am	11:00 am- 12:00 noon	12:00 noon- 1:00 pm	1:00 pm- 2:00 pm	2:00 pm- 3:00 pm	3:00 pm- 4:00 pm	4:00 pm- 5:00 pm
THUR	D.Ph-I		Ph.Chem./SKS	Ph.cognosy/SD	Soc.Pharm./CP	R E C E S S	Ph.cognosy Pr./Gr.-I/ Lab-5/SD & Ph.ceutics-I Pr./Gr.-II/ Lab-2/SKB		
	D.Ph-II		HCP/PKS.	Pharm. Law & Ethics/BSM	Ph. Therapeutics/BKN		Comm. Pharmacy & Mgt. Pr./Gr-II/Lab-16/CP		
	B.Ph-I_A	Comm. Skills/SB	Ph.ceutics-I Pr./Gr.-I/ Lab-16/SP & Ph.Analysis-I Pr./Gr.-II/ Lab-12/MKS				HAP-I/BKG	Ph.Analysis-I/BB	Ph.Ceutics.I/SJP
	B.Ph-I_B		Rem. Biology Pr./Gr.-II/ Lab-5/DKH & & HAP-I Pr./Gr.-IV/ Lab-15/BKG				Ph.Ceutics.I/SJP	HAP-I/BKG	Ph.Analysis-I/BB
	B.Ph-VIII		Soc. Prev. Pharm /AKS	Bios_Res.Meth./HKS	Cosmetic Science/ACS		Project Work for all students		
	M.Ph-I_PCeu		MAT/SKP				Reg. Aff./BRM	DDS/BSN	Mod. Pharm./PKS.
	M.Ph-I_PChm			AMC/SKK			CNP/HKS	AQC-I/MB	
	M.Ph-I_PA			Ph. Valid./BB	APA/SKP			Food Ana./MKS	
FRI	D.Ph-I		Ph.Chem./SKS	HAP/BKN	Ph.cognosy/SD		Soc. Pharmacy Pr./Gr.-I/ Lab-16/CP & Ph.chemistry-I Pr./Gr.-II/ Lab-13/SKS		
	D.Ph-II		Ph. Therapeutics/BKN	CP&M/CP	BCCP/SKS		Pharm. Law & Ethics/SJP	Pharmacology Pr./Gr.-II/ Lab-4/BM & BCCP Pr./Gr-I/Lab-11/AKP	
	B.Ph-I_A		Rem. Biology Pr./Gr.-I/ Lab-6/DKH & HAP-I Pr./Gr.-II/ Lab-15/CSB				HAP-I/CSB	Ph.Ceutics.I/SP	Rem. Biology/DKH
	B.Ph-I_B	Comm. Skills/SB	Ph.ceutics-I Pr./Gr.-II/ Lab-16/SJP & Ph.Ino.Chem. Pr./Gr.-IV/ Lab-14/HKS				Rem. Biology/DKH	HAP-I/CSB	Ph.Ceutics.I/SP
	B.Ph-VIII		Cosmetic Science/SP	Soc. Prev. Pharm/BM			Project Work for all students		
	M.Ph-I_PCeu		MAT/PKSM	Reg. Aff./SKM	DDS/ACS		Mod. Pharm./PKS.		
	M.Ph-I_PChm			AQC-I/MB	AMC/SKK		CNP/HKS		
	M.Ph-I_PA			Ph. Valid./BB	APA/SKP			Food Ana./MKS	
SAT	D.Ph-I		Ph.ceutics/SP	HAP/BKN	Ph.cognosy/SD		HAP Pr./Gr.-I/ Lab-15/BKN & Ph.cognosy Pr./Gr.-II/ Lab-5/SD		
	D.Ph-II		BCCP/SKS	HCP/SKB	Pharmacology/BM		HCP/PKS.	CP&M/CP	Ph. Therapeutics/BKN
	B.Ph-I_A	Comm. Skill Pr./Gr.-I & II/ AHCL/SB		Rem. Meth./SS	Rem. Meth./SS		Ph.Ino.Chem./HKS	Ph.Analysis-I/MKS	Ph.Ceutics.I/SJP
	B.Ph-I_B		Ph.Ino.Chem. Pr./Gr.-II/ Lab-14/HKS & Ph.Analysis-I Pr./Gr.-IV/ Lab-12/BB				Ph.ceutics.I/SJP	Ph.Ino.Chem./HKS	Ph.Analysis-I/MKS
	B.Ph-VIII		Ph.Mark.Mang./BSM	Cosmetic Science/PKS.			Project Work for all students		
	M.Ph-I_PCeu		MAT/PKSM	Mod. Pharm./BRM			DDS/BSN	Mod. Pharm./SP	
	M.Ph-I_PChm			AQC-I/SSK	AMC/SKK		CNP/PKSM		
	M.Ph-I_PA			Food Ana./MKS	APA/SKP		Ph. Valid./BB		

8/4/23

Dr. B. MishraTime Table I/C

8/4/23

Principal IPT, Salipur

INSTITUTE OF PHARMACY & TECHNOLOGY, SALIPUR, CUTTACK.

Time Table for D. Pharm Part-I & Part-II, B.Pharm 1st & 8th Semester and M.Pharm 1st Semester for the session 2022-23 w.e.f 10.04.2023

TIME/ DAY	Class	9:00 am- 10:00 am	10:00 am- 11:00 am	11:00 am- 12:00 noon	12:00 noon- 1:00 pm	1:00 pm- 2:00 pm	2:00 pm- 3:00 pm	3:00 pm- 4:00 pm	4:00 pm- 5:00 pm

Abbreviation

SKM: Dr. Santosh Kumar Mahapatra
SKB: Dr. Sunil Kumar Kanungo
BRM: Dr. Biswa Ranjan Mohanty
PKSM: Dr. Prabir Kumar Sinhamahapatra
SKP: Dr. Saroja Kumar Patro
MB: Dr. Mrityunjay Banerjee
BSN: Dr. Bhabani Shankar Nayak
SKB: Dr. Susanta Kumar Behera
AKS: Dr. Ashwini Kumar Senapati
AKP: Dr. Amiya Kumar Prusty
RKD: Dr. Ranjan Kumar Giri
CSB: Dr. Chandra Sekhar Bank
BM: Dr. Bishwanath Mishra
MKS: Dr. Minaketan Sahoo

ACS: Dr. Amaresh Chandra Sahoo
SD: Dr. Sujit Dash
HKS: Dr. H.K. Sundeep Kumar Nayak
PKS: Dr. Prabhat Kumar Sahoo
SP: Dr. Swain Panja
SS: Dr. Sujit Kumar Sahu
DKH: Mr. Deepak Kumar Hati
BB: Mrs. Bijasha Behera
BSM: Dr. Bibaswan Mishra
SSK: Dr. Sidhartha Shankar Kar
SJP: Dr. Satyajit Panda
BKN: Mr. Biraj Kumar Nayak
CP: Mr. Chinmaya Panda
SB: Mr. Saroj Kumar Behera
SS: Dr. Sakuntala Swain

Class	Theory Section	Class Rooms	Practical Group
D.Pharm 1st Sem.	No Section	Academic Block 1st Floor (LH-II)	Group-I (01-30)
			Group-II (31-60)
D.Pharm 2nd Year	No Section	Academic Block 1st Floor (LH-I)	Group-I (01-30)
			Group-II (31 onwards)
B.Pharm 1st Sem.	Sec-A: Roll 01-60	Animal House Block 1st Floor	Group-I (01-30)
			Group-II (31-60)
	Sec-B: Roll 61-105	Animal House Block 2nd Floor	Group-III (61-90)
			Group-IV (91-105)
B.Pharm 8th Sem.	No Section	Animal House Block 2nd Floor	
M.Pharm 1st Sem.		Old PG Block (Respective Dept.)	

Lab. No.	Name of the Laboratory & Location
Lab-1	Research Lab. (Old Lab Block Ground Floor)
Lab-2	Pharmaceutics Lab. (Old Lab Block Ground Floor)
Lab-3	Microbiology Lab. (Old Lab Block 1st Floor)
Lab-4	Pharmacology Lab. (Old Lab Block 1st Floor)
Lab-5	Pharmacognosy Lab. (Old Lab Block 2nd Floor)
Lab-6	Pharmacognosy Lab. (Old Lab Block 2nd Floor)
Lab-7	Machine Room (New Lab Block Ground Floor)
Lab-8	PG Pharmaceutics Lab. (New Lab Block Ground Floor)
Lab-9	Instrument Room (New Lab Block Ground Floor)
Lab-10	PG Pharma. Analysis Lab. (New Lab Block Ground Floor)
Lab-11	Pharma. Chemistry Lab. (New Lab Block 1st Floor)
Lab-12	Pharma. Analysis Lab. (New Lab Block 1st Floor)
Lab-13	Pharma. Chemistry Lab. (New Lab Block 1st Floor)
Lab-14	Pharma. Chemistry Lab (New Lab Block 1st Floor)
Lab-15	Pharmacology Lab. (New Lab Block 2nd Floor)
Lab-16	Pharmaceutics Lab (New Lab Block 2nd Floor)
Lab-17	Pharma. Chemistry Lab. (PG Lab Block 1st Floor)
Lab-18	Pharmaceutics Lab. (PG Lab Block 2nd Floor)
Lab-19	Pharma. Analysis Lab. (PG Lab Block 2nd Floor)
Lab-20	Computer Lab

10/04/23
Dr. B. MishraTime Table I/C

5/4/23
Principal IPT, Salipur

INSTITUTE OF PHARMACY & TECHNOLOGY, SALIPUR, CUTTACK-754202, ODISHA.

Time Table for D. Pharm Part-I & Part-II, B.Pharm 1st, 6th & 8th Semester and M.Pharm 1st Semester for the session 2022-23 w.e.f. 17.04.2023

TIME/ DAY	Class	6.20 am-7.00 am	7.00 am - 7.40 am	7.40 am - 8.20 am	8.20 am - 9.00 am	9.00 am - 9.15 am	9.15 am - 9.55 am	9.55 am - 10.35 am	10.35 am - 11.15 am
MON	D.Ph-I		Ph.ceutics/SP	Ph.Chem./SKS	Soc.Pharm./CP		Ph.ceutics-I Pr./Gr.-I/ Lab-2/SP & Soc. Pharmacy Pr./Gr.-II/ Lab-16/CP		
	D.Ph-II		CP&M/CP	Pharmacology/AKS	Pharm. Law & Ethics/SJP		Ph. Therapeutics/BKN	Pharmacology Pr./Gr.-I/ Lab-4/BM & BCCP Pr./Gr-II/Lab-11/AKP	
	B.Ph-I_A	Comm. Skills/SB	HAP-I Pr./Gr.-I/ Lab-15/CSB & Ph.Ino.Chem. Pr./Gr.-II/ Lab-14/PKSM				HAP-I/RKG	Ph.Analysis-I/BB	Ph.Ing.Chem./HKS
	B.Ph-I_B		Ph.Analysis-I Pr./Gr.-II/ Lab-12/BB & Rem. Biology Pr./Gr.-IV/ Lab-6/DKH				Ph.Ing.Chem./HKS	HAP-I/RKG	Ph.Analysis-I/BB
	B.Ph-VI_A		HDT/SD	Ph. Biotech./AKP	QA/BRM		BPPK/ACS	Med. Chem. III/PKSM	Pharmacology III/CSB
	B.Ph-VI_B		QA/BRM	HDT/SD	Ph. Biotech./AKP		Pharmacology III/CSB	BPPK/ACS	Med. Chem. III/PKSM
	B.Ph-VIII		Bios_Res.Meth./SJP	Cosmetic Science/SKB	Ph.Mark.Mang./SKM		Project Work for all students		
	M.Ph-I_PCeu		Pharmaceutics Pr./ Lab-18/BSN				Pharmaceutics Pr./ Lab-18/BSN		
	M.Ph-I_PChm		Ph. Chemistry Pr./ Lab-10/SKP				Ph. Chemistry Pr./ Lab-10/SKP		
	M.Ph-I_PA		Ph. Analysis Pr./ Lab-10/SKP				Ph. Analysis Pr./ Lab-10/SKP		
TUE	D.Ph-I		HAP/RKG	Soc.Pharm./SJP	Ph.ceutics/SKB		Ph.chemistry-I Pr./Gr.-I/ Lab-13/SKS & HAP Pr./Gr.-II/ Lab-15/BKN		
	D.Ph-II		Ph. Therapeutics/AKS	CP&M/CP	BCCP/SKS		Pharmacology/BM	Ph. Therapeutics Pr./ Gr-I/Lab-16/AKS & HCP Pr./Gr.-II/ Lab-3/SKB	Ph. Therapeutics Pr./ Gr-II/Lab-16/AKS & HCP Pr./Gr.-I/ Lab-1/PKS.
	B.Ph-I_A		Ph.Ino.Chem. Pr./Gr.-I/ Lab-14/PKSM & Ph.ceutics-I Pr./Gr.-II/ Lab-16/SP			R	HAP-I/CSB	Ph.Ing.Chem./PKSM	Ph.Ceutics-I/SP
	B.Ph-I_B	Comm. Skill Pr./Gr.-III & IV/ AHCL/SB		Rem. Math./SS	Rem. Math./SS	E	Ph.Ceutics-I/SP	HAP-I/CSB	Ph.Ing.Chem./PKSM
	B.Ph-VI_A		HDT/SD	Ph. Biotech./AKP	BPPK/BSN	C	Ph.Cology-II Pr./Gr.I/Lab-4/RKG & Med.Chem-II Pr./Gr.II/Lab-14/SSK		
	B.Ph-VI_B		BPPK/BSN	HDT/SD	Ph. Biotech./AKP	E	HDT Pr./Gr.III/Lab-5/DKH		
	B.Ph-VIII		Ph.Mark.Mang./BSM	Bios_Res.Meth./HKS		S	Project Work for all students		
	M.Ph-I_PCeu		Reg. Aff./BRM	MAT/SKP	DDS/ACS	S	Reg. Aff./SKM		
	M.Ph-I_PChm		AMC/SKS		AOC-I/SSK		CNP/HKS		
	M.Ph-I_PA		Food Ana./MKS		Ph. Valid./BB		APA/SKP		
WED	D.Ph-I		Soc.Pharm./CP	Ph.Chem./SSK	Ph.cognosy/SP		Ph.ceutics/SKB	HAP/BKN	
	D.Ph-II		HCP/SKB	BCCP/SKS	Pharmacology/BM		Comm. Pharmacy & Mgt. Pr./Gr-I/Lab-16/CP		
	B.Ph-I_A		Ph.Analysis-I Pr./Gr.-I/ Lab-12/MKS & Rem. Biology Pr./Gr.-II/ Lab-5/DKH				Ph.Ing.Chem./PKSM	Ph.Analysis-I/MKS	Rem. Biology/DKH
	B.Ph-I_B	Comm. Skills/SB	HAP-I Pr./Gr.-III/ Lab-15/CSB & Ph.ceutics-I Pr./Gr.-IV/ Lab-16/SP				Rem. Biology/DKH	Ph.Ing.Chem./PKSM	Ph.Analysis-I/MKS
	B.Ph-VI_A		Pharmacology III/RKG	BPPK/ACS	Ph. Biotech./AKP		Ph.Cology-II Pr./Gr.II/Lab-4/RKG & Med.Chem-II Pr./Gr.I/Lab-14/SSK		
	B.Ph-VI_B		Ph. Biotech./AKP	Pharmacology III/RKG	BPPK/ACS		HDT Pr./Gr.IV/Lab-5/SD		
	B.Ph-VIII		Soc. Prev. Pharm/AKS	Bios_Res.Meth./BSN	Ph.Mark.Mang./BSM		Project Work for all students		
	M.Ph-I_PCeu		Pharmaceutics Pr./ Lab-18/BRM				Pharmaceutics Pr./ Lab-18/BRM		
	M.Ph-I_PChm		Ph. Chemistry Pr./ Lab-17/SKK				Ph. Chemistry Pr./ Lab-17/SKK		
	M.Ph-I_PA		Ph. Analysis Pr./ Lab-10/SKP				Ph. Analysis Pr./ Lab-10/SKP		

Dr. B. Mishra Time Table I/C

Principal/PT, Salipur

INSTITUTE OF PHARMACY & TECHNOLOGY, SALIPUR, CUTTACK-754202, ODISHA.

Time Table for D. Pharm Part-I & Part-II, B.Pharm 1st, 6th & 8th Semester and M.Pharm 1st Semester for the session 2022-23 w.e.f. 17.04.2023

TIME/ DAY	Class	6.30 am-7.00 am	7.00 am - 7.40 am	7.40 am - 8.20 am	8.20 am - 9.00 am	9.00 am - 9.15 am	9.15 am - 9.55 am	9.55 am - 10.35 am	10.35 am - 11.15 am
THUR	D.Ph-I		Ph.Chem./SKS	Ph.cognosy/SD	Soc.Pharm./CP		Ph.cognosy Pr./Gr.-I/ Lab-5/SD & Ph.ceutics-I Pr./Gr.-II/ Lab-2/SKB		
	D.Ph-II		HCP/PKS	Pharm. Law & Ethics/BSM	Ph. Therapeutics/BKN		Pharmacology Pr./Gr.-II/ Lab-4/BM (9.15am to 10.35am) & Comm. Pharmacy & Mgt. Pr./Gr-I/Lab-16/CP		
	B.Ph-I_A	Comm. Skills/SB	Ph.ceutics-I Pr./Gr.-I/ Lab-16/SP & Ph.Analysis-I Pr./Gr.-II/ Lab-12/MKS				HAP-I/RKG	Ph.Analysis-I/BB	Ph.Ceutics.I/SJP
	B.Ph-I_B		Rem. Biology Pr./Gr.-III/ Lab-5/DKH & & HAP-I Pr./Gr.-IV/ Lab-15/RKG				Ph.Ceutics.I/SJP	HAP-I/RKG	Ph.Analysis-I/BB
	B.Ph-VI_A		Pharmacology II/CSB	Med. Chem. II/PKSM	QA/SKB		HDT/DKH	Ph. Biotech./AKP	BPPE/BSN
	B.Ph-VI_B		QA/SKB	Pharmacology II/CSB	Med. Chem. II/PKSM		BPPE/BSN	HDT/DKH	Ph. Biotech./AKP
	B.Ph-VIII		Soc. Prev. Pharm./AKS	Bios_Res.Meth./HKS	Cosmetic Science/ACS		Project Work for all students		
	M.Ph-I_PCeu		MAT/SKP	DDS/BSN	Reg. Aff./BRM		Med. Pharm./PKS.		
	M.Ph-I_PChm			AMC/SKK	AOC-I/SSK		CNP/HKS	AOC-I/MB	
	M.Ph-I_PA			Ph. Valid./BB	APA/SKP			Food Ana./MKS	
FRI	D.Ph-I		Ph.cognosy/SD	Ph.Chem./SKS	HAP/BKN	R E C E S S	Soc. Pharmacy Pr./Gr.-I/ Lab-16/CP & Ph.chemistry-I Pr./Gr.-II/ Lab-13/SKS		
	D.Ph-II		Ph. Therapeutics/BKN	CP&M/CP	BCCP/MKS		Pharm. Law & Ethics/SJP	BCCP Pr./Gr-I/Lab-11/AKP	
	B.Ph-I_A		Rem. Biology Pr./Gr.-I/ Lab-6/DKH & HAP-I Pr./Gr.-II/ Lab-15/CSB				HAP-I/CSB	Ph.Ceutics.I/SP	Rem. Biology/DKH
	B.Ph-I_B	Comm. Skills/SB	Ph.ceutics-I Pr./Gr.-III/ Lab-16/SJP & Ph.Ino.Chem. Pr./Gr.-IV/ Lab-14/HKS				Rem. Biology/DKH	HAP-I/CSB	Ph.Ceutics.I/SP
	B.Ph-VI_A		Med. Chem. II/SSK	QA/BRM	Pharmacology II/RKG		HDT Pr./Gr.I/Lab-6/SD		
	B.Ph-VI_B		QA/BRM	Pharmacology II/RKG	Med. Chem. II/SSK		Ph.Cology-III Pr./Gr.II/Lab-4/RKG & Med.Chem-III Pr./Gr.IV/Lab-14/SSK		
	B.Ph-VIII		Cosmetic Science/SP	Soc. Prev. Pharm/BM			Project Work for all students		
	M.Ph-I_PCeu		MAT/PKSM	Reg. Aff./BSN	DDS/ACS		Med. Pharm./PKS.		
	M.Ph-I_PChm			AOC-I/MB	AMC/SKK		CNP/HKS		
	M.Ph-I_PA			Ph. Valid./BB	APA/SKP			Food Ana./MKS	
SAT	D.Ph-I		Ph.ceutics/SP	HAP/BKN	Ph.cognosy/SD		HAP Pr./Gr.-I/ Lab-15/BKN & Ph.cognosy Pr./Gr.-II/ Lab-5/SD		
	D.Ph-II		BCCP/SKS	CP&M/CP	Pharmacology/BM		HCP/PKS	HCP/SKB	Pharm. Law & Ethics/BSM
	B.Ph-I_A	Comm. Skill Pr./Gr.-I & II/ AHCL/SB		Rem. Math./SS	Rem. Math./SS		Ph.Ing.Chem./HKS	Ph.Analysis-I/MKS	Ph.Ceutics.I/SJP
	B.Ph-I_B		Ph.Ino.Chem. Pr./Gr.-II/ Lab-14/HKS & Ph.Analysis-I Pr./Gr.-IV/ Lab-12/BB				Ph.Ceutics.I/SJP	Ph.Ing.Chem./HKS	Ph.Analysis-I/MKS
	B.Ph-VI_A		Med. Chem. II/SSK	QA/SKB	HDT/DKH		HDT Pr./Gr.I/Lab-6/DKH &		
	B.Ph-VI_B		HDT/DKH	Med. Chem. II/SSK	QA/SKB		Ph.Cology-III Pr./Gr.IV/Lab-4/RKG & Med.Chem-III Pr./Gr.II/Lab-14/SSK		
	B.Ph-VIII		Ph.Mark.Mang./BSM	Cosmetic Science/ACS	Soc. Prev. Pharm/CSB		Project Work for all students		
	M.Ph-I_PCeu		MAT/PKSM	Med. Pharm./BRM			DDS/BSN	Med. Pharm./SP	
	M.Ph-I_PChm			AMC/SKK			CNP/PKSM		
	M.Ph-I_PA			Food Ana./MKS	APA/SKP		Ph. Valid./BB		

Dr. B. Mishra, Time Table I/C

5/4/23

Principal (I/C)
Institute of Pharmacy & Technology
Salipur

INSTITUTE OF PHARMACY & TECHNOLOGY, SALIPUR, CUTTACK-754202, ODISHA.

Time Table for D. Pharm Part-I & Part-II, B.Pharm 1st, 6th & 8th Semester and M.Pharm 1st Semester for the session 2022-23 w.e.f. 17.04.2023

TIME/ DAY	Class	6.20 am-7.00 am	7.00 am - 7.40 am	7.40 am - 8.20 am	8.20 am - 9.00 am	9.00 am - 9.15 am	9.15 am - 9.55 am	9.55 am - 10.35 am	10.35 am - 11.15 am

Abbreviation

SKM: Dr. Santosh Kumar Mahapatra
SKR: Dr. Sunil Kumar Kanungo
BRM: Dr. Biswa Ranjan Mohanty
PKSM: Dr. Prabir Kumar Sinharmahapatra
SKP: Dr. Saroja Kumar Patra
MB: Dr. Mrityunjay Banerjee
BSN: Dr. Bhabani Shankar Nayak
SKB: Dr. Susanta Kumar Behera
AKS: Dr. Ashwini Kumar Senapati
AKP: Dr. Amiya Kumar Prusty
RKG: Dr. Ranjan Kumar Giri
CSB: Dr. Chandra Sekhar Barik
BM: Dr. Bishwanath Mishra
MKS: Dr. Minaketan Sahoo

ACS: Dr. Amaresh Chandra Sahoo
SD: Dr. Sujit Dash
HKS: Dr. H.K. Sundeep Kumar Nayak
PKS: Dr. Prabhat Kumar Sahoo
SP: Dr. Swalin Parija
SS: Dr. Sujit Kumar Sahu
DKH: Mr. Deepak Kumar Hati
BB: Mrs. Bijaslta Behera
BSM: Dr. Bibaswan Mishra
SSK: Dr. Sidhartha Shankar Kar
SPJ: Dr. Satyajit Panda
BKN: Mr. Biraj Kumar Nayak
CP: Mr. Chinmaya Panda
SB: Mr. Saroj Kumar Behera
SS: Dr. Sakuntala Swain

Class	Theory Section	Class Rooms	Practical Group
D.Pharm 1st Sem.	No Section	Academic Block 1st Floor (LH-6)	Group-I (01-30) Group-II (31-60)
D.Pharm 2nd Year	No Section	Academic Block 1st Floor (LH-1)	Group-I (01-30) Group-II (31-onwards)
B.Pharm 1st Sem.	Sec-A: Roll 01-60	Animal House Block 1st Floor	Group-I (01-30) Group-II (31-60)
	Sec-B: Roll 61-105	Animal House Block 2nd Floor	Group-III (61-90) Group-IV (91-105)
B.Pharm 6th Sem.	Sec-A : Regd. 01-60	Lab Block 1st Floor (NLB-105)	Group-I (01-30) Group-II (31-60)
	Sec-B : Regd. 61-105 & LE	Lab Block 1st Floor (NLB-108)	Group-III (61-90) Group-IV (91-105 & LE)
B.Pharm 8th Sem.	No Section	Animal House Block 2nd Floor	
M.Pharm 1st Sem.		Old PG Block (Respective Dept.)	

Lab. No.	Name of the Laboratory & Location
Lab-1	Research Lab. (Old Lab Block Ground Floor)
Lab-2	Pharmaceutics Lab. (Old Lab Block Ground Floor)
Lab-3	Microbiology Lab. (Old Lab Block 1st Floor)
Lab-4	Pharmacology Lab. (Old Lab Block 1st Floor)
Lab-5	Pharmacognosy Lab. (Old Lab Block 2nd Floor)
Lab-6	Pharmacognosy Lab. (Old Lab Block 2nd Floor)
Lab-7	Machine Room (New Lab Block Ground Floor)
Lab-8	PG Pharmaceutics Lab. (New Lab Block Ground Floor)
Lab-9	Instrument Room (New Lab Block Ground Floor)
Lab-10	PG Pharma. Analysis Lab.(New Lab Block Ground Floor)
Lab-11	Pharma. Chemistry Lab. (New Lab Block 1st Floor)
Lab-12	Pharma. Analysis Lab. (New Lab Block 1st Floor)
Lab-13	Pharma. Chemistry Lab. (New Lab Block 1st Floor)
Lab-14	Pharma. Chemistry Lab.(New Lab Block 1st Floor)
Lab-15	Pharmacology Lab. (New Lab Block 2nd Floor)
Lab-16	Pharmaceutics Lab.(New Lab Block 2nd Floor)
Lab-17	Pharma. Chemistry Lab. (PG Lab Block 1st Floor)
Lab-18	Pharmaceutics Lab. (PG Lab Block 2nd Floor)
Lab-19	Pharma. Analysis Lab. (PG Lab Block 2nd Floor)
Lab-20	Computer Lab.

Dr. B. MishraTime Table I/C

14/4/23
Principal (I/C)
Institute of Pharmacy & Technology, Salipur

Pharmacy Council of India

New Delhi

Rules & Syllabus for the Bachelor of Pharmacy (B. Pharm) Course

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[Framed under Regulation 6, 7 & 8 of the Bachelor of Pharmacy (B. Pharm) course regulations 2014]

CHAPTER- I: REGULATIONS

1. Short Title and Commencement

These regulations shall be called as "The Revised Regulations for the B. Pharm. Degree Program (CBCS)of the Pharmacy Council of India, New Delhi". They shall come into effect from the Academic Year 2016-17. The regulations framed are subject to modifications from time to time by Pharmacy Council of India.

2. Minimum qualification for admission

2.1 First year B. Pharm:

Candidate shall have passed 10+2 examination conducted by the respective state/central government authorities recognized as equivalent to 10+2 examination by the Association of Indian Universities (AIU) with English as one of the subjects and Physics, Chemistry, Mathematics (P.C.M) and or Biology (P.C.B / P.C.M.B.) as optional subjects individually. Any other qualification approved by the Pharmacy Council of India as equivalent to any of the above examinations.

2.2. B. Pharm lateral entry (to third semester):

A pass in D. Pharm. course from an institution approved by the Pharmacy Council of India under section 12 of the Pharmacy Act.

3. Duration of the program

The course of study for B.Pharm shall extend over a period of eight semesters (four academic years) and six semesters (three academic years) for lateral entry students. The curricula and syllabi for the program shall be prescribed from time to time by Pharmacy Council of India, New Delhi.

4. Medium of instruction and examinations

Medium of instruction and examination shall be in English.

5. Working days in each semester

Each semestershall consist of not less than 100 working days. The odd semesters shall be conducted from the month of June/July to November/December and the even semesters shall be conducted from December/January to May/June in every calendar year.

6. Attendance and progress

A candidate is required to put in at least 80% attendance in individual courses considering theory and practical separately. The candidate shall complete the prescribed course satisfactorily to be eligible to appear for the respective examinations.

7. Program/Course credit structure

As per the philosophy of Credit Based Semester System, certain quantum of academic work viz. theory classes, tutorial hours, practical classes, etc. are measured in terms of credits. On satisfactory completion of the courses, a candidate earns credits. The amount of credit associated with a course is dependent upon the number of hours of instruction per week in that course. Similarly, the credit associated with any of the other academic, co/extra-curricular activities is dependent upon the quantum of work expected to be put in for each of these activities per week.

7.1. Credit assignment

7.1.1. Theory and Laboratory courses

Courses are broadly classified as Theory and Practical. Theory courses consist of lecture (L) and /or tutorial (T) hours, and Practical (P) courses consist of hours spent in the laboratory. Credits (C) for a course is dependent on the number of hours of instruction per week in that course, and is obtained by using a multiplier of one (1) for lecture and tutorial hours, and a multiplier of half (1/2) for practical (laboratory) hours. Thus, for example, a theory course having three lectures and one tutorial per week throughout the semester carries a credit of 4. Similarly, a practical having four laboratory hours per week throughout semester carries a credit of 2.

7.2. Minimum credit requirements

The minimum credit points required for award of a B. Pharm. degree is 208. These credits are divided into Theory courses, Tutorials, Practical, Practice School and Projectover the duration of eight semesters. The credits are distributed semester-wise as shown in Table IX. Courses generally progress in sequences, building competencies and their positioning indicates certain academic maturity on the part of the learners. Learners are expected to follow the semester-wise schedule of courses given in the syllabus.

The lateral entry students shall get 52 credit points transferred from their D. Pharm program. Such students shall take up additional remedial courses of 'Communication Skills' (Theory and Practical) and 'Computer Applications in Pharmacy' (Theory and Practical) equivalent to 3 and 4 credit points respectively, a total of 7 credit points to attain 59 credit points, the maximum of I and II semesters.

8. Academic work

A regular record of attendance both in Theory and Practical shall be maintained by the teaching staff of respective courses.

9. Course of study

The course of study for B. Pharm shall include Semester Wise Theory & Practical as given in Table – I to VIII. The number of hours to be devoted to each theory, tutorial and practical course in any semester shall not be less than that shown in Table – I to VIII.

Table-I: Course of study for semester I

Course code	Name of the course	No. of hours	Tutorial	Credit points
BP101T	Human Anatomy and Physiology I– Theory	3	1	4
BP102T	Pharmaceutical Analysis I – Theory	3	1	4
BP103T	Pharmaceutics I – Theory	3	1	4
BP104T	Pharmaceutical Inorganic Chemistry – Theory	3	1	4
BP105T	Communication skills – Theory *	2	-	2
BP106RBT BP106RMT	Remedial Biology/ Remedial Mathematics – Theory*	2	-	2
BP107P	Human Anatomy and Physiology – Practical	4	-	2
BP108P	Pharmaceutical Analysis I – Practical	4	-	2
BP109P	Pharmaceutics I – Practical	4	-	2
BP110P	Pharmaceutical Inorganic Chemistry – Practical	4	-	2
BP111P	Communication skills – Practical*	2	-	1
BP112RBP	Remedial Biology – Practical*	2	-	1
	Total	**32/34$/36#**	**4**	**27/29$/30#**

#Applicable ONLY for the students who have studied Mathematics / Physics / Chemistry at HSC and appearing for Remedial Biology (RB)course**.**

$Applicable ONLY for the students who have studied Physics / Chemistry / Botany / Zoology at HSC and appearing for Remedial Mathematics (RM)course**.**

* Non University Examination (NUE)

Table-II: Course of study for semester II

Course Code	Name of the course	No. of hours	Tutorial	Credit points
BP201T	Human Anatomy and Physiology II – Theory	3	1	4
BP202T	Pharmaceutical Organic Chemistry I – Theory	3	1	4
BP203T	Biochemistry – Theory	3	1	4
BP204T	Pathophysiology – Theory	3	1	4
BP205T	Computer Applications in Pharmacy – Theory *	3	-	3
BP206T	Environmental sciences – Theory *	3	-	3
BP207P	Human Anatomy and Physiology II –Practical	4	-	2
BP208P	Pharmaceutical Organic Chemistry I– Practical	4	-	2
BP209P	Biochemistry – Practical	4	-	2
BP210P	Computer Applications in Pharmacy – Practical*	2	-	1
	Total	**32**	**4**	**29**

*****Non University Examination (NUE)

Table-III: Course of study for semester III

Course code	Name of the course	No. of hours	Tutorial	Credit points
BP301T	Pharmaceutical Organic Chemistry II – Theory	3	1	4
BP302T	Physical Pharmaceutics I – Theory	3	1	4
BP303T	Pharmaceutical Microbiology – Theory	3	1	4
BP304T	Pharmaceutical Engineering – Theory	3	1	4
BP305P	Pharmaceutical Organic Chemistry II – Practical	4	-	2
BP306P	Physical Pharmaceutics I – Practical	4	-	2
BP307P	Pharmaceutical Microbiology – Practical	4	-	2
BP 308P	Pharmaceutical Engineering –Practical	4	-	2
	Total	**28**	**4**	**24**

Table-IV: Course of study for semester IV

Course code	Name of the course	No. of hours	Tutorial	Credit points
BP401T	Pharmaceutical Organic Chemistry III– Theory	3	1	4
BP402T	Medicinal Chemistry I – Theory	3	1	4
BP403T	Physical Pharmaceutics II – Theory	3	1	4
BP404T	Pharmacology I – Theory	3	1	4
BP405T	Pharmacognosy and Phytochemistry I– Theory	3	1	4
BP406P	Medicinal Chemistry I – Practical	4	-	2
BP407P	Physical Pharmaceutics II – Practical	4		2
BP408P	Pharmacology I – Practical	4	-	2
BP409P	Pharmacognosy and Phytochemistry I – Practical	4	-	2
	Total	**31**	**5**	**28**

Table-V: Course of study for semester V

Course code	Name of the course	No. of hours	Tutorial	Credit points
BP501T	Medicinal Chemistry II – Theory	3	1	4
BP502T	Industrial PharmacyI– Theory	3	1	4
BP503T	Pharmacology II – Theory	3	1	4
BP504T	Pharmacognosy and Phytochemistry II– Theory	3	1	4
BP505T	Pharmaceutical Jurisprudence – Theory	3	1	4
BP506P	Industrial PharmacyI – Practical	4	-	2
BP507P	Pharmacology II – Practical	4	-	2
BP508P	Pharmacognosy and Phytochemistry II – Practical	4	-	2
	Total	**27**	**5**	**26**

Table-VI: Course of study for semester VI

Course code	Name of the course	No. of hours	Tutorial	Credit points
BP601T	Medicinal Chemistry III – Theory	3	1	4
BP602T	Pharmacology III – Theory	3	1	4
BP603T	Herbal Drug Technology – Theory	3	1	4
BP604T	Biopharmaceutics and Pharmacokinetics – Theory	3	1	4
BP605T	Pharmaceutical Biotechnology – Theory	3	1	4
BP606T	Quality Assurance –Theory	3	1	4
BP607P	Medicinal chemistry III – Practical	4	-	2
BP608P	Pharmacology III – Practical	4	-	2
BP609P	Herbal Drug Technology – Practical	4	-	2
	Total	**30**	**6**	**30**

Table-VII: Course of study for semester VII

Course code	Name of the course	No. of hours	Tutorial	Credit points
BP701T	Instrumental Methods of Analysis – Theory	3	1	4
BP702T	Industrial PharmacyII – Theory	3	1	4
BP703T	Pharmacy Practice – Theory	3	1	4
BP704T	Novel Drug Delivery System – Theory	3	1	4
BP705P	Instrumental Methods of Analysis – Practical	4	-	2
BP706PS	Practice School*	12	-	6
	Total	**28**	**5**	**24**

***** Non University Examination (NUE)

Table-VIII: Course of study for semester VIII

Course code	Name of the course	No. of hours	Tutorial	Credit points
BP801T	Biostatistics and Research Methodology	3	1	4
BP802T	Social and Preventive Pharmacy	3	1	4
BP803ET	Pharma Marketing Management	3 + 3 = 6	1 + 1 = 2	4 + 4 = 8
BP804ET	Pharmaceutical Regulatory Science			
BP805ET	Pharmacovigilance			
BP806ET	Quality Control and Standardization of Herbals			
BP807ET	Computer Aided Drug Design			
BP808ET	Cell and Molecular Biology			
BP809ET	Cosmetic Science			
BP810ET	Experimental Pharmacology			
BP811ET	Advanced Instrumentation Techniques			
BP812ET	Dietary Supplements and Nutraceuticals			
BP813PW	Project Work	12	-	6
	Total	**24**	**4**	**22**

Table-IX: Semester wise credits distribution

Semester	Credit Points
I	**27/29$/30#**
II	29
III	26
IV	28
V	26
VI	26
VII	24
VIII	22
Extracurricular/ Co curricular activities	01*
Total credit points for the program	**209/211$/212#**

* The credit points assigned for extracurricular and or co-curricular activities shall be given by the Principals of the colleges and the same shall be submitted to the University. The criteria to acquire this credit point shall be defined by the colleges from time to time.

$Applicable ONLY for the students studied Physics / Chemistry / Botany / Zoology at HSC and appearing for Remedial Mathematics course.

#Applicable ONLY for the students studied Mathematics / Physics / Chemistry at HSC and appearing for Remedial Biology course.

10. Program Committee

1. The B. Pharm. program shall have a Program Committee constituted by the Head of the institution in consultation with all the Heads of the departments.

2. The composition of the Program Committee shall be as follows:

   A senior teacher shall be the Chairperson; One Teacher from each department handling B.Pharm courses; and four student representatives of the program (one from each academic year), nominated by the Head of the institution.

3. Duties of the Program Committee:

   i. Periodically reviewing the progress of the classes.
   ii. Discussing the problems concerning curriculum, syllabus and the conduct of classes.
   iii. Discussing with the course teachers on the nature and scope of assessment for the course and the same shall be announced to the students at the beginning of respective semesters.
   iv. Communicating its recommendation to the Head of the institution on academic matters.
   v. The Program Committee shall meet at least thrice in a semester preferably at the end of each Sessionalexam (Internal Assessment) and before the end semester exam.

11. Examinations/Assessments

The scheme for internal assessment and end semester examinations is given in Table – X.

11.1. End semester examinations

The End Semester Examinations for each theory and practical coursethrough semesters I to VIII shall beconducted by the university except for the subjects with asterix symbol (*) in table I and II for which examinations shall be conducted by the subject experts at college level and the marks/grades shall be submitted to the university.

Tables-X: Schemes for internal assessments and end semester examinations semester wise

Semester I

Course code	Name of the course	Internal Assessment				End Semester Exams		Total Marks
		Continuous Mode	Sessional Exams		Total	Marks	Duration	
			Marks	Duration				
BP101T	Human Anatomy and Physiology I– Theory	10	15	1 Hr	25	75	3 Hrs	100
BP102T	Pharmaceutical Analysis I – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP103T	Pharmaceutics I – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP104T	Pharmaceutical Inorganic Chemistry – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP105T	Communication skills – Theory *	5	10	1 Hr	15	35	1.5 Hrs	50
BP106RBT BP106RMT	Remedial Biology/ Mathematics – Theory*	5	10	1 Hr	15	35	1.5 Hrs	50
BP107P	Human Anatomy and Physiology – Practical	5	10	4 Hrs	15	35	4 Hrs	50
BP108P	Pharmaceutical Analysis I – Practical	5	10	4 Hrs	15	35	4 Hrs	50
BP109P	Pharmaceutics I – Practical	5	10	4 Hrs	15	35	4 Hrs	50
BP110P	Pharmaceutical Inorganic Chemistry – Practical	5	10	4 Hrs	15	35	4 Hrs	50
BP111P	Communication skills – Practical*	5	5	2 Hrs	10	15	2 Hrs	25
BP112RBP	Remedial Biology – Practical*	5	5	2 Hrs	10	15	2 Hrs	25
	Total	**70/75$^{\$}$/80$^{\#}$**	**115/125$^{\$}$/130$^{\#}$**	**23/24$^{\$}$/26$^{\#}$ Hrs**	**185/200$^{\$}$/210$^{\#}$**	**490/525$^{\$}$/ 540$^{\#}$**	**31.5/33$^{\$}$/ 35$^{\#}$ Hrs**	**675/725$^{\$}$/ 750$^{\#}$**

$^{\#}$Applicable ONLY for the students studied Mathematics / Physics / Chemistry at HSC and appearing for Remedial Biology (RB)course.

$^{\$}$Applicable ONLY for the students studied Physics / Chemistry / Botany / Zoology at HSC and appearing for Remedial Mathematics (RM)course.

***** Non University Examination (NUE)

Semester II

Course code	Name of the course	Internal Assessment				End Semester Exams		Total Marks
		Continuous Mode	Sessional Exams		Total	Marks	Duration	
			Marks	Duration				
BP201T	Human Anatomy and Physiology II – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP202T	Pharmaceutical Organic Chemistry I – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP203T	Biochemistry – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP204T	Pathophysiology – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP205T	Computer Applications in Pharmacy – Theory*	10	15	1 Hr	25	50	2 Hrs	75
BP206T	Environmental sciences – Theory*	10	15	1 Hr	25	50	2 Hrs	75
BP207P	Human Anatomy and Physiology II –Practical	5	10	4 Hrs	15	35	4 Hrs	50
BP208P	Pharmaceutical Organic Chemistry I– Practical	5	10	4 Hrs	15	35	4 Hrs	50
BP209P	Biochemistry – Practical	5	10	4 Hrs	15	35	4 Hrs	50
BP210P	Computer Applications in Pharmacy – Practical*	5	5	2 Hrs	10	15	2 Hrs	25
	Total	**80**	**125**	**20 Hrs**	**205**	**520**	**30 Hrs**	**725**

***** The subject experts at college level shall conduct examinations

Semester III

Course code	Name of the course	Internal Assessment				End Semester Exams		Total Marks
		Continuous Mode	Sessional Exams		Total	Marks	Duration	
			Marks	Duration				
BP301T	Pharmaceutical Organic Chemistry II – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP302T	PhysicalPharmaceuticsI –Theory	10	15	1 Hr	25	75	3 Hrs	100
BP303T	Pharmaceutical Microbiology – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP304T	Pharmaceutical Engineering – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP305P	Pharmaceutical Organic Chemistry II – Practical	5	10	4 Hr	15	35	4 Hrs	50
BP306P	Physical Pharmaceutics I – Practical	5	10	4 Hr	15	35	4 Hrs	50
BP307P	Pharmaceutical Microbiology – Practical	5	10	4 Hr	15	35	4 Hrs	50
BP308P	Pharmaceutical Engineering – Practical	5	10	4 Hr	15	35	4 Hrs	50
Total		**60**	**100**	**20**	**160**	**440**	**28Hrs**	**600**

Semester IV

Course code	Name of the course	Internal Assessment				End Semester Exams		Total Marks
		Continuous Mode	Sessional Exams		Total	Marks	Duration	
			Marks	Duration				
BP401T	Pharmaceutical Organic Chemistry III– Theory	10	15	1 Hr	25	75	3 Hrs	100
BP402T	Medicinal Chemistry I – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP403T	Physical Pharmaceutics II – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP404T	Pharmacology I – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP405T	Pharmacognosy I – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP406P	Medicinal Chemistry I – Practical	5	10	4 Hr	15	35	4 Hrs	50
BP407P	Physical Pharmaceutics II – Practical	5	10	4 Hrs	15	35	4 Hrs	50
BP408P	Pharmacology I – Practical	5	10	4 Hrs	15	35	4 Hrs	50
BP409P	Pharmacognosy I – Practical	5	10	4 Hrs	15	35	4 Hrs	50
Total		**70**	**115**	**21 Hrs**	**185**	**515**	**31 Hrs**	**700**

Semester V

Course code	Name of the course	Internal Assessment				End Semester Exams		Total Marks
		Continuous Mode	Sessional Exams		Total	Marks	Duration	
			Marks	Duration				
BP501T	Medicinal Chemistry II – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP502T	Industrial PharmacyI– Theory	10	15	1 Hr	25	75	3 Hrs	100
BP503T	Pharmacology II – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP504T	Pharmacognosy II – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP505T	Pharmaceutical Jurisprudence – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP506P	Industrial PharmacyI– Practical	5	10	4 Hr	15	35	4 Hrs	50
BP507P	Pharmacology II – Practical	5	10	4 Hr	15	35	4 Hrs	50
BP508P	Pharmacognosy II – Practical	5	10	4 Hr	15	35	4 Hrs	50
Total		**65**	**105**	**17 Hr**	**170**	**480**	**27 Hrs**	**650**

Semester VI

Course code	Name of the course	Internal Assessment				End Semester Exams		Total Marks
		Continuous Mode	Sessional Exams		Total	Marks	Duration	
			Marks	Duration				
BP601T	Medicinal Chemistry III – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP602T	Pharmacology III – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP603T	Herbal Drug Technology – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP604T	Biopharmaceutics and Pharmacokinetics – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP605T	Pharmaceutical Biotechnology– Theory	10	15	1 Hr	25	75	3 Hrs	100
BP606T	Quality Assurance– Theory	10	15	1 Hr	25	75	3 Hrs	100
BP607P	Medicinal chemistry III – Practical	5	10	4 Hrs	15	35	4 Hrs	50
BP608P	Pharmacology III – Practical	5	10	4 Hrs	15	35	4 Hrs	50
BP609P	Herbal Drug Technology – Practical	5	10	4 Hrs	15	35	4 Hrs	50
Total		**75**	**120**	**18 Hrs**	**195**	**555**	**30 Hrs**	**750**

Semester VII

Course code	Name of the course	Internal Assessment				End Semester Exams		Total Marks
		Continuous Mode	Sessional Exams		Total	Marks	Duration	
			Marks	Duration				
BP701T	Instrumental Methods of Analysis – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP702T	Industrial Pharmacy – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP703T	Pharmacy Practice – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP704T	Novel Drug Delivery System – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP705 P	Instrumental Methods of Analysis – Practical	5	10	4 Hrs	15	35	4 Hrs	50
BP706 PS	Practice School*	25	-	-	25	125	5 Hrs	150
Total		**70**	**70**	**8Hrs**	**140**	**460**	**21 Hrs**	**600**

***** The subject experts at college level shall conduct examinations

Semester VIII

Course code	Name of the course	Internal Assessment				End Semester Exams		Total Marks
		Continuous Mode	Sessional Exams		Total	Marks	Duration	
			Marks	Duration				
BP801T	Biostatistics and Research Methodology – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP802T	Social and Preventive Pharmacy – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP803ET	Pharmaceutical Marketing – Theory	10 + 10 = 20	15 + 15 = 30	1 + 1 = 2 Hrs	25 + 25 = 50	75 + 75 = 150	3 + 3 = 6 Hrs	100 + 100 = 200
BP804ET	Pharmaceutical Regulatory Science – Theory							
BP805ET	Pharmacovigilance – Theory							
BP806ET	Quality Control and Standardization of Herbals – Theory							
BP807ET	Computer Aided Drug Design – Theory							
BP808ET	Cell and Molecular Biology – Theory							
BP809ET	Cosmetic Science – Theory							
BP810ET	Experimental Pharmacology – Theory							
BP811ET	Advanced Instrumentation Techniques – Theory							
BP812PW	Project Work	-	-	-	-	150	4 Hrs	150
	Total	**40**	**60**	**4 Hrs**	**100**	**450**	**16 Hrs**	**550**

11.2. Internal assessment: Continuous mode

The marks allocated for Continuous mode of Internal Assessment shall be awarded as per the scheme given below.

Table-XI:Scheme for awarding internal assessment: Continuous mode

Theory		
Criteria	**Maximum Marks**	
Attendance (Refer Table – XII)	4	2
Academic activities (Average of any 3 activities e.g. quiz, assignment, open book test, field work, group discussion and seminar)	3	1.5
Student – Teacher interaction	3	1.5
Total	**10**	**5**
Practical		
Attendance (Refer Table – XII)	2	
Based on Practical Records, Regular viva voce, etc.	3	
Total	**5**	

Table- XII: Guidelines for the allotment of marks for attendance

Percentage of Attendance	**Theory**	**Practical**
95 – 100	4	2
90 – 94	3	1.5
85 – 89	2	1
80 – 84	1	0.5
Less than 80	0	0

11.2.1. Sessional Exams

Two Sessional exams shall be conducted for each theory / practical course as per the schedule fixed by the college(s). The scheme of question paper for theory and practical Sessional examinations is given below. The average marks of two Sessional exams shall be computed for internal assessment as per the requirements given in tables – X.

Sessional exam shall be conducted for 30 marks for theory and shall be computed for 15 marks. Similarly Sessional exam for practical shall be conducted for 40 marks and shall be computed for 10 marks.

Question paper pattern for theory Sessional examinations

For subjects having University examination

I. Multiple Choice Questions (MCQs)	=	10 x 1 = 10
OR		OR
Objective Type Questions (5 x 2)	=	05 x 2 = 10
(Answer all the questions)		
I. Long Answers (Answer 1 out of 2)	=	1 x 10 = 10
II. Short Answers (Answer 2 out of 3)	=	2 x 5 = 10

Total	=	30 marks

For subjects having Non University Examination

I. Long Answers (Answer 1 out of 2)	=	1 x 10 = 10
II. Short Answers (Answer 4 out of 6)	=	4 x 5 = 20

Total	=	30 marks

Question paper pattern for practical sessional examinations

I. Synopsis	=	10
II. Experiments	=	25
III. Viva voce	=	05

Total	=	40 marks
		----------

12. Promotion and award of grades

A student shall be declared PASSand eligible for getting gradein a course of B.Pharm.program if he/she secures at least 50% marks in that particular course including internal assessment.For example, to be declared as PASS and to get grade, the student has to secure a minimum of 50 marks for the total of 100 including continuous mode of assessment and end semester theory examination and has to secure a minimum of 25 marks for the total 50 including internal assessment and end semester practical examination.

13. Carry forward of marks

In case a studentfails to secure the minimum 50% in any Theory or Practical course as specified in 12,then he/she shall reappear for the end semester examinationof that course. However his/her marks of the Internal Assessmentshallbe carried overand he/she shall be entitled for grade obtained by him/her on passing.

14. Improvement of internal assessment

A studentshall have the opportunity to improvehis/her performance only oncein the Sessional exam component of the internal assessment. The re-conduct of the Sessional exam shall be completed before the commencement of next end semester theory examinations.

15. Re-examination of end semester examinations

Reexamination ofend semester examinationshall be conducted as per the schedule given in table XIII. The exact dates of examinations shall be notified from time to time.

Table-XIII: Tentative schedule of end semester examinations

Semester	For Regular Candidates	For Failed Candidates
I, III, V and VII	November / December	May / June
II, IV, VI and VIII	May / June	November / December

Question paper pattern for end semester theory examinations

For 75 marks paper

I. Multiple Choice Questions(MCQs) = 20 x 1 = 20
OR OR
Objective Type Questions (10 x 2) = 10 x 2 = 20
(Answer all the questions)
II. Long Answers (Answer 2 out of 3) = 2 x 10 = 20
III. Short Answers (Answer 7 out of 9) = 7 x 5 = 35

Total = 75 marks

For 50 marks paper

I. Long Answers (Answer 2 out of 3) = 2 x 10 = 20
II. Short Answers (Answer 6 out of 8) = 6 x 5 = 30

Total = 50 marks

For 35 marks paper

I. Long Answers (Answer 1 out of 2) = 1 x 10 =10
II. Short Answers (Answer 5 out of 7) = 5 x 5 = 25

Total = 35 marks

Question paper pattern for end semester practical examinations

I. Synopsis = 5
II. Experiments = 25
III. Viva voce = 5

Total = 35 marks

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16. Academic Progression:

No student shall be admitted to any examination unless he/she fulfills the norms given in 6. Academic progression rules are applicable as follows:

A student shall be eligible to carry forward all the courses of I, II and III semesters till the IV semester examinations. However, he/she shall not be eligible to attend the courses of V semester until all the courses of I and II semesters are successfully completed.

A student shall be eligible to carry forward all the courses of III, IV and V semesters till the VI semester examinations. However, he/she shall not be eligible to attend the courses of VII semester until all the courses of I, II, III and IV semesters are successfully completed.

A student shall be eligible to carry forward all the courses of V, VI and VII semesters till the VIII semester examinations. However, he/she shall not be eligible to get the course completion certificate until all the courses of I, II, III, IV, V and VI semesters are successfully completed.

A student shall be eligible to get his/her CGPA upon successful completion of the courses of I to VIII semesters within the stipulated time period as per the norms specified in 26.

A lateral entry student shall be eligible to carry forward all the courses of III, IV and V semesters till the VI semester examinations. However, he/she shall not be eligible to attend the courses of VII semester until all the courses of III and IV semesters are successfully completed.

A lateral entry student shall be eligible to carry forward all the courses of V, VI and VII semesters till the VIII semester examinations. However, he/she shall not be eligible to get the course completion certificate until all the courses of III, IV, V and VI semesters are successfully completed.

A lateral entry student shall be eligible to get his/her CGPA upon successful completion of the courses of III to VIII semesters within the stipulated time period as per the norms specified in 26.

Any student who hasgiven more than 4 chances for successful completion of I / III semester courses and more than 3 chances for successful completion of II / IV semester courses shall be permitted to attend V / VII semester classes ONLY during the subsequent academic year as the case may be. In simpler terms there shall NOT be any ODD BATCH for any semester.

Note: Grade ABshould be considered as failed and treated as one head for deciding academic progression. Such rules are also applicable for those students who fail to register for examination(s) of any course in any semester.

17. Grading of performances

17.1. Letter grades and grade points allocations:

Based on the performances, each student shall be awarded a final letter grade at the end of the semester for each course.The letter grades and their corresponding grade points are given in Table – XII.

Table – XII: Letter grades and grade points equivalent to Percentage of marks and performances

Percentage of Marks Obtained	Letter Grade	Grade Point	Performance
90.00 – 100	O	10	Outstanding
80.00 – 89.99	A	9	Excellent
70.00 – 79.99	B	8	Good
60.00 – 69.99	C	7	Fair
50.00 – 59.99	D	6	Average
Less than 50	F	0	Fail
Absent	AB	0	Fail

A learner who remains absent for any end semester examination shall be assigned a letter grade of ABand a corresponding grade point of zero. He/she should reappear for the said evaluation/examination in due course.

18. The Semester grade point average (SGPA)

The performance of a student in a semester is indicated by a number called 'Semester Grade Point Average' (SGPA). The SGPA is the weighted average of the grade points obtainedin all the courses by the student during the semester. For example, if a student takes five courses(Theory/Practical) in a semester with credits C1, C2, C3, C4 and C5 and the student's grade pointsin these courses are G1, G2, G3, G4 and G5, respectively, and then students' SGPA is equal to:

$$\text{SGPA} = \frac{C_1G_1 + C_2G_2 + C_3G_3 + C_4G_4 + C_5G_5}{C_1 + C_2 + C_3 + C_4 + C_5}$$

The SGPA is calculated to two decimal points.It should be noted that, the SGPA for any semester shall take into consideration the F and ABSgrade awarded in that semester. For example if a learner has a F or ABS grade in course 4, theSGPA shall then be computed as:

$$\text{SGPA} = \frac{C_1G_1 + C_2G_2 + C_3G_3 + C_4 * \text{ZERO} + C_5G_5}{C_1 + C_2 + C_3 + C_4 + C_5}$$

19. Cumulative Grade Point Average (CGPA)

The CGPA is calculated with the SGPA of all the VIII semesters to two decimal points and is indicated in final grade report card/final transcript showing the grades of all VIII semesters and their courses. The CGPA shall reflect the failed statusin case of F grade(s),till the course(s) is/are passed. When the course(s)is/are passedby obtaining a pass grade on subsequent examination(s) theCGPA shall only reflect the new grade and not the fail grades earned earlier.The CGPA is calculated as:

$$\text{CGPA} = \frac{C_1S_1 + C_2S_2 + C_3S_3 + C_4S_4 + C_5S_5 + C_6S_6 + C_7S_7 + C_8S_8}{C_1 + C_2 + C_3 + C_4 + C_5 + C_6 + C_7 + C_8}$$

where $C_1, C_2, C_3,\ldots$ is the total number of credits for semester I,II,III,…. and $S_1,S_2, S_3,\ldots$is the SGPA of semester I,II,III,…. .

20. Declaration of class

The class shall be awarded on the basis of CGPA as follows:

First Class with Distinction	= CGPA of. 7.50 and above
First Class	= CGPA of 6.00 to 7.49
Second Class	= CGPA of 5.00 to 5.99

21. Project work

All the students shall undertake a projectunder the supervision of a teacher and submit a report. The area of the project shall directly relate any one of the elective subject opted by the student in semester VIII. The project shall be carried out in group not exceeding 5 in number. The project report shall be submitted in triplicate (typed & bound copy not less than 25 pages).

The internal and external examiner appointed by the University shall evaluate the project at the time of the Practical examinations of other semester(s). Students shall be evaluated in groups for four hours (i.e., about half an hour for a group of five students). The projects shall be evaluated as per the criteria given below.

Evaluation of Dissertation Book:

Objective(s) of the work done		15 Marks
Methodology adopted		20 Marks
Results and Discussions		20 Marks
Conclusions and Outcomes		20 Marks
	Total	**75 Marks**

Evaluation of Presentation:

Presentation of work		25 Marks
Communication skills		20 Marks
Question and answer skills		30 Marks
	Total	**75 Marks**

Explanation: The 75 marks assigned to the dissertation book shall be same for all the students in a group. However, the 75 marks assigned for presentation shall be awarded based on the performance of individual students in the given criteria.

22. Industrial training (Desirable)

Every candidate shall be required to work for at least 150 hours spread over four weeks in a Pharmaceutical Industry/Hospital. It includes Production unit, Quality Control department, Quality Assurance department, Analytical laboratory, Chemical manufacturing unit, Pharmaceutical R&D, Hospital (Clinical Pharmacy), Clinical Research Organization, Community Pharmacy, etc. After the Semester – VI and before the commencement of Semester – VII, and shall submit satisfactory report of such work and certificate duly signed by the authority of training organization to the head of the institute.

23. Practice School

In the VII semester, every candidate shall undergo practice school for a period of 150 hours evenly distributed throughout the semester. The student shall opt any one of the domains for practice school declared by the program committee from time to time.

At the end of the practice school, every student shall submit a printed report (in triplicate) on the practice school he/she attended (not more than 25 pages). Along with the exams of semester VII, the report submitted by the student, knowledge and skills acquired by the student through practice school shall be evaluated by the subject experts at college leveland grade point shall be awarded.

24. Award of Ranks

Ranks and Medals shall be awarded on the basis of final CGPA. However, candidates who fail in one or more courses during the B.Pharm program shall not be eligible for award of ranks.Moreover, the candidates should have completed the B. Pharm program in minimum prescribed number of years, (four years) for the award of Ranks.

25. Award of degree

Candidates who fulfill the requirements mentioned above shall be eligible for award of degree during the ensuing convocation.

26. Duration for completion of the program of study

The duration for the completion of the program shall be fixed as double the actual duration of the program and the students have to pass within the said period, otherwise they have to get fresh Registration.

27. Re-admission after break of study

Candidate who seeks re-admission to the program after break of study has to get the approval from the university by paying a condonation fee.

No condonation is allowed for the candidate who has more than 2 years of break up period and he/she has to rejoin the program by paying the required fees.

CHAPTER - II: SYLLABUS

Semester I

BP101T. HUMAN ANATOMY AND PHYSIOLOGY-I (Theory)

45 Hours

Scope: This subject is designed to impart fundamental knowledge on the structure and functions of the various systems of the human body. It also helps in understanding both homeostatic mechanisms. The subject provides the basic knowledge required to understand the various disciplines of pharmacy.

Objectives: Upon completion of this course the student should be able to

1. Explain the gross morphology, structure and functions of various organs of the human body.
2. Describe the various homeostatic mechanisms and their imbalances.
3. Identify the various tissues and organs of different systems of human body.
4. Perform the various experiments related to special senses and nervous system.
5. Appreciate coordinated working pattern of different organs of each system

Course Content:

Unit I **10 hours**

- **Introduction to human body**
  Definition and scope of anatomy and physiology, levels of structural organization and body systems, basic life processes, homeostasis, basic anatomical terminology.
- **Cellular level of organization**
  Structure and functions of cell, transport across cell membrane, cell division, cell junctions. General principles of cell communication, intracellular signaling pathway activation by extracellular signal molecule, Forms of intracellular signaling: a) Contact-dependent b) Paracrine c) Synaptic d) Endocrine
- **Tissue level of organization**
  Classification of tissues, structure, location and functions of epithelial, muscular and nervous and connective tissues.

Unit II **10 hours**

- **Integumentary system**
  Structure and functions of skin
- **Skeletal system**
  Divisions of skeletal system, types of bone, salient features and functions of bones of axial and appendicular skeletal system
  Organization of skeletal muscle, physiology of muscle contraction, neuromuscular junction

- **Joints**
  Structural and functional classification, types of joints movements and its articulation

Unit III **10 hours**

- **Body fluids and blood**
- Body fluids, composition and functions of blood, hemopoeisis, formation of hemoglobin, anemia, mechanisms of coagulation, blood grouping, Rh factors, transfusion, its significance and disorders of blood, Reticulo endothelial system.
- **Lymphatic system**

  Lymphatic organs and tissues, lymphatic vessels, lymph circulation and functions of lymphatic system

Unit IV **08 hours**

Peripheral nervous system:
Classification of peripheral nervous system: Structure and functions of sympathetic and parasympathetic nervous system.
Origin and functions of spinal and cranial nerves.

- **Special senses**
  Structure and functions of eye, ear, nose and tongue and their disorders.

Unit V **07 hours**

- **Cardiovascular system**
  Heart – anatomy of heart, blood circulation, blood vessels, structure and functions of artery, vein and capillaries, elements of conduction system of heart and heart beat, its regulation by autonomic nervous system, cardiac output, cardiac cycle. Regulation of blood pressure, pulse, electrocardiogram and disorders of heart.

BP107P. HUMAN ANATOMY AND PHYSIOLOGY (Practical)

4 Hours/week

Practical physiology is complimentary to the theoretical discussions in physiology. Practicals allow the verification of physiological processes discussed in theory classes through experiments on living tissue, intact animals or normal human beings. This is helpful for developing an insight on the subject**.**

1. Study of compound microscope.
2. Microscopic study of epithelial and connective tissue
3. Microscopic study of muscular and nervous tissue
4. Identification of axial bones
5. Identification of appendicular bones

6. Introduction to hemocytometry.
7. Enumeration of white blood cell (WBC) count
8. Enumeration of total red blood corpuscles (RBC) count
9. Determination of bleeding time
10. Determination of clotting time
11. Estimation of hemoglobin content
12. Determination of blood group.
13. Determination of erythrocyte sedimentation rate (ESR).
14. Determination of heart rate and pulse rate.
15. Recording of blood pressure.

Recommended Books (Latest Editions)

1. Essentials of Medical Physiology by K. Sembulingam and P. Sembulingam. Jaypee brothers medical publishers, New Delhi.
2. Anatomy and Physiology in Health and Illness by Kathleen J.W. Wilson, Churchill Livingstone, New York
3. Physiological basis of Medical Practice-Best and Tailor. Williams & Wilkins Co,Riverview,MI USA
4. Text book of Medical Physiology- Arthur C,Guyton andJohn.E. Hall. Miamisburg, OH, U.S.A.
5. Principles of Anatomy and Physiology by Tortora Grabowski. Palmetto, GA, U.S.A.

6. Textbook of Human Histology by Inderbir Singh, Jaypee brother's medical publishers, New Delhi.
7. Textbook of Practical Physiology by C.L. Ghai, Jaypee brother's medical publishers, New Delhi.
8. Practical workbook of Human Physiology by K. Srinageswari and Rajeev Sharma, Jaypee brother's medical publishers, New Delhi.

Reference Books (Latest Editions)

1. Physiological basis of Medical Practice-Best and Tailor. Williams & Wilkins Co, Riverview, MI USA
2. Text book of Medical Physiology- Arthur C, Guyton and John. E. Hall. Miamisburg, OH, U.S.A.
3. Human Physiology (vol 1 and 2) by Dr. C.C. Chatterrje ,Academic Publishers Kolkata

BP102T. PHARMACEUTICAL ANALYSIS (Theory)

45 Hours

Scope: This course deals with the fundamentals of analytical chemistry and principles of electrochemical analysis of drugs

Objectives: Upon completion of the course student shall be able to

- understand the principles of volumetric and electro chemical analysis
- carryout various volumetric and electrochemical titrations
- develop analytical skills

Course Content:

UNIT-I **10 Hours**

(a) Pharmaceutical analysis- Definition and scope

i) Different techniques of analysis

ii) Methods of expressing concentration

iii) Primary and secondary standards.

iv) Preparation and standardization of various molar and normal solutions- Oxalic acid, sodium hydroxide, hydrochloric acid, sodium thiosulphate, sulphuric acid, potassium permanganate and ceric ammonium sulphate

(b)Errors: Sources of errors, types of errors, methods of minimizing errors, accuracy, precision and significant figures

(c)Pharmacopoeia, Sources of impurities in medicinal agents,limit tests.

UNIT-II **10 Hours**

- **Acid base titration**: Theories of acid base indicators, classification of acid base titrations and theory involved in titrations of strong, weak, and very weak acids and bases, neutralization curves
- **Non aqueous titration**: Solvents, acidimetry and alkalimetry titration and estimation of Sodium benzoate and Ephedrine HCl

UNIT-III **10 Hours**

- **Precipitation titrations**: Mohr's method, Volhard's, Modified Volhard's, Fajans method, estimation of sodium chloride.
- **Complexometric titration**: Classification, metal ion indicators, masking and demasking reagents, estimation of Magnesium sulphate, and calcium gluconate.
- **Gravimetry**: Principle and steps involved in gravimetric analysis. Purity of the precipitate: co-precipitation and post precipitation, Estimation of barium sulphate.

- Basic Principles,methods and application of diazotisation titration.

UNIT-IV **08 Hours**

Redox titrations

(a) Concepts of oxidation and reduction

(b) Types of redox titrations (Principles and applications)

Cerimetry, Iodimetry, Iodometry, Bromatometry, Dichrometry, Titration with potassium iodate

UNIT-V **07 Hours**

- **Electrochemical methods of analysis**
  - **Conductometry**- Introduction, Conductivity cell, Conductometric titrations, applications.
  - **Potentiometry** - Electrochemical cell, construction and working of reference (Standard hydrogen, silver chloride electrode and calomel electrode) and indicator electrodes (metal electrodes and glass electrode), methods to determine end point of potentiometric titration and applications.
  - **Polarography** - Principle, Ilkovic equation, construction and working of dropping mercury electrode and rotating platinum electrode, applications

BP108P. PHARMACEUTICAL ANALYSIS (Practical)

4 Hours / Week

I **Limit Test of the following**

(1) Chloride
(2) Sulphate
(3) Iron
(4) Arsenic

II **Preparation and standardization of**

(1) Sodium hydroxide
(2) Sulphuric acid
(3) Sodium thiosulfate
(4) Potassium permanganate
(5) Ceric ammonium sulphate

III **Assay of the following compounds along with Standardization of Titrant**

(1) Ammonium chloride by acid base titration
(2) Ferrous sulphate by Cerimetry
(3) Copper sulphate by Iodometry
(4) Calcium gluconate by complexometry
(5) Hydrogen peroxide by Permanganometry
(6) Sodium benzoate by non-aqueous titration
(7) Sodium Chloride by precipitation titration

IV **Determination of Normality by electro-analytical methods**

(1) Conductometric titration of strong acid against strong base
(2) Conductometric titration of strong acid and weak acid against strong base
(3) Potentiometric titration of strong acid against strong base

Recommended Books: (Latest Editions)

1. A.H. Beckett & J.B. Stenlake's, Practical Pharmaceutical Chemistry Vol I & II, Stahlone Press of University of London
2. A.I. Vogel, Text Book of Quantitative Inorganic analysis
3. P. Gundu Rao, Inorganic Pharmaceutical Chemistry
4. Bentley and Driver's Textbook of Pharmaceutical Chemistry
5. John H. Kennedy, Analytical chemistry principles
6. Indian Pharmacopoeia.

BP103T. PHARMACEUTICS- I (Theory)

45 Hours

Scope: This course is designed to impart a fundamental knowledge on the preparatory pharmacy with arts and science of preparing the different conventional dosage forms.

Objectives: Upon completion of this course the student should be able to:

- Know the history of profession of pharmacy
- Understand the basics of different dosage forms, pharmaceutical incompatibilities and pharmaceutical calculations
- Understand the professional way of handling the prescription
- Preparation of various conventional dosage forms

Course Content:

UNIT – I **10 Hours**

- **Historical background and development of profession of pharmacy**: History of profession of Pharmacy in India in relation to pharmacy education, industry and organization, Pharmacy as a career, Pharmacopoeias: Introduction to IP, BP, USP and Extra Pharmacopoeia.
- **Dosage forms:** Introduction to dosage forms, classification and definitions
- **Prescription:** Definition, Parts of prescription, handling of Prescription and Errors in prescription.
- **Posology:** Definition, Factors affecting posology. Pediatric dose calculations based on age, body weight and body surface area.

UNIT – II **10 Hours**

- **Pharmaceutical calculations**: Weights and measures – Imperial & Metric system, Calculations involving percentage solutions, alligation, proof spirit and isotonic solutions based on freezing point and molecular weight.

- **Powders:** Definition, classification, advantages and disadvantages,Simple & compound powders – official preparations, dusting powders, effervescent, efflorescent and hygroscopic powders, eutectic mixtures. Geometric dilutions.

- **Liquid dosage forms:** Advantages and disadvantages of liquid dosage forms. Excipients used in formulation of liquid dosage forms. Solubility enhancement techniques

UNIT – III **08 Hours**

- **Monophasic liquids:** Definitions and preparations of Gargles, Mouthwashes, Throat Paint, Eardrops, Nasal drops, Enemas, Syrups, Elixirs, Liniments and Lotions.
- **Biphasic liquids:**
- **Suspensions:** Definition, advantages and disadvantages, classifications, Preparation of suspensions; Flocculated and Deflocculated suspension & stability problems and methods to overcome.
- **Emulsions:** Definition, classification, emulsifying agent, test for the identification of type ofEmulsion, Methods of preparation & stability problems and methods to overcome.

UNIT – IV **08 Hours**

- **Suppositories**: Definition, types, advantages and disadvantages, types of bases, methods of preparations. Displacement value & its calculations, evaluation of suppositories.
- **Pharmaceutical incompatibilities**: Definition, classification, physical, chemical and therapeutic incompatibilities with examples.

UNIV – V **07 Hours**

- **Semisolid dosage forms:** Definitions, classification, mechanisms and factors influencing dermal penetration of drugs. Preparation of ointments, pastes, creams and gels. Excipients used in semi solid dosage forms. Evaluation of semi solid dosages forms

BP109P. PHARMACEUTICSI (Practical)

3 Hours / week

1 . Syrups

a) Syrup IP'66

b) Compound syrup of Ferrous Phosphate BPC'68

2. Elixirs a) Piperazine citrate elixir

b) Paracetamol pediatric elixir

3.Linctus a) Terpin Hydrate Linctus IP'66

b) Iodine Throat Paint (Mandles Paint)

4. Solutions

a) Strong solution of ammonium acetate

b) Cresol with soap solution

c) Lugol's solution

5. Suspensions

a) Calamine lotion

b) Magnesium Hydroxide mixture

c) Aluminimum Hydroxide gel

6. Emulsions a) Turpentine Liniment

b) Liquid paraffin emulsion

7. Powders and Granules

a) ORS powder (WHO)

b) Effervescent granules

c)Dusting powder

d)Divded powders

8. Suppositories

a) Glycero gelatin suppository

b) Coca butter suppository

c) Zinc Oxide suppository

8. Semisolids

a) Sulphur ointment

b) Non staining-iodine ointment with methyl salicylate

c) Carbopal gel

9. Gargles and Mouthwashes

a) Iodine gargle

b) Chlorhexidine mouthwash

Recommended Books: (Latest Editions)

1. H.C. Ansel et al., Pharmaceutical Dosage Form and Drug Delivery System, Lippincott Williams and Walkins, New Delhi.
2. Carter S.J., Cooper and Gunn's-Dispensing for Pharmaceutical Students, CBS publishers, New Delhi.
3. M.E. Aulton, Pharmaceutics, The Science& Dosage Form Design, Churchill Livingstone, Edinburgh.
4. Indian pharmacopoeia.
5. British pharmacopoeia.
6. Lachmann. Theory and Practice of Industrial Pharmacy,Lea& Febiger Publisher, The University of Michigan.
7. Alfonso R. Gennaro Remington. The Science and Practice of Pharmacy, Lippincott Williams, New Delhi.
8. Carter S.J., Cooper and Gunn's. Tutorial Pharmacy, CBS Publications, New Delhi.
9. E.A. Rawlins, Bentley's Text Book of Pharmaceutics, English Language Book Society, Elsevier Health Sciences, USA.
10. Isaac Ghebre Sellassie: Pharmaceutical Pelletization Technology, Marcel Dekker, INC, New York.
11. Dilip M. Parikh: Handbook of Pharmaceutical Granulation Technology, Marcel Dekker, INC, New York.
12. Francoise Nieloud and Gilberte Marti-Mestres: Pharmaceutical Emulsions and Suspensions, Marcel Dekker, INC, New York.

BP104T. PHARMACEUTICAL INORGANIC CHEMISTRY (Theory)

45 Hours

Scope: This subject deals with the monographs of inorganic drugs and pharmaceuticals.

Objectives: Upon completion of course student shall be able to

- know the sources of impurities and methods to determine the impurities in inorganic drugs and pharmaceuticals
- understand the medicinal and pharmaceutical importance of inorganic compounds

Course Content:

UNIT I **10 Hours**

- **Impurities in pharmaceutical substances:** History of Pharmacopoeia, Sources and types of impurities, principle involved in the limit test for Chloride, Sulphate, Iron, Arsenic, Lead and Heavy metals, modified limit test for Chloride and Sulphate

  General methods of preparation, assay for the compounds superscripted with **asterisk (*),** properties and medicinal uses of inorganic compounds belonging to the following classes

UNIT II **10 Hours**

- **Acids, Bases and Buffers:** Buffer equations and buffer capacity in general, buffers in pharmaceutical systems, preparation, stability, buffered isotonic solutions, measurements of tonicity, calculations and methods of adjusting isotonicity.
- **Major extra and intracellular electrolytes**: Functions of major physiological ions, Electrolytes used in the replacement therapy: Sodium chloride*, Potassium chloride, Calcium gluconate* and Oral Rehydration Salt (ORS), Physiological acid base balance.
- **Dental products**: Dentifrices, role of fluoride in the treatment of dental caries, Desensitizing agents, Calcium carbonate, Sodium fluoride, and Zinc eugenol cement.

UNIT III **10 Hours**

- **Gastrointestinal agents**

  Acidifiers: Ammonium chloride* and Dil. HCl

  Antacid: Ideal properties of antacids, combinations of antacids, Sodium

Bicarbonate*, Aluminum hydroxide gel, Magnesium hydroxide mixture

Cathartics: Magnesium sulphate, Sodium orthophosphate, Kaolin and Bentonite

Antimicrobials: Mechanism, classification, Potassium permanganate, Boric acid, Hydrogen peroxide*, Chlorinated lime*, Iodine and its preparations

UNIT IV **08 Hours**

- **Miscellaneous compounds**

  Expectorants: Potassium iodide, Ammonium chloride*.

  Emetics: Copper sulphate*, Sodium potassium tartarate

  Haematinics: Ferrous sulphate*, Ferrous gluconate

  Poison and Antidote: Sodium thiosulphate*, Activated charcoal, Sodium nitrite333

  Astringents: Zinc Sulphate, Potash Alum

UNIT V **07 Hours**

- **Radiopharmaceuticals**: Radio activity, Measurement of radioactivity, Properties of α, β, γ radiations, Half life, radio isotopes and study of radio isotopes - Sodium iodide I^{131}, Storage conditions, precautions & pharmaceutical application of radioactive substances.

BP110P. PHARMACEUTICAL INORGANIC CHEMISTRY (Practical)

4 Hours / Week

I **Limit tests for following ions**

Limit test for Chlorides and Sulphates
Modified limit test for Chlorides and Sulphates
Limit test for Iron
Limit test for Heavy metals
Limit test for Lead
Limit test for Arsenic

II **Identification test**

Magnesium hydroxide
Ferrous sulphate
Sodium bicarbonate
Calcium gluconate
Copper sulphate

III **Test for purity**

Swelling power of Bentonite
Neutralizing capacity of aluminum hydroxide gel
Determination of potassium iodate and iodine in potassium Iodide

IV **Preparation of inorganic pharmaceuticals**

Boric acid
Potash alum
Ferrous sulphate

Recommended Books (Latest Editions)

1. A.H. Beckett & J.B. Stenlake's, Practical Pharmaceutical Chemistry Vol I & II, Stahlone Press of University of London, 4th edition.
2. A.I. Vogel, Text Book of Quantitative Inorganic analysis
3. P. Gundu Rao, Inorganic Pharmaceutical Chemistry, 3rd Edition
4. M.L Schroff, Inorganic Pharmaceutical Chemistry
5. Bentley and Driver's Textbook of Pharmaceutical Chemistry
6. Anand & Chatwal, Inorganic Pharmaceutical Chemistry
7. Indian Pharmacopoeia

BP105T.COMMUNICATION SKILLS (Theory)

30 Hours

Scope: This course will prepare the young pharmacy student to interact effectively with doctors, nurses, dentists, physiotherapists and other health workers. At the end of this course the student will get the soft skills set to work cohesively with the team as a team player and will add value to the pharmaceutical business.

Objectives:

Upon completion of the course the student shall be able to

1. Understand the behavioral needs for a Pharmacist to function effectively in the areas of pharmaceutical operation
2. Communicate effectively (Verbal and Non Verbal)
3. Effectively manage the team as a team player
4. Develop interview skills
5. Develop Leadership qualities and essentials

Course content:

UNIT – I **07 Hours**

- **Communication Skills:** Introduction, Definition, The Importance of Communication, The Communication Process – Source, Message, Encoding, Channel, Decoding, Receiver, Feedback, Context

- **Barriers to communication:** Physiological Barriers, Physical Barriers, Cultural Barriers, Language Barriers, Gender Barriers, Interpersonal Barriers, Psychological Barriers, Emotional barriers

- **Perspectives in Communication:** Introduction, Visual Perception, Language, Other factors affecting our perspective - Past Experiences, Prejudices, Feelings, Environment

UNIT – II **07 Hours**

- **Elements of Communication:** Introduction, Face to Face Communication - Tone of Voice, Body Language (Non-verbal communication), Verbal Communication, Physical Communication

- **Communication Styles:** Introduction, The Communication Styles Matrix with example for each -Direct Communication Style, Spirited Communication Style, Systematic Communication Style, Considerate Communication Style

UNIT – III **07 Hours**

- **Basic Listening Skills:** Introduction, Self-Awareness, Active Listening, Becoming an Active Listener, Listening in Difficult Situations
- **Effective Written Communication:** Introduction, When and When Not to Use Written Communication - Complexity of the Topic, Amount of Discussion' Required, Shades of Meaning, Formal Communication
- **Writing Effectively:** Subject Lines, Put the Main Point First, Know Your Audience, Organization of the Message

UNIT – IV **05 Hours**

- **Interview Skills:** Purpose of an interview, Do's and Dont's of an interview
- **Giving Presentations:** Dealing with Fears, Planning your Presentation, Structuring Your Presentation, Delivering Your Presentation, Techniques of Delivery

UNIT – V **04 Hours**

- **Group Discussion:** Introduction, Communication skills in group discussion, Do's and Dont's of group discussion

BP111P.COMMUNICATION SKILLS (Practical)

2 Hours / week

Thefollowing learning modules are to be conducted using wordsworth® English language lab software

Basic communication covering the following topics

Meeting People

Asking Questions

Making Friends

What did you do?

Do's and Dont's

Pronunciations covering the following topics

Pronunciation (Consonant Sounds)

Pronunciation and Nouns

Pronunciation (Vowel Sounds)

Advanced Learning

Listening Comprehension / Direct and Indirect Speech

Figures of Speech

Effective Communication

Writing Skills

Effective Writing

Interview Handling Skills

E-Mail etiquette

Presentation Skills

Recommended Books: (Latest Edition)

1. Basic communication skills for Technology, Andreja. J. Ruther Ford, 2nd Edition, Pearson Education, 2011
2. Communication skills, Sanjay Kumar, Pushpalata, 1stEdition, Oxford Press, 2011
3. Organizational Behaviour, Stephen .P. Robbins, 1stEdition, Pearson, 2013
4. Brilliant- Communication skills, Gill Hasson, 1stEdition, Pearson Life, 2011
5. The Ace of Soft Skills: Attitude, Communication and Etiquette for success, Gopala Swamy Ramesh, 5thEdition, Pearson, 2013
6. Developing your influencing skills, Deborah Dalley, Lois Burton, Margaret, Green hall, 1st Edition Universe of Learning LTD, 2010
7. Communication skills for professionals, Konar nira, 2ndEdition, New arrivals – PHI, 2011
8. Personality development and soft skills, Barun K Mitra, 1stEdition, Oxford Press, 2011
9. Soft skill for everyone, Butter Field, 1st Edition, Cengage Learning india pvt.ltd, 2011
10. Soft skills and professional communication, Francis Peters SJ, 1stEdition, Mc Graw Hill Education, 2011
11. Effective communication, John Adair, 4thEdition, Pan Mac Millan,2009
12. Bringing out the best in people, Aubrey Daniels, 2ndEdition, Mc Graw Hill, 1999

BP 106RBT.REMEDIAL BIOLOGY (Theory)

30 Hours

Scope: To learn and understand the components of living world, structure and functional system of plant and animal kingdom.

Objectives: Upon completion of the course, the student shall be able to

- know the classification and salient features of five kingdoms of life
- understand the basic components of anatomy & physiology of plant
- know understand the basic components of anatomy & physiology animal with special reference to human

UNIT I **07 Hours**

Living world:

- Definition and characters of living organisms
- Diversity in the living world
- Binomial nomenclature
- Five kingdoms of life and basis of classification. Salient features of Monera, Potista, Fungi, Animalia and Plantae, Virus,

Morphology of Flowering plants

- Morphology of different parts of flowering plants – Root, stem, inflorescence, flower, leaf, fruit, seed.
- General Anatomy of Root, stem, leaf of monocotyledons & Dicotylidones.

UNIT II **07 Hours**

Body fluids and circulation

- Composition of blood, blood groups, coagulation of blood
- Composition and functions of lymph
- Human circulatory system
- Structure of human heart and blood vessels
- Cardiac cycle, cardiac output and ECG

Digestion and Absorption

- Human alimentary canal and digestive glands
- Role of digestive enzymes
- Digestion, absorption and assimilation of digested food

Breathing and respiration

- Human respiratory system
- Mechanism of breathing and its regulation
- Exchange of gases, transport of gases and regulation of respiration
- Respiratory volumes

UNIT III **07 Hours**

Excretory products and their elimination

- Modes of excretion
- Human excretory system- structure and function
- Urine formation
- Rennin angiotensin system

Neural control and coordination

- Definition and classification of nervous system
- Structure of a neuron
- Generation and conduction of nerve impulse
- Structure of brain and spinal cord
- Functions of cerebrum, cerebellum, hypothalamus and medulla oblongata

Chemical coordination and regulation

- Endocrine glands and their secretions
- Functions of hormones secreted by endocrine glands

Human reproduction

- Parts of female reproductive system
- Parts of male reproductive system
- Spermatogenesis and Oogenesis
- Menstrual cycle

UNIT IV **05 Hours**

Plants and mineral nutrition:

- Essential mineral, macro and micronutrients
- Nitrogen metabolism, Nitrogen cycle, biological nitrogen fixation

Photosynthesis

- Autotrophic nutrition, photosynthesis, Photosynthetic pigments, Factors affecting photosynthesis.

UNIT V **04 Hours**

Plant respiration: Respiration, glycolysis, fermentation (anaerobic).

Plant growth and development

- Phases and rate of plant growth, Condition of growth,Introduction to plant growth regulators

Cell - The unit of life

- Structure and functions of cell and cell organelles.Cell division

Tissues

- Definition, types of tissues, location and functions.

Text Books

a. Text book of Biology by S. B. Gokhale
b. A Text book of Biology by Dr. Thulajappa and Dr. Seetaram.

Reference Books

a. A Text book of Biology by B.V. Sreenivasa Naidu
b. A Text book of Biology by Naidu and Murthy
c. Botany for Degree students By A.C.Dutta.
d.Outlines of Zoology by M. Ekambaranatha ayyer and T. N. Ananthakrishnan.
e. A manual for pharmaceutical biology practical by S.B. Gokhale and C. K. Kokate

BP112RBP.REMEDIAL BIOLOGY (Practical)

30 Hours

1. Introduction to experiments in biology
   a) Study of Microscope
   b) Section cutting techniques
   c) Mounting and staining
   d) Permanent slide preparation
2. Study of cell and its inclusions
3. Study of Stem, Root, Leaf, seed, fruit, flower and their modifications
4. Detailed study of frog by using computer models
5. Microscopic study and identification of tissues pertinent to Stem, Root Leaf, seed, fruit and flower
6. Identification of bones
7. Determination of blood group
8. Determination of blood pressure
9. Determination of tidal volume

Reference Books

1. Practical human anatomy and physiology. by S.R.Kale and R.R.Kale.
2. A Manual of pharmaceutical biology practical by S.B.Gokhale, C.K.Kokate and S.P.Shriwastava.
3. Biology practical manual according to National core curriculum .Biology forum of Karnataka. Prof .M.J.H.Shafi

BP 106RMT.REMEDIAL MATHEMATICS (Theory)

30 Hours

Scope: This is an introductory course in mathematics. This subject deals with the introduction to Partial fraction, Logarithm, matrices and Determinant, Analytical geometry, Calculus, differential equation and Laplace transform.

Objectives: Upon completion of the course the student shall be able to:-

1. Know the theory and their application in Pharmacy
2. Solve the different types of problems by applying theory
3. Appreciate the important application of mathematics in Pharmacy

Course Content:

UNIT – I **06 Hours**

- **Partial fraction**

Introduction, Polynomial, Rational fractions, Proper and Improper fractions, Partial fraction , Resolving into Partial fraction, Application of Partial Fraction in Chemical Kinetics and Pharmacokinetics

- **Logarithms**

Introduction, Definition, Theorems/Properties of logarithms, Common logarithms, Characteristic and Mantissa, worked examples, application of logarithm to solve pharmaceutical problems.

- **Function***:*

Real Valued function, Classification of real valued functions,

- **Limits and continuity** :

Introduction , Limit of a function, Definition of limit of a function ($\in$ - δ definition) , $\lim_{x\to a}\frac{x^n - a^n}{x-a} = na^{n-1}$, $\lim_{\theta\to 0}\frac{\sin\theta}{\theta} = 1,$

UNIT –II **06 Hours**

- **Matrices and Determinant:**

Introduction matrices, Types of matrices, Operation on matrices, Transpose of a matrix, Matrix Multiplication, Determinants, Properties of determinants , Product of determinants, Minors and co-Factors, Adjoint or adjugate of a square matrix , Singular and non-singular matrices, Inverse of a matrix, Solution of system of linear of equations using matrix method, Cramer's rule, Characteristic equation and roots of a square matrix, Cayley–Hamilton theorem,Applicationof Matrices in solving Pharmacokinetic equations

UNIT – III **06 Hours**

- **Calculus**

Differentiation : Introductions, Derivative of a function, Derivative of a constant, Derivative of a product of a constant and a function , Derivative of the sum or difference of two functions, Derivative of the product of two functions (product formula), Derivative of the quotient of two functions (Quotient formula) – **Without Proof**, Derivative of x^n *w.r.t*x,where *n* is any rational number, Derivative of e^x,, Derivative of $\log_e x$, Derivative of a^x,Derivative of trigonometric functions from first principles **(without Proof)**, Successive Differentiation, Conditions for a function to be a maximum or a minimum at a point. Application

UNIT – IV **06 Hours**

- **Analytical Geometry**

Introduction: Signs of the Coordinates, Distance formula,

Straight Line : Slope or gradient of a straight line, Conditions for parallelism and perpendicularity of two lines, Slope of a line joining two points, Slope – intercept form of a straight line

Integration:

Introduction, Definition, Standard formulae, Rules of integration , Method of substitution, Method of Partial fractions, Integration by parts, definite integrals, application

UNIT-V **06 Hours**

- **Differential Equations** : Some basic definitions, Order and degree, Equations in separable form , Homogeneous equations, Linear Differential equations, Exact equations, **Application in solving Pharmacokinetic equations**
- **Laplace Transform** : Introduction, Definition, Properties of Laplace transform, Laplace Transforms of elementary functions, Inverse Laplace transforms, Laplace transform of derivatives, Application to solve Linear differential equations, **Application in solving Chemical kinetics and Pharmacokinetics equations**

Recommended Books (Latest Edition)

1. Differential Calculus by Shanthinarayan
2. Pharmaceutical Mathematics with application to Pharmacy by Panchaksharappa Gowda D.H.
3. Integral Calculus by Shanthinarayan
4. Higher Engineering Mathematics by Dr.B.S.Grewal

Semester II

BP 201T. HUMAN ANATOMY AND PHYSIOLOGY-II (Theory)

45 Hours

Scope: This subject is designed to impart fundamental knowledge on the structure and functions of the various systems of the human body. It also helps in understanding both homeostatic mechanisms. The subject provides the basic knowledge required to understand the various disciplines of pharmacy.

Objectives: Upon completion of this course the student should be able to:

1. Explain the gross morphology, structure and functions of various organs of the human body.
2. Describe the various homeostatic mechanisms and their imbalances.
3. Identify the various tissues and organs of different systems of human body.
4. Perform the hematological tests like blood cell counts, haemoglobin estimation, bleeding/clotting time etc and also record blood pressure, heart rate, pulse and respiratory volume.
5. Appreciate coordinated working pattern of different organs of each system
6. Appreciate the interlinked mechanisms in the maintenance of normal functioning (homeostasis) of human body.

Course Content:

Unit I **10 hours**

- **Nervous system**

Organization of nervous system, neuron, neuroglia, classification and properties of nerve fibre, electrophysiology, action potential, nerve impulse, receptors, synapse, neurotransmitters.

Central nervous system: Meninges, ventricles of brain and cerebrospinal fluid.structure and functions of brain (cerebrum, brain stem, cerebellum), spinal cord (gross structure, functions of afferent and efferent nerve tracts,reflex activity)

Unit II **06 hours**

- **Digestive system**

Anatomy of GI Tract with special reference to anatomy and functions of stomach, (Acid production in the stomach, regulation of acid production through parasympathetic nervous system, pepsin role in protein digestion) small intestine

and large intestine, anatomy and functions of salivary glands, pancreas and liver, movements of GIT, digestion and absorption of nutrients and disorders of GIT.

- **Energetics**

  Formation and role of ATP, Creatinine Phosphate and BMR.

Unit III

- **Respiratory system** **10 hours**

  Anatomy of respiratory system with special reference to anatomy of lungs, mechanism of respiration, regulation of respiration

  Lung Volumes and capacities transport of respiratory gases, artificial respiration, and resuscitation methods.

- **Urinary system**
  Anatomy of urinary tract with special reference to anatomy of kidney and nephrons, functions of kidney and urinary tract, physiology of urine formation, micturition reflex and role of kidneys in acid base balance, role of RAS in kidney and disorders of kidney.

Unit IV **10 hours**

- **Endocrine system**
  Classification of hormones, mechanism of hormone action, structure and functions of pituitary gland, thyroid gland, parathyroid gland, adrenal
  gland, pancreas, pineal gland, thymus and their disorders.

Unit V **09 hours**

- **Reproductive system**

  Anatomy of male and female reproductive system, Functions of male and female reproductive system, sex hormones, physiology of menstruation, fertilization, spermatogenesis, oogenesis, pregnancy and parturition

- **Introduction to genetics**

  Chromosomes, genes and DNA, protein synthesis, genetic pattern of inheritance

BP 207 P. HUMAN ANATOMY AND PHYSIOLOGY (Practical)

4 Hours/week

Practical physiology is complimentary to the theoretical discussions in physiology. Practicals allow the verification of physiological processes discussed in theory classes through experiments on living tissue, intact animals or normal human beings. This is helpful for developing an insight on the subject**.**

1. To study the integumentary and special senses using specimen, models, etc.,
2. To study the nervous system using specimen, models, etc.,
3. To study the endocrine system using specimen, models, etc
4. To demonstrate the general neurological examination
5. To demonstrate the function of olfactory nerve
6. To examine the different types of taste.
7. To demonstrate the visual acuity
8. To demonstrate the reflex activity
9. Recording of body temperature
10. To demonstrate positive and negative feedback mechanism.
11. Determination of tidal volume and vital capacity.
12. Study of digestive, respiratory, cardiovascular systems, urinary and reproductive systems with the help of models, charts and specimens.
13. Recording of basal mass index .
14. Study of family planning devices and pregnancy diagnosis test.
15. Demonstration of total blood count by cell analyser
16. Permanent slides of vital organs and gonads.

Recommended Books (Latest Editions)

1. Essentials of Medical Physiology by K. Sembulingam and P. Sembulingam. Jaypee brothers medical publishers, New Delhi.
2. Anatomy and Physiology in Health and Illness by Kathleen J.W. Wilson, Churchill Livingstone, New York
3. Physiological basis of Medical Practice-Best and Tailor. Williams & Wilkins Co,Riverview,MI USA

4. Text book of Medical Physiology- Arthur C,Guyton andJohn.E. Hall. Miamisburg, OH, U.S.A.
5. Principles of Anatomy and Physiology by Tortora Grabowski. Palmetto, GA, U.S.A.
6. Textbook of Human Histology by Inderbir Singh, Jaypee brothers medical publishers, New Delhi.
7. Textbook of Practical Physiology by C.L. Ghai, Jaypee brothers medical publishers, New Delhi.
8. Practical workbook of Human Physiology by K. Srinageswari and Rajeev Sharma, Jaypee brother's medical publishers, New Delhi.

Reference Books:

1. Physiological basis of Medical Practice-Best and Tailor. Williams & Wilkins Co, Riverview, MI USA
2. Text book of Medical Physiology- Arthur C, Guyton and John. E. Hall. Miamisburg, OH, U.S.A.
3. Human Physiology (vol 1 and 2) by Dr. C.C. Chatterrje ,Academic Publishers Kolkata

BP202T. PHARMACEUTICAL ORGANIC CHEMISTRY –I (Theory)

45 Hours

Scope: This subject deals with classification and nomenclature of simple organic compounds, structural isomerism, intermediates forming in reactions, important physical properties, reactions and methods of preparation of these compounds. The syllabus also emphasizes on mechanisms and orientation of reactions.

Objectives: Upon completion of the course the student shall be able to

1. write the structure, name and the type of isomerism of the organic compound
2. write the reaction, name the reaction and orientation of reactions
3. account for reactivity/stability of compounds,
4. identify/confirm the identification of organic compound

Course Content:

General methods of preparation and reactions of compounds superscripted with asterisk (*) to be explained

To emphasize on definition, types, classification, principles/mechanisms, applications, examples and differences

UNIT-I **07 Hours**

- **Classification, nomenclature and isomerism**

  Classification of Organic Compounds

  Common and IUPAC systems of nomenclature of organic compounds

  (up to 10 Carbons open chain and carbocyclic compounds)

Structural isomerisms in organic compounds

UNIT-II10 Hours

- **Alkanes*, Alkenes* and Conjugated dienes***

  SP^3 hybridization in alkanes, Halogenation of alkanes, uses of paraffins.

  Stabilities of alkenes, SP^2 hybridization in alkenes

  E_1 and E_2 reactions – kinetics, order of reactivity of alkyl halides, rearrangement of carbocations, Saytzeffs orientation and evidences. E_1 verses E_2 reactions, Factors affecting E_1 and E_2 reactions. Ozonolysis, electrophilic addition reactions of alkenes, Markownikoff's orientation, free radical addition reactions of alkenes, Anti Markownikoff's orientation.

  Stability of conjugated dienes, Diel-Alder, electrophilic addition, free radical addition reactions of conjugated dienes, allylic rearrangement

UNIT-III10 Hours

- **Alkyl halides***

  SN_1 and SN_2 reactions - kinetics, order of reactivity of alkyl halides, stereochemistry and rearrangement of carbocations.

  SN_1 versus SN_2 reactions, Factors affecting SN_1 and SN_2 reactions

  Structure and uses of ethylchloride, Chloroform, trichloroethylene, tetrachloroethylene, dichloromethane, tetrachloromethane and iodoform.

- **Alcohols*-** Qualitative tests, Structure and uses of Ethyl alcohol, Methyl alcohol, chlorobutanol, Cetosteryl alcohol, Benzyl alcohol, Glycerol, Propylene glycol

UNIT-IV10 Hours

- **Carbonyl compounds* (Aldehydes and ketones)**

  Nucleophilic addition, Electromeric effect, aldol condensation, Crossed Aldol condensation, Cannizzaro reaction, Crossed Cannizzaro reaction, Benzoin condensation, Perkin condensation, qualitative tests, Structure and uses of Formaldehyde, Paraldehyde, Acetone, Chloral hydrate, Hexamine, Benzaldehyde, Vanilin, Cinnamaldehyde.

UNIT-V **08 Hours**

- **Carboxylic acids***

  Acidity of carboxylic acids, effect of substituents on acidity, inductive effect and qualitative tests for carboxylic acids ,amide and ester

  Structure and Uses of Acetic acid, Lactic acid, Tartaric acid, Citric acid, Succinic acid. Oxalic acid, Salicylic acid, Benzoic acid, Benzyl benzoate, Dimethyl phthalate, Methyl salicylate and Acetyl salicylic acid

- **Aliphatic amines* -** Basicity, effect of substituent on Basicity. Qualitative test, Structure and uses of Ethanolamine, Ethylenediamine, Amphetamine

BP208P. PHARMACEUTICAL ORGANIC CHEMISTRY -I (Practical)

4 Hours / week

1. Systematic qualitative analysis of unknown organic compounds like
    1. Preliminary test: Color, odour, aliphatic/aromatic compounds, saturation and unsaturation, etc.
    2. Detection of elements like Nitrogen, Sulphur and Halogen by Lassaigne's test
    3. Solubility test
    4. Functional group test like Phenols, Amides/ Urea, Carbohydrates, Amines, Carboxylic acids, Aldehydes and Ketones, Alcohols, Esters, Aromatic and Halogenated Hydrocarbons, Nitro compounds and Anilides.
    5. Melting point/Boiling point of organic compounds
    6. Identification of the unknown compound from the literature using melting point/ boiling point.
    7. Preparation of the derivatives and confirmation of the unknown compound by melting point/ boiling point.
    8. Minimum 5 unknown organic compounds to be analysed systematically.
2. Preparation of suitable solid derivatives from organic compounds
3. Construction of molecular models

Recommended Books (Latest Editions)

1. Organic Chemistry by Morrison and Boyd
2. Organic Chemistry by I.L. Finar , Volume-I
3. Textbook of Organic Chemistry by B.S. Bahl & Arun Bahl.
4. Organic Chemistry by P.L.Soni
5. Practical Organic Chemistry by Mann and Saunders.
6. Vogel's text book of Practical Organic Chemistry
7. Advanced Practical organic chemistry by N.K.Vishnoi.
8. Introduction to Organic Laboratory techniques by Pavia, Lampman and Kriz.
9. Reaction and reaction mechanism by Ahluwaliah/Chatwal.

BP203 T. BIOCHEMISTRY (Theory)

45 Hours

Scope: Biochemistry deals with complete understanding of the molecular levels of the chemical process associated with living cells. The scope of the subject is providing biochemical facts and the principles to understand metabolism of nutrient molecules in physiological and pathological conditions. It is also emphasizing on genetic organization of mammalian genome and hetero & autocatalytic functions of DNA.

Objectives: Upon completion of course student shell able to

1. Understand the catalytic role of enzymes, importance of enzyme inhibitors in design of new drugs, therapeutic and diagnostic applications of enzymes.
2. Understand the metabolism of nutrient molecules in physiological and pathological conditions.
3. Understand the genetic organization of mammalian genome and functions of DNA in the synthesis of RNAs and proteins.

Course Content:

UNIT I **08 Hours**

- **Biomolecules**

  Introduction, classification, chemical nature and biological role of carbohydrate, lipids, nucleic acids, amino acids and proteins.

- **Bioenergetics**

  Concept of free energy, endergonic and exergonic reaction, Relationship between free energy, enthalpy and entropy; Redox potential.

  Energy rich compounds; classification; biological significances of ATP and cyclic AMP

UNIT II **10 Hours**

- **Carbohydrate metabolism**

  Glycolysis – Pathway, energetics and significance

  Citric acid cycle- Pathway, energetics and significance

  HMP shunt and its significance; Glucose-6-Phosphate dehydrogenase (G6PD) deficiency

  Glycogen metabolism Pathways and glycogen storage diseases (GSD)

  Gluconeogenesis- Pathway and its significance

  Hormonal regulation of blood glucose level and Diabetes mellitus

- **Biological oxidation**

  Electron transport chain (ETC) and its mechanism.

Oxidative phosphorylation & its mechanism and substrate level phosphorylation

Inhibitors ETC and oxidative phosphorylation/Uncouplers

UNIT III **10 Hours**

- **Lipid metabolism**

  β-Oxidation of saturated fatty acid (Palmitic acid)

Formation and utilization of ketone bodies; ketoacidosis

De novo synthesis of fatty acids (Palmitic acid)

Biological significance of cholesterol and conversion of cholesterol into bile acids, steroid hormone and vitamin D

Disorders of lipid metabolism: Hypercholesterolemia, atherosclerosis, fatty liver and obesity.

- **Amino acid metabolism**

  General reactions of amino acid metabolism: Transamination, deamination & decarboxylation, urea cycle and its disorders

  Catabolism of phenylalanine and tyrosine and their metabolic disorders (Phenyketonuria, Albinism, alkeptonuria, tyrosinemia)

  Synthesis and significance of biological substances; 5-HT, melatonin, dopamine, noradrenaline, adrenaline

  Catabolism of heme; hyperbilirubinemia and jaundice

UNIT IV **10 Hours**

- **Nucleic acid metabolism and genetic information transfer**

  Biosynthesis of purine and pyrimidine nucleotides

  Catabolism of purine nucleotides and Hyperuricemia and Gout disease

  Organization of mammalian genome

  Structure of DNA and RNA and their functions

  DNA replication (semi conservative model)

  Transcription or RNA synthesis

  Genetic code, Translation or Protein synthesis and inhibitors

UNIT V **07 Hours**

- **Enzymes**

  Introduction, properties, nomenclature and IUB classification of enzymes

  Enzyme kinetics (Michaelis plot, Line Weaver Burke plot)

  Enzyme inhibitors with examples

  Regulation of enzymes: enzyme induction and repression, allosteric enzymes regulation

  Therapeutic and diagnostic applications of enzymes and isoenzymes

  Coenzymes –Structure and biochemical functions

BP 209 P. BIOCHEMISTRY (Practical)

4 Hours / Week

1. Qualitative analysis of carbohydrates (Glucose, Fructose, Lactose, Maltose, Sucrose and starch)
2. Identification tests for Proteins (albumin and Casein)
3. Quantitative analysis of reducing sugars (DNSA method) and Proteins (Biuret method)
4. Qualitative analysis of urine for abnormal constituents
5. Determination of blood creatinine
6. Determination of blood sugar
7. Determination of serum total cholesterol
8. Preparation of buffer solution and measurement of pH
9. Study of enzymatic hydrolysis of starch
10. Determination of Salivary amylase activity
11. Study the effect of Temperature on Salivary amylase activity.
12. Study the effect of substrate concentration on salivary amylase activity.

Recommended Books (Latest Editions)

1. Principles of Biochemistry by Lehninger.
2. Harper's Biochemistry by Robert K. Murry, Daryl K. Granner and Victor W. Rodwell.
3. Biochemistry by Stryer.
4. Biochemistry by D. Satyanarayan and U.Chakrapani
5. Textbook of Biochemistry by Rama Rao.
6. Textbook of Biochemistry by Deb.
7. Outlines of Biochemistry by Conn and Stumpf
8. Practical Biochemistry by R.C. Gupta and S. Bhargavan.
9. Introduction of Practical Biochemistry by David T. Plummer. (3rd Edition)
10. Practical Biochemistry for Medical students by Rajagopal and Ramakrishna.
11. Practical Biochemistry by Harold Varley.

BP 204T.PATHOPHYSIOLOGY (THEORY)

45Hours

Scope: Pathophysiology is the study of causes of diseases and reactions of the body to such disease producing causes.This course is designed to impart a thorough knowledge of the relevant aspects of pathology of various conditions with reference to its pharmacological applications, and understanding of basic pathophysiological mechanisms. Hence it will not only help to study the syllabus of pathology, but also to get baseline knowledge required to practice medicine safely, confidently, rationally and effectively.

Objectives: Upon completion of the subject student shall be able to –

1. Describe the etiology and pathogenesis of the selected disease states;
2. Name the signs and symptoms of the diseases; and
3. Mention the complications of the diseases.

Course content:

Unit I **10Hours**

- **Basic principles of Cell injury and Adaptation:**
  Introduction, definitions, Homeostasis, Components and Types of Feedback systems, Causes of cellular injury**,**Pathogenesis (Cell membrane damage, Mitochondrial damage, Ribosome damage, Nuclear damage)**,**Morphology of cell injury – Adaptive changes (Atrophy, Hypertrophy, hyperplasia, Metaplasia, Dysplasia)**,**Cell swelling, Intra cellular accumulation, Calcification, Enzyme leakage and Cell Death Acidosis &Alkalosis,Electrolyte imbalance

- **Basic mechanism involved in the process of inflammation and repair:**
  Introduction, Clinical signs of inflammation, Different types of Inflammation,Mechanism of Inflammation – Alteration in vascular permeability and blood flow, migration of WBC's,Mediators of inflammation,Basic principles of wound healing in the skin,Pathophysiology of Atherosclerosis

Unit II **10Hours**

- **Cardiovascular System:**
  Hypertension, congestive heart failure, ischemic heart disease (angina,myocardial infarction, atherosclerosis and arteriosclerosis)
- **Respiratory system:**Asthma, Chronic obstructive airways diseases.
- **Renal system:**Acute and chronic renal failure .

Unit II **10Hours**

- **Haematological Diseases:**
  Iron deficiency, megaloblastic anemia (Vit B12 and folic acid), sickle cell anemia, thalasemia, hereditary acquired anemia, hemophilia
- **Endocrine system:** Diabetes, thyroid diseases, disorders of sex hormones
- **Nervous system:** Epilepsy, Parkinson's disease, stroke, psychiatric disorders: depression, schizophrenia and Alzheimer's disease.
- **Gastrointestinal system:** Peptic Ulcer
-

Unit IV **8 Hours**

- Inflammatory bowel diseases, jaundice, hepatitis (A,B,C,D,E,F) alcoholic liver disease.
- **Disease of bones and joints:** Rheumatoid arthritis, osteoporosis and gout
- **Principles of cancer:** classification, etiology and pathogenesis of cancer
- **Diseases of bones and joints:**Rheumatoid Arthritis, Osteoporosis,Gout

- **Principles of Cancer:** Classification, etiology and pathogenesis of Cancer

Unit V **7 Hours**

- **Infectious diseases:**Meningitis,Typhoid, Leprosy, Tuberculosis

Urinary tract infections

- **Sexually transmitted diseases:**AIDS, Syphilis, Gonorrhea

Recommended Books (Latest Editions)

1. Vinay Kumar, Abul K. Abas, Jon C. Aster; Robbins &Cotran Pathologic Basis of Disease; South Asia edition; India; Elsevier; 2014.
2. Harsh Mohan; Text book of Pathology; 6th edition; India; Jaypee Publications; 2010.
3. Laurence B, Bruce C, Bjorn K. ; Goodman Gilman's The Pharmacological Basis of Therapeutics; 12th edition; New York; McGraw-Hill; 2011.
4. Best, Charles Herbert 1899-1978; Taylor, Norman Burke 1885-1972; West, John B (John Burnard); Best and Taylor's Physiological basis of medical practice; 12th ed; united states;
5. William and Wilkins, Baltimore;1991 [1990 printing].
6. Nicki R. Colledge, Brian R. Walker, Stuart H. Ralston;Davidson's Principles and Practice of Medicine; 21st edition; London; ELBS/Churchill Livingstone; 2010.
7. Guyton A, John .E Hall; Textbook of Medical Physiology; 12th edition; WB Saunders Company; 2010.
8. Joseph DiPiro, Robert L. Talbert, Gary Yee, Barbara Wells, L. Michael Posey; Pharmacotherapy: A Pathophysiological Approach; 9th edition; London; McGraw-Hill Medical; 2014.
9. V. Kumar, R. S. Cotran and S. L. Robbins; Basic Pathology; 6th edition; Philadelphia; WB Saunders Company; 1997.
10. Roger Walker, Clive Edwards; Clinical Pharmacy and Therapeutics; 3rd edition; London; Churchill Livingstone publication; 2003.

Recommended Journals

1. The Journal of Pathology. ISSN: 1096-9896 (Online)
2. The American Journal of Pathology. ISSN: 0002-9440
3. Pathology. 1465-3931 (Online)
4. International Journal of Physiology, Pathophysiology and Pharmacology. ISSN: 1944-8171 (Online)
5. Indian Journal of Pathology and Microbiology. ISSN-0377-4929.

BP205 T. COMPUTER APPLICATIONS IN PHARMACY (Theory)

30 Hrs (2 Hrs/Week)

Scope: This subject deals with the introduction Database, Database Management system, computer application in clinical studies and use of databases.

Objectives: Upon completion of the course the student shall be able to

1. know the various types of application of computers in pharmacy
2. know the various types of databases
3. know the various applications of databases in pharmacy

Course content:

UNIT – I **06 hours**

Number system: Binary number system, Decimal number system, Octal number system, Hexadecimal number systems, conversion decimal to binary, binary to decimal, octal to binary etc, binary addition, binary subtraction – One's complement ,Two's complement method, binary multiplication, binary division

Concept of I nformation Systems and Software : Information gathering, requirement and feasibility analysis, data flow diagrams, process specifications, input/output design, process life cycle, planning and managing the project

UNIT –II **06 hours**

Web technologies:Introduction to HTML, XML,CSS and Programming languages, introduction to web servers and Server Products

Introduction to databases, MYSQL, MS ACCESS, Pharmacy Drug database

UNIT – III **06 hours**

Application of computers in Pharmacy – Drug information storage and retrieval, Pharmacokinetics, Mathematical model in Drug design, Hospital and Clinical Pharmacy, Electronic Prescribing and discharge (EP) systems, barcode medicine identification and automated dispensing of drugs, mobile technology and adherence monitoring

Diagnostic System, Lab-diagnostic System, Patient Monitoring System, Pharma Information System

UNIT – IV **06 hours**

Bioinformatics: Introduction, Objective of Bioinformatics, Bioinformatics Databases, Concept of Bioinformatics, Impact of Bioinformatics in Vaccine Discovery

UNIT-V **06 hours**

Computers as data analysis in Preclinical development:
Chromatographic dada analysis(CDS), Laboratory Information management System (LIMS) and Text Information Management System(TIMS)

BP210P. COMPUTER APPLICATIONS IN PHARMACY (Practical)

1. Design a questionnaire using a word processing package to gather information about a particular disease.
2. Create a HTML web page to show personal information.
3 Retrieve the information of a drug and its adverse effects using online tools
4 Creating mailing labels Using Label Wizard , generating label in MS WORD
5 Create a database in MS Access to store the patient information with the required fields Using access
6. Design a form in MS Access to view, add, delete and modify the patient record in the database
7. Generating report and printing the report from patient database
8. Creating invoice table using – MS Access
9. Drug information storage and retrieval using MS Access
10. Creating and working with queries in MS Access
11. Exporting Tables, Queries, Forms and Reports to web pages
12. Exporting Tables, Queries, Forms and Reports to XML pages

Recommended books (Latest edition):

1. Computer Application in Pharmacy – William E.Fassett –Lea and Febiger, 600 South Washington Square, USA, (215) 922-1330.
2. Computer Application in Pharmaceutical Research and Development –Sean Ekins – Wiley-Interscience, A John Willey and Sons, INC., Publication, USA
3. Bioinformatics (Concept, Skills and Applications) – S.C.Rastogi-CBS Publishers and Distributors, 4596/1- A, 11 Darya Gani, New Delhi – 110 002(INDIA)
4. Microsoft office Access - 2003, Application Development Using VBA, SQL Server, DAP and Infopath – Cary N.Prague – Wiley Dreamtech India (P) Ltd., 4435/7, Ansari Road, Daryagani, New Delhi - 110002

BP 206 T. ENVIRONMENTAL SCIENCES (Theory)

30 hours

Scope: Environmental Sciences is the scientific study of the environmental system and the status of its inherent or induced changes on organisms. It includes not only the study of physical and biological characters of the environment but also the social and cultural factors and the impact of man on environment.

Objectives: Upon completion of the course the student shall be able to**:**

1. Create the awareness about environmental problems among learners.
2. Impart basic knowledge about the environment and its allied problems.
3. Develop an attitude of concern for the environment.
4. Motivate learner to participate in environment protection and environment improvement.
5. Acquire skills to help the concerned individuals in identifying and solving environmental problems.
6. Strive to attain harmony with Nature.

Course content:

Unit-I **10hours**

The Multidisciplinary nature of environmental studies

Natural Resources

Renewable and non-renewable resources:

Natural resources and associated problems

a) Forest resources; b) Water resources; c) Mineral resources; d) Food resources; e) Energy resources; f) Land resources: Role of an individual in conservation of natural resources.

Unit-II **10hours**

Ecosystems

- Concept of an ecosystem.
- Structure and function of an ecosystem.
- Introduction, types, characteristic features, structure and function of the ecosystems: Forest ecosystem; Grassland ecosystem; Desert ecosystem; Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

Unit- III **10hours**

Environmental Pollution: Air pollution; Water pollution; Soil pollution

Recommended Books (Latest edition):

1. Y.K. Sing, Environmental Science, New Age International Pvt, Publishers, Bangalore
2. Agarwal, K.C. 2001 Environmental Biology, Nidi Publ. Ltd. Bikaner.
3. Bharucha Erach, The Biodiversity of India, Mapin Pu blishing Pvt. Ltd., Ahmedabad – 380 013, India,
4. Brunner R.C., 1989, Hazardous Waste Incineration, McGraw Hill Inc. 480p
5. Clark R.S., Marine Pollution, Clanderson Press Oxford
6. Cunningham, W.P. Cooper, T.H. Gorhani, E & Hepworth, M.T. 2001, Environmental Encyclopedia, Jaico Publ. House, Mumbai, 1196p
7. De A.K., Environmental Chemistry, Wiley Eastern Ltd.
8. Down of Earth, Centre for Science and Environment

SEMESTER III

BP301T. PHARMACEUTICAL ORGANIC CHEMISTRY –II (Theory)

45 Hours

Scope: This subject deals with general methods of preparation and reactions of some organic compounds. Reactivity of organic compounds are also studied here. The syllabus emphasizes on mechanisms and orientation of reactions. Chemistry of fats and oils are also included in the syllabus.

Objectives: Upon completion of the course the student shall be able to

1. write the structure, name and the type of isomerism of the organic compound
2. write the reaction, name the reaction and orientation of reactions
3. account for reactivity/stability of compounds,
4. prepare organic compounds

Course Content:

General methods of preparation and reactions of compounds superscripted with asterisk (*) to be explained

To emphasize on definition, types, classification, principles/mechanisms, applications, examples and differences

UNIT I **10 Hours**

- **Benzene and its derivatives**
  - **A.** Analytical, synthetic and other evidences in the derivation of structure of benzene, Orbital picture, resonance in benzene, aromatic characters, Huckel's rule
  - **B.** Reactions of benzene - nitration, sulphonation, halogenation- reactivity, Friedelcrafts alkylation- reactivity, limitations, Friedelcrafts acylation.
  - **C.** Substituents, effect of substituents on reactivity and orientation of mono substituted benzene compounds towards electrophilic substitution reaction
  - **D.** Structure and uses of DDT, Saccharin, BHC and Chloramine

UNIT II **10 Hours**

- **Phenols*** - Acidity of phenols, effect of substituents on acidity, qualitative tests, Structure and uses of phenol, cresols, resorcinol, naphthols
- **Aromatic Amines* -** Basicity of amines, effect of substituents on basicity, and synthetic uses of aryl diazonium salts
- **Aromatic Acids* –**Acidity, effect of substituents on acidity and important reactions of benzoic acid.

UNIT III

10 Hours

- **Fats and Oils**

a. Fatty acids – reactions.

b. Hydrolysis, Hydrogenation, Saponification and Rancidity of oils, Drying oils.

c. Analytical constants – Acid value, Saponification value, Ester value, Iodine value, Acetyl value, Reichert Meissl (RM) value – significance and principle involved in their determination.

UNIT IV **08 Hours**

- **Polynuclear hydrocarbons:**

a. Synthesis, reactions

b. Structure and medicinal uses of Naphthalene, Phenanthrene, Anthracene, Diphenylmethane, Triphenylmethane and their derivatives

UNIT V **07 Hours**

- **Cyclo alkanes***

Stabilities – Baeyer's strain theory, limitation of Baeyer's strain theory, Coulson and Moffitt's modification, Sachse Mohr's theory (Theory of strainless rings), reactions of cyclopropane and cyclobutane only

BP305P. PHARMACEUTICAL ORGANIC CHEMISTRY -II (Practical)

4 Hrs/week

I Experiments involving laboratory techniques

- Recrystallization
- Steam distillation

II Determination of following oil values (including standardization of reagents)

- Acid value
- Saponification value
- Iodine value

III **Preparation of compounds**

- Benzanilide/Phenyl benzoate/Acetanilide from Aniline/ Phenol /Aniline by acylation reaction.
- 2,4,6-Tribromo aniline/Para bromo acetanilide from Aniline/
- Acetanilide by halogenation (Bromination) reaction.
- 5-Nitro salicylic acid/Meta di nitro benzene from Salicylic acid / Nitro benzene by nitration reaction.
- Benzoic acid from Benzyl chloride by oxidation reaction.
- Benzoic acid/ Salicylic acid from alkyl benzoate/ alkyl salicylate by hydrolysis reaction.
- 1-Phenyl azo-2-napthol from Aniline by diazotization and coupling reactions.
- Benzil from Benzoin by oxidation reaction.
- Dibenzal acetone from Benzaldehyde by Claison Schmidt reaction
- Cinnammic acid from Benzaldehyde by Perkin reaction
- *P*-Iodo benzoic acid from *P*-amino benzoic acid

Recommended Books (Latest Editions)

1. Organic Chemistry by Morrison and Boyd
2. Organic Chemistry by I.L. Finar , Volume-I
3. Textbook of Organic Chemistry by B.S. Bahl & Arun Bahl.
4. Organic Chemistry by P.L.Soni
5. Practical Organic Chemistry by Mann and Saunders.
6. Vogel's text book of Practical Organic Chemistry
7. Advanced Practical organic chemistry by N.K.Vishnoi.

8. Introduction to Organic Laboratory techniques by Pavia, Lampman and Kriz.

BP302T. PHYSICAL PHARMACEUTICS-I (Theory)

45Hours

Scope: The course deals with the various physica and physicochemical properties, and principles involved in dosage forms/formulations. Theory and practical components of the subject help the student to get a better insight into various areas of formulation research and development, and stability studies of pharmaceutical dosage forms.

Objectives: Upon the completion of the course student shall be able to

1. Understand various physicochemical properties of drug molecules in the designing the dosage forms
2. Know the principles of chemical kinetics & to use them for stability testing nad determination of expiry date of formulations
3. Demonstrate use of physicochemical properties in the formulation development and evaluation of dosage forms.

Course Content:

UNIT-I **10 Hours**

Solubility of drugs: Solubility expressions, mechanisms of solute solvent interactions, ideal solubility parameters, solvation & association, quantitative approach to the factors influencing solubility of drugs, diffusion principles in biological systems. Solubility of gas in liquids, solubility of liquids in liquids, (Binary solutions, ideal solutions) Raoult's law, real solutions. Partially miscible liquids, Critical solution temperature and applications. Distribution law, its limitations and applications

UNIT-II **10Hours**

States of Matter and properties of matter: State of matter, changes in the state of matter, latent heats, vapour pressure, sublimation critical point, eutectic mixtures, gases, aerosols – inhalers, relative humidity, liquid complexes, liquid crystals, glassy states, solid-crystalline, amorphous & polymorphism.

Physicochemical properties of drug molecules: Refractive index, optical rotation, dielectric constant, dipole moment, dissociation constant, determinations and applications

UNIT-III **08 Hours**

Surface and interfacial phenomenon: Liquid interface, surface & interfacial tensions,

surface free energy, measurement of surface & interfacial tensions, spreading coefficient, adsorption at liquid interfaces, surface active agents, HLB Scale, solubilisation, detergency, adsorption at solid interface.

UNIT-IV **08Hours**

Complexation and protein binding: Introduction, Classification of Complexation, Applications, methods of analysis, protein binding, Complexation and drug action, crystalline structures of complexes and thermodynamic treatment of stability constants.

UNIT-V **07 Hours**

pH, buffers and Isotonic solutions: Sorensen's pH scale, pH determination (electrometric and calorimetric), applications of buffers, buffer equation, buffer capacity, buffers in pharmaceutical and biological systems, buffered isotonic solutions.

BP306P. PHYSICAL PHARMACEUTICS – I (Practical)

4 Hrs/week

1. Determination the solubility of drug at room temperature
2. Determination of pKa value by Half Neutralization/ Henderson Hasselbalch equation.
3. Determination of Partition co- efficient of benzoic acid in benzene and water
4. Determination of Partition co- efficient of Iodine in CCl_4 and water
5. Determination of % composition of NaCl in a solution using phenol-water system by CST method
6. Determination of surface tension of given liquids by drop count and drop weight method
7. Determination of HLB number of a surfactant by saponification method
8. Determination of Freundlich and Langmuir constants using activated char coal
9. Determination of critical micellar concentration of surfactants
10. Determination of stability constant and donor acceptor ratio of PABA-Caffeine complex by solubility method
11. Determination of stability constant and donor acceptor ratio of Cupric-Glycine complex by pH titration method

Recommended Books: (Latest Editions)

1. Physical Pharmacy by Alfred Martin
2. Experimental Pharmaceutics by Eugene, Parott.
3. Tutorial Pharmacy by Cooper and Gunn.
4. Stocklosam J. Pharmaceutical Calculations, Lea &Febiger, Philadelphia.
5. Liberman H.A, Lachman C., Pharmaceutical Dosage forms, Tablets, Volume-1 to 3, MarcelDekkar Inc.
6. Liberman H.A, Lachman C, Pharmaceutical Dosage forms. Disperse systems, volume 1, 2, 3. Marcel Dekkar Inc.
7. Physical Pharmaceutics by Ramasamy C and ManavalanR.
8. Laboratory Manual of Physical Pharmaceutics, C.V.S. Subramanyam, J. Thimma settee
9. Physical Pharmaceutics by C.V.S. Subramanyam
10. Test book of Physical Phramacy, by Gaurav Jain & Roop K. Khar

BP 303 T. PHARMACEUTICAL MICROBIOLOGY (Theory)

45Hours

Scope:

- Study of all categories of microorganisims especially for the production of alchol antibiotics, vaccines, vitamins enzymes etc..

Objectives: Upon completion of the subject student shall be able to;

1. Understand methods of identification, cultivation and preservation of various microorganisms
2. To understand the importance and implementation of sterlization in pharmaceutical processing and industry
3. Learn sterility testing of pharmaceutical products.
4. Carried out microbiological standardization of Pharmaceuticals.
5. Understand the cell culture technology and its applications in pharmaceutical industries.

Course content:

Unit I **10 Hours**

Introduction, history of microbiology, its branches, scope and its importance.
Introduction to Prokaryotes and Eukaryotes
Study of ultra-structure and morphological classification of bacteria, nutritional requirements, raw materials used for culture media and physical parameters for growth, growth curve, isolation and preservation methods for pure cultures, cultivation of anaerobes, quantitative measurement of bacterial growth (total & viable count).
Study of different types of phase constrast microscopy, dark field microscopy and electron microscopy.

Unit II **10 Hours**

Identification of bacteria using staining techniques (simple, Gram's &Acid fast staining) and biochemical tests (IMViC).

Study of principle, procedure, merits, demerits and applications of physical, chemical gaseous,radiation and mechanical method of sterilization.

Evaluation of the efficiency of sterilization methods.

Equipments employed in large scale sterilization.

Sterility indicators.

Unit III **10 Hours**

Study of morphology, classification, reproduction/replication and cultivation of Fungi and Viruses.

Classification and mode of action of disinfectants

Factors influencing disinfection, antiseptics and their evaluation. For bacteriostatic and bactericidal actions

Evaluation of bactericidal & Bacteriostatic.

Sterility testing of products (solids, liquids, ophthalmic and other sterile products) according to IP, BP and USP.

Unit IV **08 Hours**

Designing of aseptic area, laminar flow equipments; study of different sources of contamination in an aseptic area and methods of prevention, clean area classification.
Principles and methods of different microbiological assay. Methods for standardization of antibiotics, vitamins and amino acids.
Assessment of a new antibiotic.

Unit V **07Hours**

Types of spoilage, factors affecting the microbial spoilage of pharmaceutical products, sources and types of microbial contaminants, assessment of microbial contamination and spoilage.

Preservation of pharmaceutical products using antimicrobial agents, evaluation of microbial stability of formulations.

Growth of animal cells in culture, general procedure for cell culture, Primary, established and transformed cell cultures.

Application of cell cultures in pharmaceutical industry and research.

BP 307P.PHARMACEUTICAL MICROBIOLOGY (Practical)

4 Hrs/week

1. Introduction and study of different equipments and processing, e.g., B.O.D. incubator, laminar flow, aseptic hood, autoclave, hot air sterilizer, deep freezer, refrigerator, microscopes used in experimental microbiology.
2. Sterilization of glassware, preparation and sterilization of media.
3. Sub culturing of bacteria and fungus. Nutrient stabs and slants preparations.
4. Staining methods- Simple, Grams staining and acid fast staining (Demonstration with practical).
5. Isolation of pure culture of micro-organisms by multiple streak plate technique and other techniques.
6. Microbiological assay of antibiotics by cup plate method and other methods
7. Motility determination by Hanging drop method.
8. Sterility testing of pharmaceuticals.
9. Bacteriological analysis of water
10. Biochemical test.

Recommended Books (Latest edition)

1. W.B. Hugo and A.D. Russel: Pharmaceutical Microbiology, Blackwell Scientific publications, Oxford London.
2. Prescott and Dunn., Industrial Microbiology, 4th edition, CBS Publishers & Distributors, Delhi.
3. Pelczar, Chan Kreig, Microbiology, Tata McGraw Hill edn.
4. Malcolm Harris, Balliere Tindall and Cox: Pharmaceutical Microbiology.
5. Rose: Industrial Microbiology.
6. Probisher, Hinsdill et al: Fundamentals of Microbiology, 9th ed. Japan
7. Cooper and Gunn's: Tutorial Pharmacy, CBS Publisher and Distribution.
8. Peppler: Microbial Technology.
9. I.P., B.P., U.S.P.- latest editions.
10. Ananthnarayan : Text Book of Microbiology, Orient-Longman, Chennai
11. Edward: Fundamentals of Microbiology.
12. N.K.Jain: Pharmaceutical Microbiology, Vallabh Prakashan, Delhi
13. Bergeys manual of systematic bacteriology, Williams and Wilkins- A Waverly company

BP 304 T. PHARMACEUTICAL ENGINEERING (Theory)

45 Hours

Scope: This course is designed to impart a fundamental knowledge on the art and science of various unit operations used in pharmaceutical industry.

Objectives: Upon completion of the course student shall be able:

1. To know various unit operations used in Pharmaceutical industries.
2. To understand the material handling techniques.
3. To perform various processes involved in pharmaceutical manufacturing process.
4. To carry out various test to prevent environmental pollution.
5. To appreciate and comprehend significance of plant lay out design for optimum use of resources.
6. To appreciate the various preventive methods used for corrosion control in Pharmaceutical industries.

Course content:

UNIT-I **10 Hours**

- **Flow of fluids:** Types of manometers, Reynolds number and its significance, Bernoulli's theorem and its applications, Energy losses, Orifice meter, Venturimeter, Pitot tube and Rotometer.
- **Size Reduction:** Objectives, Mechanisms & Laws governing size reduction, factors affecting size reduction, principles, construction, working, uses, merits and demerits of Hammer mill, ball mill, fluid energy mill, Edge runner mill & end runner mill.
- **Size Separation:** Objectives, applications & mechanism of size separation, official standards of powders, sieves, size separation Principles, construction, working, uses, merits and demerits of Sieve shaker, cyclone separator, Air separator, Bag filter & elutriation tank.

UNIT-II **10 Hours**

- **Heat Transfer:** Objectives, applications & Heat transfer mechanisms. Fourier's law, Heat transfer by conduction, convection & radiation. Heat interchangers & heat exchangers.

- **Evaporation:** Objectives, applications and factors influencing evaporation, differences between evaporation and other heat process. principles, construction, working, uses, merits and demerits of Steam jacketed kettle, horizontal tube evaporator, climbing film evaporator, forced circulation evaporator, multiple effect evaporator& Economy of multiple effect evaporator.

- **Distillation:** Basic Principles and methodology of simple distillation,flash distillation, fractional distillation, distillation under reduced pressure, steam distillation & molecular distillation

UNIT- III **08 Hours**

- **Drying:** Objectives, applications & mechanism of drying process, measurements & applications of Equilibrium Moisture content, rate of drying curve. principles, construction, working, uses, merits and demerits of Tray dryer, drum dryer spray dryer, fluidized bed dryer, vacuum dryer, freeze dryer.

- **Mixing:** Objectives, applications & factors affecting mixing, Difference between solid and liquid mixing, mechanism of solid mixing, liquids mixing and semisolids mixing. Principles, Construction, Working, uses, Merits and Demerits of Double cone blender, twin shell blender, ribbon blender, Sigma blade mixer, planetary mixers, Propellers, Turbines, Paddles & Silverson Emulsifier,

UNIT-IV **08 Hours**

- **Filtration:** Objectives, applications, Theories & Factors influencing filtration, filter aids, filter medias. Principle, Construction, Working, Uses, Merits and demerits of plate & frame filter, filter leaf, rotary drum filter, Meta filter & Cartridge filter, membrane filters and Seidtz filter.
- **Centrifugation:** Objectives, principle & applications of Centrifugation, principles, construction, working, uses, merits and demerits of Perforated basket centrifuge, Non-perforated basket centrifuge, semi continuous centrifuge & super centrifuge.

UNIT- V **07 Hours**

- **Materials of pharmaceutical plant construction, Corrosion and its prevention:** Factors affecting during materials selected for Pharmaceutical plant construction, Theories of corrosion, types of corrosion and there prevention. Ferrous and nonferrous metals, inorganic and organic non metals, basic of material handling systems.

Recommended Books: (Latest Editions)

1. Introduction to chemical engineering – Walter L Badger & Julius Banchero, Latest edition.
2. Solid phase extraction, Principles, techniques and applications by Nigel J.K. Simpson- Latest edition.
3. Unit operation of chemical engineering – Mcabe Smith, Latest edition.
4. Pharmaceutical engineering principles and practices – C.V.S Subrahmanyam et al., Latest edition.
5. Remington practice of pharmacy- Martin, Latest edition.
6. Theory and practice of industrial pharmacy by Lachmann., Latest edition.
7. Physical pharmaceutics- C.V.S Subrahmanyam et al., Latest edition.
8. Cooper and Gunn's Tutorial pharmacy, S.J. Carter, Latest edition.

BP308P - PHARMACEUTICAL ENGINEERING (Practical)

4 Hours/week

I. Determination of radiation constant of brass, iron, unpainted and painted glass.
II. Steam distillation – To calculate the efficiency of steam distillation.
III. To determine the overall heat transfer coefficient by heat exchanger.
IV. Construction of drying curves (for calcium carbonate and starch).
V. Determination of moisture content and loss on drying.
VI. Determination of humidity of air – i) From wet and dry bulb temperatures –use of Dew point method.
VII. Description of Construction working and application of Pharmaceutical Machinery such as rotary tablet machine, fluidized bed coater, fluid energy mill, de humidifier.
VIII. Size analysis by sieving – To evaluate size distribution of tablet granulations – Construction of various size frequency curves including arithmetic andlogarithmic probability plots.
IX. Size reduction: To verify the laws of size reduction using ball mill and determining Kicks, Rittinger's, Bond's coefficients, power requirement and critical speed of Ball Mill.
X. Demonstration of colloid mill, planetary mixer, fluidized bed dryer, freeze dryer and such othermajor equipment.
XI. Factors affecting Rate of Filtration and Evaporation (Surface area, Concentration and Thickness/ viscosity
XII. To study the effect of time on the Rate of Crystallization.
XIII. To calculate the uniformity Index for given sample by using Double Cone Blender.

SEMESTER IV

BP401T. PHARMACEUTICAL ORGANIC CHEMISTRY –III (Theory)

45 Hours

Scope: This subject imparts knowledge on stereo-chemical aspects of organic compounds and organic reactions, important named reactions, chemistry of important hetero cyclic compounds. It also emphasizes on medicinal and other uses of organic compounds.

Objectives: At the end of the course, the student shall be able to

1. understand the methods of preparation and properties of organic compounds
2. explain the stereo chemical aspects of organic compounds and stereo chemical reactions
3. know the medicinal uses and other applications of organic compounds

Course Content:

Note: To emphasize on definition, types, mechanisms, examples, uses/applications

UNIT-I **10 Hours**

Stereo isomerism

Optical isomerism –

Optical activity, enantiomerism, diastereoisomerism, meso compounds

Elements of symmetry, chiral and achiral molecules

DL system of nomenclature of optical isomers, sequence rules, RS system of nomenclature of optical isomers

Reactions of chiral molecules

Racemic modification and resolution of racemic mixture.

Asymmetric synthesis: partial and absolute

UNIT-II **10 Hours**

Geometrical isomerism

Nomenclature of geometrical isomers (Cis Trans, EZ, Syn Anti systems)

Methods of determination of configuration of geometrical isomers.

Conformational isomerism in Ethane, n-Butane and Cyclohexane.

Stereo isomerism in biphenyl compounds (Atropisomerism) and conditions for optical activity.

Stereospecific and stereoselective reactions

UNIT-III **10 Hours**

Heterocyclic compounds:

Nomenclature and classification

Synthesis, reactions and medicinal uses of following compounds/derivatives

Pyrrole, Furan, and Thiophene

Relative aromaticity and reactivity of Pyrrole, Furan and Thiophene

UNIT-IV **8 Hours**

Synthesis, reactions and medicinal uses of following compounds/derivatives

Pyrazole, Imidazole, Oxazole and Thiazole.

Pyridine, Quinoline, Isoquinoline, Acridine and Indole. Basicity of pyridine

Synthesis and medicinal uses of Pyrimidine, Purine, azepines and their derivatives

UNIT-V **07 Hours**

Reactions of synthetic importance

Metal hydride reduction ($NaBH_4$ and $LiAlH_4$), Clemmensen reduction, Birch reduction, Wolff Kishner reduction.

Oppenauer-oxidation and Dakin reaction.

Beckmanns rearrangement and Schmidt rearrangement.

Claisen-Schmidt condensation

Recommended Books (Latest Editions)

1. Organic chemistry by I.L. Finar, Volume-I & II.
2. A text book of organic chemistry – Arun Bahl, B.S. Bahl.
3. Heterocyclic Chemistry by Raj K. Bansal
4. Organic Chemistry by Morrison and Boyd
5. Heterocyclic Chemistry by T.L. Gilchrist

BP402T. MEDICINAL CHEMISTRY – I (Theory)

45 Hours

Scope: This subject is designed to impart fundamental knowledge on the structure, chemistry and therapeutic value of drugs. The subject emphasizes on structure activity relationships of drugs, importance of physicochemical properties and metabolism of drugs. The syllabus also emphasizes on chemical synthesis of important drugs under each class.

Objectives: Upon completion of the course the student shall be able to

1. understand the chemistry of drugs with respect to their pharmacological activity
2. understand the drug metabolic pathways, adverse effect and therapeutic value of drugs
3. know the Structural Activity Relationship (SAR) of different class of drugs
4. write the chemical synthesis of some drugs

Course Content:

Study of the development of the following classes of drugs, Classification, mechanism of action, uses of drugs mentioned in the course, Structure activity relationship of selective class of drugs as specified in the course and synthesis of drugs superscripted (*)

UNIT- I **10 Hours**

Introduction to Medicinal Chemistry

History and development of medicinal chemistry

Physicochemical properties in relation to biological action

Ionization, Solubility, Partition Coefficient, Hydrogen bonding, Protein binding, Chelation, Bioisosterism, Optical and Geometrical isomerism.

Drug metabolism

Drug metabolism principles- Phase I and Phase II.

Factors affecting drug metabolism including stereo chemical aspects.

UNIT- II **10 Hours**

Drugs acting on Autonomic Nervous System

Adrenergic Neurotransmitters:

Biosynthesis and catabolism of catecholamine.

Adrenergic receptors (Alpha & Beta) and their distribution.

Sympathomimetic agents: SAR of Sympathomimetic agents

Direct acting: Nor-epinephrine, Epinephrine, Phenylephrine*, Dopamine,

Methyldopa, Clonidine, Dobutamine, Isoproterenol, Terbutaline, Salbutamol*, Bitolterol, Naphazoline, Oxymetazoline and Xylometazoline.

- Indirect acting agents: Hydroxyamphetamine, Pseudoephedrine, Propylhexedrine.
- Agents with mixed mechanism: Ephedrine, Metaraminol.

Adrenergic Antagonists:

Alpha adrenergic blockers: Tolazoline*, Phentolamine, Phenoxybenzamine, Prazosin, Dihydroergotamine, Methysergide.

Beta adrenergic blockers: SAR of beta blockers, Propranolol*, Metibranolol, Atenolol, Betazolol, Bisoprolol, Esmolol, Metoprolol, Labetolol, Carvedilol.

UNIT-III **10 Hours**

Cholinergic neurotransmitters:

Biosynthesis and catabolism of acetylcholine.

Cholinergic receptors (Muscarinic & Nicotinic) and their distribution.

Parasympathomimetic agents: SAR of Parasympathomimetic agents

Direct acting agents: Acetylcholine, Carbachol*, Bethanechol, Methacholine, Pilocarpine.

Indirect acting/ Cholinesterase inhibitors (Reversible & Irreversible): Physostigmine, Neostigmine*, Pyridostigmine, Edrophonium chloride, Tacrine hydrochloride, Ambenonium chloride, Isofluorphate, Echothiophate iodide, Parathione, Malathion.

Cholinesterase reactivator: Pralidoxime chloride.

Cholinergic Blocking agents: SAR of cholinolytic agents

Solanaceous alkaloids and analogues: Atropine sulphate, Hyoscyamine sulphate, Scopolamine hydrobromide, Homatropine hydrobromide, Ipratropium bromide*.

Synthetic cholinergic blocking agents: Tropicamide, Cyclopentolate hydrochloride, Clidinium bromide, Dicyclomine hydrochloride*, Glycopyrrolate, Methantheline bromide, Propantheline bromide, Benztropine mesylate, Orphenadrine citrate, Biperidine hydrochloride, Procyclidine hydrochloride*, Tridihexethyl chloride, Isopropamide iodide, Ethopropazine hydrochloride.

UNIT- IV **08 Hours**

Drugs acting on Central Nervous System

A. Sedatives and Hypnotics:

Benzodiazepines: SAR of Benzodiazepines, Chlordiazepoxide, Diazepam*, Oxazepam, Chlorazepate, Lorazepam, Alprazolam, Zolpidem

Barbiturtes: SAR of barbiturates, Barbital*, Phenobarbital, Mephobarbital, Amobarbital, Butabarbital, Pentobarbital, Secobarbital

Miscelleneous:

Amides & imides: Glutethmide.

Alcohol & their carbamate derivatives: Meprobomate, Ethchlorvynol.

Aldehyde & their derivatives: Triclofos sodium, Paraldehyde.

B. Antipsychotics

Phenothiazeines: SAR of Phenothiazeines - Promazine hydrochloride, Chlorpromazine hydrochloride*, Trifluprомazine, Thioridazine hydrochloride, Piperacetazine hydrochloride, Prochlorperazine maleate, Trifluoperazine hydrochloride.

Ring Analogues of Phenothiazeines: Chlorprothixene, Thiothixene, Loxapine succinate, Clozapine.

Fluro buterophenones: Haloperidol, Droperidol, Risperidone.

Beta amino ketones: Molindone hydrochloride.

Benzamides: Sulpieride.

C. Anticonvulsants: SAR of Anticonvulsants**,** mechanism of anticonvulsant action

Barbiturates: Phenobarbitone, Methabarbital. **Hydantoins:**

Phenytoin*, Mephenytoin, Ethotoin **Oxazolidine diones:**

Trimethadione, Paramethadione **Succinimides:**

Phensuximide, Methsuximide, Ethosuximide* **Urea and**

monoacylureas: Phenacemide, Carbamazepine*

Benzodiazepines: Clonazepam

Miscellaneous: Primidone, Valproic acid , Gabapentin, Felbamate

UNIT – V **07 Hours**

Drugs acting on Central Nervous System

General anesthetics:

Inhalation anesthetics: Halothane*, Methoxyflurane, Enflurane, Sevoflurane, Isoflurane, Desflurane.

Ultra short acting barbitutrates: Methohexital sodium*, Thiamylal sodium, Thiopental sodium.

Dissociative anesthetics: Ketamine hydrochloride.*

Narcotic and non-narcotic analgesics

Morphine and related drugs: SAR of Morphine analogues, Morphine sulphate, Codeine, Meperidine hydrochloride, Anilerdine hydrochloride, Diphenoxylate hydrochloride, Loperamide hydrochloride, Fentanyl citrate*, Methadone hydrochloride*, Propoxyphene hydrochloride, Pentazocine, Levorphanol tartarate.

Narcotic antagonists: Nalorphine hydrochloride, Levallorphan tartarate, Naloxone hydrochloride.

Anti-inflammatory agents: Sodium salicylate, Aspirin, Mefenamic acid*, Meclofenamate, Indomethacin, Sulindac, Tolmetin, Zomepriac, Diclofenac, Ketorolac, Ibuprofen*, Naproxen, Piroxicam, Phenacetin, Acetaminophen, Antipyrine, Phenylbutazone.

BP406P. MEDICINAL CHEMISTRY – I (Practical)

4 Hours/Week

I Preparation of drugs/ intermediates

1 1,3-pyrazole

2 1,3-oxazole

3 Benzimidazole

4 Benztriazole

5 2,3- diphenyl quinoxaline

6 Benzocaine

7 Phenytoin

8 Phenothiazine

9 Barbiturate

II Assay of drugs

1 Chlorpromazine

2 Phenobarbitone

3 Atropine

4 Ibuprofen

5 Aspirin

6 Furosemide

III Determination of Partition coefficient for any two drugs

Recommended Books (Latest Editions)

1. Wilson and Giswold's Organic medicinal and Pharmaceutical Chemistry.
2. Foye's Principles of Medicinal Chemistry.
3. Burger's Medicinal Chemistry, Vol I to IV.
4. Introduction to principles of drug design- Smith and Williams.
5. Remington's Pharmaceutical Sciences.
6. Martindale's extra pharmacopoeia.

7. Organic Chemistry by I.L. Finar, Vol. II.
8. The Organic Chemistry of Drug Synthesis by Lednicer, Vol. 1-5.
9. Indian Pharmacopoeia.
10. Text book of practical organic chemistry- A.I.Vogel.

BP 403 T. PHYSICAL PHARMACEUTICS-II (Theory)

45Hours

Scope: The course deals with the various physica and physicochemical properties, and principles involved in dosage forms/formulations. Theory and practical components of the subject help the student to get a better insight into various areas of formulation research and development, and stability studies of pharmaceutical dosage forms.

Objectives: Upon the completion of the course student shall be able to

1. Understand various physicochemical properties of drug molecules in the designing the dosage forms
2. Know the principles of chemical kinetics & to use them for stability testing nad determination of expiry date of formulations
3. Demonstrate use of physicochemical properties in the formulation development and evaluation of dosage forms.

Course Content:

UNIT-I **07 Hours**

Colloidal dispersions: Classification of dispersed systems & their general characteristics, size & shapes of colloidal particles, classification of colloids & comparative account of their general properties. Optical, kinetic & electrical properties. Effect of electrolytes, coacervation, peptization& protective action.

UNIT-II **10 Hours**

Rheology: Newtonian systems, law of flow, kinematic viscosity, effect of temperature, non-Newtonian systems, pseudoplastic, dilatant, plastic, thixotropy, thixotropy in formulation, determination of viscosity, capillary, falling Sphere, rotational viscometers

Deformation of solids: Plastic and elastic deformation, Heckel equation, Stress, Strain, Elastic Modulus

UNIT-III **10 Hours**

Coarse dispersion: Suspension, interfacial properties of suspended particles, settling in suspensions, formulation of flocculated and deflocculated suspensions. Emulsions and theories of emulsification, microemulsion and multiple emulsions; Stability of emulsions, preservation of emulsions, rheological properties of emulsions and emulsion formulation by HLB method.

UNIT-IV **10Hours**

Micromeretics: Particle size and distribution, mean particle size, number and weight distribution, particle number, methods for determining particle size by different methods, counting and separation method, particle shape, specific surface, methods for determining surface area, permeability, adsorption, derived properties of powders, porosity, packing arrangement, densities, bulkiness & flow properties.

UNIT-V **10 Hours**

Drug stability: Reaction kinetics: zero, pseudo-zero, first & second order, units of basic rate constants, determination of reaction order. Physical and chemical factors influencing the chemical degradation of pharmaceutical product: temperature, solvent, ionic strength, dielectric constant, specific & general acid base catalysis, Simple numerical problems. Stabilization of medicinal agents against common reactions like hydrolysis & oxidation. Accelerated stability testing in expiration dating of pharmaceutical dosage forms. Photolytic degradation and its prevention

BP 407P. PHYSICAL PHARMACEUTICS- II (Practical)

3 Hrs/week

1. Determination of particle size, particle size distribution using sieving method
2. Determination of particle size, particle size distribution using Microscopic method
3. Determination of bulk density, true density and porosity
4. Determine the angle of repose and influence of lubricant on angle of repose
5. Determination of viscosity of liquid using Ostwald's viscometer
6. Determination sedimentation volume with effect of different suspending agent
7. Determination sedimentation volume with effect of different concentration of single suspending agent
8. Determination of viscosity of semisolid by using Brookfield viscometer
9. Determination of reaction rate constant first order.
10. Determination of reaction rate constant second order
11. Accelerated stability studies

Recommended Books: (Latest Editions)

1. Physical Pharmacy by Alfred Martin, Sixth edition
2. Experimental pharmaceutics by Eugene, Parott.
3. Tutorial pharmacy by Cooper and Gunn.
4. Stocklosam J. Pharmaceutical calculations, Lea & Febiger, Philadelphia.
5. Liberman H.A, Lachman C., Pharmaceutical Dosage forms, Tablets, Volume-1 to 3, Marcel Dekkar Inc.
6. Liberman H.A, Lachman C, Pharmaceutical dosage forms. Disperse systems, volume 1, 2, 3. Marcel Dekkar Inc.
7. Physical Pharmaceutics by Ramasamy C, and Manavalan R.

BP 404 T. PHARMACOLOGY-I (Theory)

45 Hrs

Scope: The main purpose of the subject is to understand what drugs do to the living organisms and how their effects can be applied to therapeutics. The subject covers the information about the drugs like, mechanism of action, physiological and biochemical effects (pharmacodynamics) as well as absorption, distribution, metabolism and excretion (pharmacokinetics) along with the adverse effects, clinical uses, interactions, doses, contraindications and routes of administration of different classes of drugs.

Objectives: Upon completion of this course the student should be able to

1. Understand the pharmacological actions of different categories of drugs
2. Explain the mechanism of drug action at organ system/sub cellular/ macromolecular levels.
3. Apply the basic pharmacological knowledge in the prevention and treatment of various diseases.
4. Observe the effect of drugs on animals by simulated experiments
5. Appreciate correlation of pharmacology with other bio medical sciences

Course Content:

UNIT-I **08 hours**

1. General Pharmacology

a. Introduction to Pharmacology- Definition, historical landmarks and scope of pharmacology, nature and source of drugs, essential drugs concept and routes of drug administration, Agonists, antagonists(competitive and non competitive), spare receptors, addiction, tolerance, dependence, tachyphylaxis, idiosyncrasy, allergy.

b. Pharmacokinetics- Membrane transport, absorption, distribution, metabolism and excretion of drugs .Enzyme induction, enzyme inhibition, kinetics of elimination

UNIT-II **12 Hours**

General Pharmacology

a. Pharmacodynamics- Principles and mechanisms of drug action. Receptor theories and classification of receptors, regulation of receptors. drug receptors interactions signal transduction mechanisms, G-protein–coupled receptors, ion channel receptor, transmembrane enzyme linked receptors, transmembrane JAK-STAT binding receptor and receptors that regulate transcription factors, dose response relationship, therapeutic index, combined effects of drugs and factors modifying drug action.
b. Adverse drug reactions.
c. Drug interactions (pharmacokinetic and pharmacodynamic)
d. Drug discovery and clinical evaluation of new drugs -Drug discovery phase, preclinical evaluation phase, clinical trial phase, phases of clinical trials and pharmacovigilance.

UNIT-III **10 Hours**

2. Pharmacology of drugs acting on peripheral nervous system

a. Organization and function of ANS.

b.Neurohumoral transmission,co-transmission and classification of neurotransmitters.

c. Parasympathomimetics, Parasympatholytics, Sympathomimetics, sympatholytics.

d. Neuromuscular blocking agents and skeletal muscle relaxants (peripheral).

e. Local anesthetic agents.

f. Drugs used in myasthenia gravis and glaucoma

UNIT-IV **08 Hours**

3. Pharmacology of drugs acting on central nervous system

a. Neurohumoral transmission in the C.N.S.special emphasis on importance of various neurotransmitters like with GABA, Glutamate, Glycine, serotonin, dopamine.

b. General anesthetics and pre-anesthetics**.**

c. Sedatives, hypnotics and centrally acting muscle relaxants.

d. Anti-epileptics

e. Alcohols and disulfiram

UNIT-V **07 Hours**

3. Pharmacology of drugs acting on central nervous system

a. Psychopharmacological agents: Antipsychotics, antidepressants, anti-anxiety agents, anti-manics and hallucinogens.

b. Drugs used in Parkinsons disease and Alzheimer's disease.

c. CNS stimulants and nootropics.

d. Opioid analgesics and antagonists

e. Drug addiction, drug abuse, tolerance and dependence.

BP 408 P.PHARMACOLOGY-I (Practical)

4Hrs/Week

1. Introduction to experimental pharmacology.
2. Commonly used instruments in experimental pharmacology.
3. Study of common laboratory animals.
4. Maintenance of laboratory animals as per CPCSEA guidelines.
5. Common laboratory techniques. Blood withdrawal, serum and plasma separation, anesthetics and euthanasia used for animal studies.
6. Study of different routes of drugs administration in mice/rats.
7. Study of effect of hepatic microsomal enzyme inducers on the phenobarbitone sleeping time in mice.
8. Effect of drugs on ciliary motility of frog oesophagus
9. Effect of drugs on rabbit eye.
10. Effects of skeletal muscle relaxants using rota-rod apparatus.
11. Effect of drugs on locomotor activity using actophotometer.
12. Anticonvulsant effect of drugs by MES and PTZ method.
13. Study of stereotype and anti-catatonic activity of drugs on rats/mice.
14. Study of anxiolytic activity of drugs using rats/mice.
15. Study of local anesthetics by different methods

Note: All laboratory techniques and animal experiments are demonstrated by simulated experiments by softwares and videos

Recommended Books (Latest Editions)

1. Rang H. P., Dale M. M., Ritter J. M., Flower R. J., Rang and Dale's Pharmacology,.Churchil Livingstone Elsevier
2. Katzung B. G., Masters S. B., Trevor A. J., Basic and clinical pharmacology, Tata Mc Graw-Hill
3. Goodman and Gilman's, The Pharmacological Basis of Therapeutics
4. Marry Anne K. K., Lloyd Yee Y., Brian K. A., Robbin L.C., Joseph G. B., Wayne A. K., Bradley R.W., Applied Therapeutics, The Clinical use of Drugs, The Point Lippincott Williams & Wilkins
5. Mycek M.J, Gelnet S.B and Perper M.M. Lippincott's Illustrated Reviews-Pharmacology

6. K.D.Tripathi. Essentials of Medical Pharmacology, JAYPEE Brothers Medical Publishers (P) Ltd, New Delhi.

7. Sharma H. L., Sharma K. K., Principles of Pharmacology, Paras medical publisher

8. Modern Pharmacology with clinical Applications, by Charles R.Craig& Robert,

9. Ghosh MN. Fundamentals of Experimental Pharmacology. Hilton & Company, Kolkata.

10. Kulkarni SK. Handbook of experimental pharmacology. VallabhPrakashan,

BP 405 T.PHARMACOGNOSY AND PHYTOCHEMISTRY I (Theory)

45 Hours

Scope: The subject involves the fundamentals of Pharmacognosy like scope, classification of crude drugs, their identification and evaluation, phytochemicals present in them and their medicinal properties.

Objectives: Upon completion of the course, the student shall be able

1. to know the techniques in the cultivation and production of crude drugs
2. to know the crude drugs, their uses and chemical nature
3. know the evaluation techniques for the herbal drugs
4. to carry out the microscopic and morphological evaluation of crude drugs

Course Content:

UNIT-I **10 Hours**

Introduction to Pharmacognosy:

(a) Definition, history, scope and development of Pharmacognosy

(b) Sources of Drugs – Plants, Animals, Marine & Tissue culture

(c) Organized drugs, unorganized drugs (dried latex, dried juices, dried extracts, gums and mucilages, oleoresins and oleo- gum -resins).

Classification of drugs:

Alphabetical, morphological, taxonomical, chemical, pharmacological, chemo and sero taxonomical classification of drugs

Quality control of Drugs of Natural Origin:

Adulteration of drugs of natural origin. Evaluation by organoleptic, microscopic, physical, chemical and biological methods and properties.

Quantitative microscopy of crude drugs including lycopodium spore method, leafconstants, camera lucida and diagrams of microscopic objects to scale with camera lucida.

UNIT-II **10 Hours**

Cultivation, Collection, Processing and storage of drugs of natural origin:

Cultivation and Collection of drugs of natural origin

Factors influencing cultivation of medicinal plants.

Plant hormones and their applications.

Polyploidy, mutation and hybridization with reference to medicinal plants

Conservation of medicinal plants

UNIT-III **07 Hours**

Plant tissue culture:

Historical development of plant tissue culture, types of cultures, Nutritional requirements, growth and their maintenance.

Applications of plant tissue culture in pharmacognosy.

Edible vaccines

UNIT IV **10 Hours**

Pharmacognosy in various systems of medicine:

Role of Pharmacognosy in allopathy and traditional systems of medicine namely, Ayurveda, Unani, Siddha, Homeopathy and Chinese systems of medicine.

Introduction to secondary metabolites:

Definition, classification, properties and test for identification of Alkaloids, Glycosides, Flavonoids, Tannins, Volatile oil and Resins

UNIT V **08 Hours**

Study of biological source, chemical nature and uses of drugs of natural origin containing following drugs

Plant Products:

Fibers - Cotton, Jute, Hemp

Hallucinogens, Teratogens, Natural allergens

Primary metabolites:

General introduction, detailed study with respect to chemistry, sources, preparation, evaluation, preservation, storage, therapeutic used and commercial utility as Pharmaceutical Aids and/or Medicines for the following Primary metabolites:

Carbohydrates: Acacia, Agar, Tragacanth, Honey

Proteins and Enzymes : Gelatin, casein, proteolytic enzymes (Papain, bromelain, serratiopeptidase, urokinase, streptokinase, pepsin).

Lipids(Waxes, fats, fixed oils) : Castor oil, Chaulmoogra oil, Wool Fat, Bees Wax

Marine Drugs:

Novel medicinal agents from marine sources

BP408 P. PHARMACOGNOSY AND PHYTOCHEMISTRY I (Practical)

4 Hours/Week

1. Analysis of crude drugs by chemical tests: **(**i)Tragaccanth (ii) Acacia (iii)Agar (iv) Gelatin (v) starch (vi) Honey (vii) Castor oil
2. Determination of stomatal number and index
3. Determination of vein islet number, vein islet termination and paliside ratio.
4. Determination of size of starch grains, calcium oxalate crystals by eye piece micrometer
5. Determination of Fiber length and width
6. Determination of number of starch grains by Lycopodium spore method
7. Determination of Ash value
8. Determination of Extractive values of crude drugs
9. Determination of moisture content of crude drugs
10. Determination of swelling index and foaming

Recommended Books: (Latest Editions)

1. W.C.Evans, Trease and Evans Pharmacognosy, 16th edition, W.B. Sounders & Co., London, 2009.
2. Tyler, V.E., Brady, L.R. and Robbers, J.E., Pharmacognosy, 9th Edn., Lea and Febiger, Philadelphia, 1988.
3. Text Book of Pharmacognosy by T.E. Wallis
4. Mohammad Ali. Pharmacognosy and Phytochemistry, CBS Publishers & Distribution, New Delhi.
5. Text book of Pharmacognosy by C.K. Kokate, Purohit, Gokhlae (2007), 37th Edition, Nirali Prakashan, New Delhi.
6. Herbal drug industry by R.D. Choudhary (1996), Ist Edn, Eastern Publisher, New Delhi.
7. Essentials of Pharmacognosy, Dr.SH.Ansari, IInd edition, Birla publications, New Delhi, 2007
8. Practical Pharmacognosy: C.K. Kokate, Purohit, Gokhlae
9. Anatomy of Crude Drugs by M.A. Iyengar

SEMESTER V

BP501T. MEDICINAL CHEMISTRY – II (Theory)

45 Hours

Scope: This subject is designed to impart fundamental knowledge on the structure, chemistry and therapeutic value of drugs. The subject emphasizes on structure activity relationships of drugs, importance of physicochemical properties and metabolism of drugs. The syllabus also emphasizes on chemical synthesis of important drugs under each class.

Objectives: Upon completion of the course the student shall be able to

1. Understand the chemistry of drugs with respect to their pharmacological activity
2. Understand the drug metabolic pathways, adverse effect and therapeutic value of drugs
3. Know the Structural Activity Relationship of different class of drugs
4. Study the chemical synthesis of selected drugs

Course Content:

Study of the development of the following classes of drugs, Classification, mechanism of action, uses of drugs mentioned in the course, Structure activity relationship of selective class of drugs as specified in the course and synthesis of drugs superscripted (*)

UNIT- I **10 Hours**

Antihistaminic agents: Histamine, receptors and their distribution in the humanbody

H_1–antagonists: Diphenhydramine hydrochloride*, Dimenhydrinate, Doxylamines cuccinate, Clemastine fumarate, Diphenylphyraline hydrochloride, Tripelenamine hydrochloride, Chlorcyclizine hydrochloride, Meclizine hydrochloride, Buclizine hydrochloride, Chlorpheniramine maleate, Triprolidine hydrochloride*, Phenidamine tartarate, Promethazine hydrochloride*, Trimeprazine tartrate, Cyproheptadine hydrochloride, Azatidine maleate, Astemizole, Loratadine, Cetirizine, Levocetrazine Cromolyn sodium

H_2-antagonists: Cimetidine*, Famotidine, Ranitidin.

Gastric Proton pump inhibitors: Omeprazole, Lansoprazole, Rabeprazole, Pantoprazole

Anti-neoplastic agents:

Alkylating agents: Meclorethamine*, Cyclophosphamide, Melphalan,

Chlorambucil, Busulfan, Thiotepa

Antimetabolites: Mercaptopurine*, Thioguanine, Fluorouracil, Floxuridine, Cytarabine, Methotrexate*, Azathioprine

Antibiotics: Dactinomycin, Daunorubicin, Doxorubicin, Bleomycin

Plant products: Etoposide, Vinblastin sulphate, Vincristin sulphate

Miscellaneous: Cisplatin, Mitotane.

UNIT – II **10 Hours**

Anti-anginal:

Vasodilators: Amyl nitrite, Nitroglycerin*, Pentaerythritol tetranitrate, Isosorbide dinitrite*, Dipyridamole.

Calcium channel blockers: Verapamil, Bepridil hydrochloride, Diltiazem hydrochloride, Nifedipine, Amlodipine, Felodipine, Nicardipine, Nimodipine.

Diuretics:

Carbonic anhydrase inhibitors: Acetazolamide*, Methazolamide, Dichlorphenamide.

Thiazides: Chlorthiazide*, Hydrochlorothiazide, Hydroflumethiazide, Cyclothiazide,

Loop diuretics: Furosemide*, Bumetanide, Ethacrynic acid.

Potassium sparing Diuretics: Spironolactone, Triamterene, Amiloride.

Osmotic Diuretics: Mannitol

Anti-hypertensive Agents: Timolol, Captopril, Lisinopril, Enalapril, Benazepril hydrochloride, Quinapril hydrochloride, Methyldopate hydrochloride,* Clonidine hydrochloride, Guanethidine monosulphate, Guanabenz acetate, Sodium nitroprusside, Diazoxide, Minoxidil, Reserpine, Hydralazine hydrochloride.

UNIT- III **10 Hours**

Anti-arrhythmic Drugs: Quinidine sulphate, Procainamide hydrochloride, Disopyramide phosphate*, Phenytoin sodium, Lidocaine hydrochloride, Tocainide hydrochloride, Mexiletine hydrochloride, Lorcainide hydrochloride, Amiodarone, Sotalol.

Anti-hyperlipidemic agents: Clofibrate, Lovastatin, Cholesteramine and Cholestipol

Coagulant & Anticoagulants: Menadione, Acetomenadione, Warfarin*, Anisindione, clopidogrel

Drugs used in Congestive Heart Failure: Digoxin, Digitoxin, Nesiritide, Bosentan, Tezosentan.

UNIT- IV **08 Hours**

Drugs acting on Endocrine system

Nomenclature, Stereochemistry and metabolism of steroids

Sex hormones: Testosterone, Nandralone, Progestrones, Oestriol, Oestradiol, Oestrione, Diethyl stilbestrol.
Drugs for erectile dysfunction: Sildenafil, Tadalafil.
Oral contraceptives: Mifepristone, Norgestril, Levonorgestrol
Corticosteroids: Cortisone, Hydrocortisone, Prednisolone, Betamethasone, Dexamethasone
Thyroid and antithyroid drugs: L-Thyroxine, L-Thyronine, Propylthiouracil, Methimazole.

UNIT – V **07 Hours**

Antidiabetic agents:

Insulin and its preparations

Sulfonyl ureas: Tolbutamide*, Chlorpropamide, Glipizide, Glimepiride.

Biguanides: Metformin.

Thiazolidinediones: Pioglitazone, Rosiglitazone.

Meglitinides: Repaglinide, Nateglinide.

Glucosidase inhibitors: Acrabose, Voglibose.

Local Anesthetics: SAR of Local anesthetics

Benzoic Acid derivatives; Cocaine, Hexylcaine, Meprylcaine, Cyclomethycaine, Piperocaine.

Amino Benzoic acid derivatives: Benzocaine*, Butamben, Procaine*, Butacaine, Propoxycaine, Tetracaine, Benoxinate.

Lidocaine/Anilide derivatives: Lignocaine, Mepivacaine, Prilocaine, Etidocaine.

Miscellaneous: Phenacaine, Diperodon, Dibucaine.*

Recommended Books (Latest Editions)

1. Wilson and Giswold's Organic medicinal and Pharmaceutical Chemistry.
2. Foye's Principles of Medicinal Chemistry.
3. Burger's Medicinal Chemistry, Vol I to IV.
4. Introduction to principles of drug design- Smith and Williams.
5. Remington's Pharmaceutical Sciences.
6. Martindale's extra pharmacopoeia.
7. Organic Chemistry by I.L. Finar, Vol. II.
8. The Organic Chemistry of Drug Synthesis by Lednicer, Vol. 1to 5.
9. Indian Pharmacopoeia.
10. Text book of practical organic chemistry- A.I.Vogel.

BP 502 T. Industrial PharmacyI (Theory)

45 Hours

Scope: Course enables the student to understand and appreciate the influence of pharmaceutical additives and various pharmaceutical dosage forms on the performance of the drug product.

Objectives: Upon completion of the course the student shall be able to

1. Know the various pharmaceutical dosage forms and their manufacturing techniques.
2. Know various considerations in development of pharmaceutical dosage forms
3. Formulate solid, liquid and semisolid dosage forms and evaluate them for their quality

Course content:

3 hours/ week

UNIT-I **07 Hours**

Preformulation Studies: Introduction to preformulation, goals and objectives, study of physicochemical characteristics of drug substances.

a. Physical properties: Physical form (crystal & amorphous), particle size, shape, flow properties, solubility profile (pKa, pH, partition coefficient), polymorphism

b. Chemical Properties: Hydrolysis, oxidation, reduction, racemisation, polymerization

BCS classification of drugs & its significant

Application of preformulation considerations in the development of solid, liquid oral and parenteral dosage forms and its impact on stability of dosage forms.

UNIT-II **10 Hours**

Tablets:

a. Introduction, ideal characteristics of tablets, classification of tablets. Excipients, Formulation of tablets, granulation methods, compression and processing problems. Equipments and tablet tooling.

b. Tablet coating: Types of coating, coating materials, formulation of coating composition, methods of coating, equipment employed and defects in coating.

c. Quality control tests: In process and finished product tests

Liquid orals: Formulation and manufacturing consideration of syrups and elixirs suspensions and emulsions; Filling and packaging; evaluation of liquid orals official in pharmacopoeia

UNIT-III **08 Hours**

Capsules:

a. ***Hard gelatin capsules:*** Introduction, Production of hard gelatin capsule shells. size of capsules, Filling, finishing and special techniques of formulation of hard gelatin capsules, manufacturing defects. In process and final product quality control tests for capsules.

b. ***Soft gelatin capsules:*** Nature of shell and capsule content, size of capsules,importance of base adsorption and minim/gram factors, production, in process and final product quality control tests. Packing, storage and stability testing of soft gelatin capsules and their applications.

Pellets: Introduction, formulation requirements, pelletization process, equipments for manufacture of pellets

UNIT-IV **10 Hours**

Parenteral Products:

a. Definition, types, advantages and limitations. Preformulation factors and essential requirements, vehicles, additives, importance of isotonicity

b. Production procedure, production facilities and controls,
aseptic processing

c. Formulation of injections, sterile powders, large volume parenterals and lyophilized products.

d. Containers and closures selection, filling and sealing of ampoules, vials and infusion fluids. Quality control tests of parenteral products.

Ophthalmic Preparations: Introduction, formulation considerations; formulation of eye drops, eye ointments and eye lotions; methods of preparation; labeling, containers; evaluation of ophthalmic preparations

UNIT-V **10 Hours**

Cosmetics: Formulation and preparation of the following cosmetic preparations: lipsticks, shampoos, cold cream and vanishing cream, tooth pastes, hair dyes and sunscreens.

Pharmaceutical Aerosols: Definition, propellants, containers, valves, types of aerosol systems; formulation and manufacture of aerosols; Evaluation of aerosols; Quality control and stability studies.

Packaging Materials Science: Materials used for packaging of pharmaceutical products, factors influencing choice of containers, legal and official requirements for containers, stability aspects of packaging materials, quality control tests.

BP 506 P. Industrial PharmacyI (Practical)

4 Hours/week

1. Preformulation studies on paracetamol/asparin/or any other drug
2. Preparation and evaluation of Paracetamol tablets
3. Preparation and evaluation of Aspirin tablets
4. Coating of tablets- film coating of tables/granules
5. Preparation and evaluation of Tetracycline capsules
6. Preparation of Calcium Gluconate injection
7. Preparation of Ascorbic Acid injection
8. Qulaity control test of (as per IP) marketed tablets and capsules
9. Preparation of Eye drops/ and Eye ointments
10. Preparation of Creams (cold / vanishing cream)
11. Evaluation of Glass containers (as per IP)

Recommended Books: (Latest Editions)

1. Pharmaceutical dosage forms - Tablets, volume 1 -3 by H.A. Liberman, Leon Lachman &J.B.Schwartz
2. Pharmaceutical dosage form - Parenteral medication vol- 1&2 by Liberman & Lachman
3. Pharmaceutical dosage form disperse system VOL-1 by Liberman & Lachman
4. Modern Pharmaceutics by Gilbert S. Banker & C.T. Rhodes, 3rd Edition
5. Remington: The Science and Practice of Pharmacy, 20th edition Pharmaceutical Science (RPS)
6. Theory and Practice of Industrial Pharmacy by Liberman & Lachman
7. Pharmaceutics- The science of dosage form design by M.E.Aulton, Churchill livingstone, Latest edition
8. Introduction to Pharmaceutical Dosage Forms by H. C.Ansel, Lea &Febiger, Philadelphia, 5thedition, 2005
9. Drug stability - Principles and practice by Cartensen & C.J. Rhodes, 3rd Edition, Marcel Dekker Series, Vol 107.

BP503.T. PHARMACOLOGY-II (Theory)

45 Hours

Scope: This subject is intended to impart the fundamental knowledge on various aspects (classification, mechanism of action, therapeutic effects, clinical uses, side effects and contraindications) of drugs acting on different systems of body and in addition,emphasis on the basic concepts of bioassay.

Objectives: Upon completion of this course the student should be able to

1. Understand the mechanism of drug action and its relevance in the treatment of different diseases
2. Demonstrate isolation of different organs/tissues from the laboratory animals by simulated experiments
3. Demonstrate the various receptor actions using isolated tissue preparation
4. Appreciate correlation of pharmacology with related medical sciences

Course Content:

UNIT-I **10hours**

1. Pharmacology of drugs acting on cardio vascular system

a. Introduction to hemodynamic and electrophysiology of heart.
b. Drugs used in congestive heart failure
c. Anti-hypertensive drugs.
d. Anti-anginal drugs.
e. Anti-arrhythmic drugs.
f. Anti-hyperlipidemic drugs.

UNIT-II **10hours**

1. Pharmacology of drugs acting on cardio vascular system

a. Drug used in the therapy of shock.
b. Hematinics, coagulants and anticoagulants.
c. Fibrinolytics and anti-platelet drugs
d. Plasma volume expanders

2. Pharmacology of drugs acting on urinary system

a. Diuretics
b. Anti-diuretics.

UNIT-III **10hours**

3. Autocoids and related drugs

a. Introduction to autacoids and classification
b. Histamine, 5-HT and their antagonists.
c. Prostaglandins, Thromboxanes and Leukotrienes.
d. Angiotensin, Bradykinin and Substance P.
e. Non-steroidal anti-inflammatory agents
f. Anti-gout drugs
g. Antirheumatic drugs

UNIT-IV **08hours**

5. Pharmacology of drugs acting on endocrine system

a. Basic concepts in endocrine pharmacology.
b. Anterior Pituitary hormones- analogues and their inhibitors.
c. Thyroid hormones- analogues and their inhibitors.
d. Hormones regulating plasma calcium level- Parathormone, Calcitonin and Vitamin-D.
d. Insulin, Oral Hypoglycemic agents and glucagon.
e. ACTH and corticosteroids.

UNIT-V **07hours**

5. Pharmacology of drugs acting on endocrine system

a. Androgens and Anabolic steroids.
b. Estrogens, progesterone and oral contraceptives.
c. Drugs acting on the uterus.

6. Bioassay

a. Principles and applications of bioassay.
b.Types of bioassay
c. Bioassay of insulin, oxytocin, vasopressin, ACTH,d-tubocurarine,digitalis, histamine and 5-HT

BP 507 P. PHARMACOLOGY-II (Practical)

4Hrs/Week

1. Introduction to *in-vitro* pharmacology and physiological salt solutions.
2. Effect of drugs on isolated frog heart.
3. Effect of drugs on blood pressure and heart rate of dog.
4. Study of diuretic activity of drugs using rats/mice.
5. DRC of acetylcholine using frog rectus abdominis muscle.
6. Effect of physostigmine and atropine on DRC of acetylcholine using frog rectus abdominis muscle and rat ileum respectively.
7. Bioassay of histamine using guinea pig ileum by matching method.
8. Bioassay of oxytocin using rat uterine horn by interpolation method.
9. Bioassay of serotonin using rat fundus strip by three point bioassay.
10. Bioassay of acetylcholine using rat ileum/colon by four point bioassay.
11. Determination of PA_2 value of prazosin using rat anococcygeus muscle (by Schilds plot method).
12. Determination of PD_2 value using guinea pig ileum.
13. Effect of spasmogens and spasmolytics using rabbit jejunum.
14. Anti-inflammatory activity of drugs using carrageenan induced paw-edema model.
15. Analgesic activity of drug using central and peripheral methods

Note: All laboratory techniques and animal experiments are demonstrated by simulated experiments by softwares and videos

Recommended Books (Latest Editions)

1. Rang H. P., Dale M. M., Ritter J. M., Flower R. J., Rang and Dale's Pharmacology, Churchil Livingstone Elsevier
2. Katzung B. G., Masters S. B., Trevor A. J., Basic and clinical pharmacology, Tata Mc Graw-Hill.
3. Goodman and Gilman's, The Pharmacological Basis of Therapeutics
4. Marry Anne K. K., Lloyd Yee Y., Brian K. A., Robbin L.C., Joseph G. B., Wayne A. K., Bradley R.W., Applied Therapeutics, The Clinical use of Drugs, The Point Lippincott Williams & Wilkins.
5. Mycek M.J, Gelnet S.B and Perper M.M. Lippincott's Illustrated Reviews-Pharmacology.
6. K.D.Tripathi. Essentials of Medical Pharmacology, , JAYPEE Brothers Medical Publishers (P) Ltd, New Delhi.
7. Sharma H. L., Sharma K. K., Principles of Pharmacology, Paras medical publisher
8. Modern Pharmacology with clinical Applications, by Charles R.Craig& Robert.
9. Ghosh MN. Fundamentals of Experimental Pharmacology. Hilton & Company, Kolkata.
10. Kulkarni SK. Handbook of experimental pharmacology. Vallabh Prakashan.

BP504 T. PHARMACOGNOSY AND PHYTOCHEMISTRY II (Theory)

45Hours

Scope: The main purpose of subject is to impart the students the knowledge of how the secondary metabolites are produced in the crude drugs, how to isolate and identify and produce them industrially. Also this subject involves the study of producing the plants and phytochemicals through plant tissue culture, drug interactions and basic principles of traditional system of medicine

Objectives: Upon completion of the course, the student shall be able

1. to know the modern extraction techniques, characterization and identification of the herbal drugs and phytoconstituents
2. to understand the preparation and development of herbal formulation.
3. to understand the herbal drug interactions
4. to carryout isolation and identification of phytoconstituents

Course Content:

UNIT-I **7 Hours**

Metabolic pathways in higher plants and their determination

a) Brief study of basic metabolic pathways and formation of different secondary metabolites through these pathways- Shikimic acid pathway, Acetate pathways and Amino acid pathway.
b) Study of utilization of radioactive isotopes in the investigation of Biogenetic studies.

UNIT-II **14 Hours**

General introduction, composition, chemistry & chemical classes, biosources, therapeutic uses and commercial applications of following

secondary metabolites:

Alkaloids: Vinca, Rauwolfia, Belladonna, Opium,
Phenylpropanoids and Flavonoids: Lignans, Tea, Ruta
Steroids, Cardiac Glycosides & Triterpenoids: Liquorice, Dioscorea, Digitalis
Volatile oils: Mentha, Clove, Cinnamon, Fennel, Coriander,
Tannins: Catechu, Pterocarpus
Resins: Benzoin, Guggul, Ginger, Asafoetida, Myrrh, Colophony
Glycosides: Senna, Aloes, Bitter Almond
Iridoids, Other terpenoids & Naphthaquinones: Gentian, Artemisia, taxus, carotenoids

UNIT-III **06 Hours**

Isolation, Identification and Analysis of Phytoconstituents

a) Terpenoids: Menthol, Citral, Artemisin
b) Glycosides: Glycyrhetinic acid & Rutin
c) Alkaloids: Atropine,Quinine,Reserpine,Caffeine
d) Resins: Podophyllotoxin, Curcumin

UNIT-IV **10 Hours**

Industrial production, estimation and utilization of the following phytoconstituents: Forskolin, Sennoside, Artemisinin, Diosgenin, Digoxin, Atropine, Podophyllotoxin, Caffeine, Taxol, Vincristine and Vinblastine

UNIT V **8 Hours**

Basics of Phytochemistry

Modern methods of extraction, application of latest techniques like Spectroscopy, chromatography and electrophoresis in the isolation, purification and identification of crude drugs.

BP 508 P. PHARMACOGNOSY AND PHYTOCHEMISTRY II (Practical)

4 Hours/Week

1. Morphology, histology and powder characteristics & extraction & detection of: Cinchona, Cinnamon, Senna, Clove, Ephedra, Fennel and Coriander
2. Exercise involving isolation & detection of active principles
   a. Caffeine - from tea dust.
   b. Diosgenin from Dioscorea
   c. Atropine from Belladonna
   d. Sennosides from Senna
3. Separation of sugars by Paper chromatography
4. TLC of herbal extract
5. Distillation of volatile oils and detection of phytoconstitutents by TLC
6. Analysis of crude drugs by chemical tests: **(**i) Asafoetida (ii) Benzoin (iii) Colophony (iv) Aloes (v) Myrrh

Recommended Books: (Latest Editions)

1. W.C.Evans, Trease and Evans Pharmacognosy, 16th edition, W.B. Sounders & Co., London, 2009.
2. Mohammad Ali. Pharmacognosy and Phytochemistry, CBS Publishers & Distribution, New Delhi.
3. Text book of Pharmacognosy by C.K. Kokate, Purohit, Gokhlae (2007), 37th Edition, Nirali Prakashan, New Delhi.
4. Herbal drug industry by R.D. Choudhary (1996), Ist Edn, Eastern Publisher, New Delhi.
5. Essentials of Pharmacognosy, Dr.SH.Ansari, IInd edition, Birla publications, New Delhi, 2007
6. Herbal Cosmetics by H.Pande, Asia Pacific Business press, Inc, New Delhi.
7. A.N. Kalia, Textbook of Industrial Pharmacognosy, CBS Publishers, New Delhi, 2005.
8. R Endress, Plant cell Biotechnology, Springer-Verlag, Berlin, 1994.
9. Pharmacognosy & Pharmacobiotechnology. James Bobbers, Marilyn KS, VE Tylor.
10. The formulation and preparation of cosmetic, fragrances and flavours.
11. Remington's Pharmaceutical sciences.
12. Text Book of Biotechnology by Vyas and Dixit.
13. Text Book of Biotechnology by R.C. Dubey.

BP 505 T. PHARMACEUTICAL JURISPRUDENCE (Theory)

45 Hours

Scope: This course is designed to impart basic knowledge on important legislations related to the profession of pharmacy in India.

Objectives: Upon completion of the course, the student shall be able to understand:

1. The Pharmaceutical legislations and their implications in the development and marketing of pharmaceuticals.
2. Various Indian pharmaceutical Acts and Laws
3. The regulatory authorities and agencies governing the manufacture and sale of pharmaceuticals
4. The code of ethics during the pharmaceutical practice

Course Content:

UNIT-I **10 Hours**

Drugs and Cosmetics Act, 1940 and its rules 1945:

Objectives, Definitions, Legal definitions of schedules to the Act and Rules

Import of drugs – Classes of drugs and cosmetics prohibited from import, Import under license or permit. Offences and penalties**.**

Manufacture of drugs – Prohibition of manufacture and sale of certain drugs,

Conditions for grant of license and conditions of license for manufacture of drugs, Manufacture of drugs for test, examination and analysis, manufacture of new drug, loan license and repacking license.

UNIT-II **10 Hours**

Drugs and Cosmetics Act, 1940 and its rules 1945.

Detailed study of Schedule G, H, M, N, P,T,U, V, X, Y, Part XII B, Sch F & DMR (OA)

Sale of Drugs – Wholesale, Retail sale and Restricted license. Offences and penalties

Labeling & Packing of drugs- General labeling requirements and specimen labels for drugs and cosmetics, List of permitted colors. Offences and penalties.

Administration of the Act and Rules – Drugs Technical Advisory Board, Central drugs Laboratory, Drugs Consultative Committee, Government drug analysts, Licensing authorities, controlling authorities, Drugs Inspectors

UNIT-III **10 Hours**

- **Pharmacy Act –1948**: Objectives, Definitions, Pharmacy Council of India; its constitution and functions, Education Regulations, State and Joint state pharmacy councils; constitution and functions, Registration of Pharmacists, Offences and

Penalties

- **Medicinal and Toilet Preparation Act –1955**: Objectives, Definitions, Licensing, Manufacture In bond and Outside bond, Export of alcoholic preparations, Manufacture of Ayurvedic, Homeopathic, Patent & Proprietary Preparations. Offences and Penalties.
- **Narcotic Drugs and Psychotropic substances Act-1985 and Rules**: Objectives, Definitions, Authorities and Officers, Constitution and Functions of narcotic & Psychotropic Consultative Committee, National Fund for Controlling the Drug Abuse, Prohibition, Control and Regulation, opium poppy cultivation and production of poppy straw, manufacture, sale and export of opium, Offences and Penalties

UNIT-IV **08 Hours**

- **Study of Salient Features of Drugs and Magic Remedies Act and its rules:** Objectives, Definitions, Prohibition of certain advertisements, Classes of Exempted advertisements, Offences and Penalties
- **Prevention of Cruelty to animals Act-1960:** Objectives, Definitions, Institutional Animal Ethics Committee, CPCSEA guidelines for Breeding and Stocking of Animals, Performance of Experiments, Transfer and acquisition of animals for experiment, Records, Power to suspend or revoke registration, Offences and Penalties
- **National Pharmaceutical Pricing Authority:** Drugs Price Control Order (DPCO)-2013. Objectives, Definitions, Sale prices of bulk drugs, Retail price of formulations, Retail price and ceiling price of scheduled formulations, National List of Essential Medicines (NLEM)

UNIT-V **07 Hours**

- **Pharmaceutical Legislations –** A brief review, Introduction, Study of drugs enquiry committee, Health survey and development committee, Hathi committee and Mudaliar committee
- **Code of Pharmaceutical ethics** D efinition, Pharmacist in relation to his job, trade, medical profession and his profession, Pharmacist's oath
- **Medical Termination of Pregnancy Act**
- **Right to Information Act**
- **Introduction to Intellectual Property Rights (IPR)**

Recommended books: (Latest Edition)

1. Forensic Pharmacy by B. Suresh

2. Text book of Forensic Pharmacy by B.M. Mithal
3. Hand book of drug law-by M.L. Mehra
4. A text book of Forensic Pharmacy by N.K. Jain
5. Drugs and Cosmetics Act/Rules by Govt. of India publications.
6. Medicinal and Toilet preparations act 1955 by Govt. of India publications.
7. Narcotic drugs and psychotropic substances act by Govt. of India publications
8. Drugs and Magic Remedies act by Govt. of India publication
9.Bare Acts of the said laws published by Government. Reference books (Theory)

SEMESTER VI

BP601T. MEDICINAL CHEMISTRY – III (Theory)

45 Hours

Scope: This subject is designed to impart fundamental knowledge on the structure, chemistry and therapeutic value of drugs. The subject emphasis on modern techniques of rational drug design like quantitative structure activity relationship (QSAR), Prodrug concept, combinatorial chemistry and Computer aided drug design (CADD). The subject also emphasizes on the chemistry, mechanism of action, metabolism, adverse effects, Structure Activity Relationships (SAR), therapeutic uses and synthesis of important drugs.

Objectives: Upon completion of the course student shall be able to

1. Understand the importance of drug design and different techniques of drug design.
2. Understand the chemistry of drugs with respect to their biological activity.
3. Know the metabolism, adverse effects and therapeutic value of drugs.
4. Know the importance of SAR of drugs.

Course Content:

Study of the development of the following classes of drugs, Classification, mechanism of action, uses of drugs mentioned in the course, Structure activity relationship of selective class of drugs as specified in the course and synthesis of drugs superscripted by (*)

UNIT – I **10 Hours**

Antibiotics

Historical background, Nomenclature, Stereochemistry, Structure activity relationship, Chemical degradation classification and important products of the following classes.

β-Lactam antibiotics: Penicillin, Cepholosporins, β- Lactamase inhibitors, Monobactams

Aminoglycosides: Streptomycin, Neomycin, Kanamycin

Tetracyclines: Tetracycline,Oxytetracycline, Chlortetracycline, Minocycline, Doxycycline

UNIT – II **10 Hours**

Antibiotics

Historical background, Nomenclature, Stereochemistry, Structure activity relationship, Chemical degradation classification and important products of the following classes.

Macrolide: Erythromycin Clarithromycin, Azithromycin.

Miscellaneous: Chloramphenicol*, Clindamycin.

Prodrugs: Basic concepts and application of prodrugs design.

Antimalarials: Etiology of malaria.

Quinolines: SAR, Quinine sulphate, Chloroquine*, Amodiaquine, Primaquine phosphate, Pamaquine*, Quinacrine hydrochloride, Mefloquine.

Biguanides and dihydro triazines: Cycloguanil pamoate, Proguanil.

Miscellaneous: Pyrimethamine, Artesunete, Artemether, Atovoquone.

UNIT – III **10 Hours**

Anti-tubercular Agents

Synthetic anti tubercular agents: Isoniozid*, Ethionamide, Ethambutol, Pyrazinamide, Para amino salicylic acid.*

Anti tubercular antibiotics: Rifampicin, Rifabutin, Cycloserine Streptomycine, Capreomycin sulphate.

Urinary tract anti-infective agents

Quinolones: SAR of quinolones, Nalidixic Acid,Norfloxacin, Enoxacin, Ciprofloxacin*, Ofloxacin, Lomefloxacin, Sparfloxacin, Gatifloxacin, Moxifloxacin

Miscellaneous: Furazolidine, Nitrofurantoin*, Methanamine.

Antiviral agents:

Amantadine hydrochloride, Rimantadine hydrochloride, Idoxuridine trifluoride, Acyclovir*, Gancyclovir, Zidovudine, Didanosine, Zalcitabine, Lamivudine, Loviride, Delavirding, Ribavirin, Saquinavir, Indinavir, Ritonavir.

UNIT – IV **08 Hours**

Antifungal agents:

Antifungal antibiotics: Amphotericin-B, Nystatin, Natamycin, Griseofulvin.

Synthetic Antifungal agents: Clotrimazole, Econazole, Butoconazole, Oxiconazole Tioconozole, Miconazole*, Ketoconazole, Terconazole, Itraconazole, Fluconazole, Naftifine hydrochloride, Tolnaftate*.

Anti-protozoal Agents: Metronidazole*, Tinidazole, Ornidazole, Diloxanide, Iodoquinol, Pentamidine Isethionate, Atovaquone, Eflornithine.

Anthelmintics: Diethylcarbamazine citrate*, Thiabendazole, Mebendazole*, Albendazole, Niclosamide, Oxamniquine, Praziquantal, Ivermectin.

Sulphonamides and Sulfones

Historical development, chemistry, classification and SAR of Sulfonamides: Sulphamethizole, Sulfisoxazole, Sulphamethizine, Sulfacetamide*, Sulphapyridine, Sulfamethoxaole*, Sulphadiazine, Mefenide acetate, Sulfasalazine.

Folate reductase inhibitors: Trimethoprim*, Cotrimoxazole.

Sulfones: Dapsone*.

UNIT – V **07 Hours**

Introduction to Drug Design

Various approaches used in drug design.

Physicochemical parameters used in quantitative structure activity relationship (QSAR) such as partition coefficient, Hammet's electronic parameter, Tafts steric parameter and Hansch analysis.

Pharmacophore modeling and docking techniques.

Combinatorial Chemistry: Concept and applications of combinatorial chemistry: solid phase and solution phase synthesis.

BP607P. MEDICINAL CHEMISTRY- III (Practical)

4 Hours / week

I Preparation of drugs and intermediates

1 Sulphanilamide

2 7-Hydroxy, 4-methyl coumarin

3 Chlorobutanol

4 Triphenyl imidazole

5 Tolbutamide

6 Hexamine

II Assay of drugs

1 Isonicotinic acid hydrazide

2 Chloroquine

3 Metronidazole

4 Dapsone

5 Chlorpheniramine maleate

6 Benzyl penicillin

III Preparation of medicinally important compounds or intermediates by Microwave irradiation technique

IV Drawing structures and reactions using chem draw®

V Determination of physicochemical properties such as logP, clogP, MR, Molecular weight, Hydrogen bond donors and acceptors for class of drugs course content using drug design software Drug likeliness screening (Lipinskies RO5)

Recommended Books (Latest Editions)

1. Wilson and Giswold's Organic medicinal and Pharmaceutical Chemistry.
2. Foye's Principles of Medicinal Chemistry.
3. Burger's Medicinal Chemistry, Vol I to IV.
4. Introduction to principles of drug design- Smith and Williams.
5. Remington's Pharmaceutical Sciences.
6. Martindale's extra pharmacopoeia.

7. Organic Chemistry by I.L. Finar, Vol. II.
8. The Organic Chemistry of Drug Synthesis by Lednicer, Vol. 1-5.
9. Indian Pharmacopoeia.
10. Text book of practical organic chemistry- A.I.Vogel.

BP602 T. PHARMACOLOGY-III (Theory)

45 Hours

Scope: This subject is intended to impart the fundamental knowledge on various aspects (classification, mechanism of action, therapeutic effects, clinical uses, side effects and contraindications) of drugs acting on respiratory and gastrointestinal system, infectious diseases, immuno-pharmacology and in addition,emphasis on the principles of toxicology and chronopharmacology.

Objectives: Upon completion of this course the student should be able to:

1. understand the mechanism of drug action and its relevance in the treatment of different infectious diseases
2. comprehend the principles of toxicology and treatment of various poisoningsand
3. appreciate correlation of pharmacology with related medical sciences.

Course Content:

UNIT-I **10hours**

1. Pharmacology of drugs acting on Respiratory system

a. Anti -asthmatic drugs
b. Drugs used in the management of COPD
c. Expectorants and antitussives
d. Nasal decongestants
e. Respiratory stimulants

2. Pharmacology of drugs acting on the Gastrointestinal Tract

a. Antiulcer agents.
b. Drugs for constipation and diarrhoea.
c. Appetite stimulants and suppressants.
d. Digestants and carminatives.
e. Emetics and anti-emetics.

UNIT-II **10hours**

3. Chemotherapy

a. General principles of chemotherapy.

b. Sulfonamides and cotrimoxazole.

c. Antibiotics- Penicillins, cephalosporins, chloramphenicol, macrolides, quinolones and fluoroquinolins, tetracycline and aminoglycosides

UNIT-III **10hours**

3. Chemotherapy

a. Antitubercular agents

b. Antileprotic agents

c. Antifungal agents

d. Antiviral drugs

e.Anthelmintics

f. Antimalarial drugs

g. Antiamoebic agents

UNIT-IV **08hours**

3. Chemotherapy

l. Urinary tract infections and sexually transmitted diseases.

m. Chemotherapy of malignancy.

4. Immunopharmacology

a. Immunostimulants

b. Immunosuppressant

Protein drugs, monoclonal antibodies, target drugs to antigen, biosimilars

UNIT-V **07hours**

5. Principles of toxicology

a. Definition and basic knowledge of acute, subacute and chronic toxicity.

b. Definition and basic knowledge of genotoxicity, carcinogenicity, teratogenicity and mutagenicity

c. General principles of treatment of poisoning

d. Clinical symptoms and management of barbiturates, morphine, organophosphosphorus compound and lead, mercury and arsenic poisoning.

6. Chronopharmacology

a. Definition of rhythm and cycles.

b. Biological clock and their significance leading to chronotherapy.

BP 608 P. PHARMACOLOGY-III (Practical)

4Hrs/Week

1. Dose calculation in pharmacological experiments
2. Antiallergic activity by mast cell stabilization assay
3. Study of anti-ulcer activity of a drug using pylorus ligand (SHAY) rat model and NSAIDS induced ulcer model.
4. Study of effect of drugs on gastrointestinal motility
5. Effect of agonist and antagonists on guinea pig ileum
6. Estimation of serum biochemical parameters by using semi- autoanalyser
7. Effect of saline purgative on frog intestine
8. Insulin hypoglycemic effect in rabbit
9. Test for pyrogens (rabbit method)
10. Determination of acute oral toxicity (LD50) of a drug from a given data
11. Determination of acute skin irritation / corrosion of a test substance
12. Determination of acute eye irritation / corrosion of a test substance
13. Calculation of pharmacokinetic parameters from a given data
14. Biostatistics methods in experimental pharmacology(student's t test, ANOVA)
15. Biostatistics methods in experimental pharmacology (Chi square test, Wilcoxon Signed Rank test)

**Experiments are demonstrated by simulated experiments/videos*

Recommended Books (Latest Editions)

1. Rang H. P., Dale M. M., Ritter J. M., Flower R. J., Rang and Dale's Pharmacology, Churchil Livingstone Elsevier
2. Katzung B. G., Masters S. B., Trevor A. J., Basic and clinical pharmacology, Tata Mc Graw-Hill
3. Goodman and Gilman's, The Pharmacological Basis of Therapeutics
4. Marry Anne K. K., Lloyd Yee Y., Brian K. A., Robbin L.C., Joseph G. B., Wayne A. K., Bradley R.W., Applied Therapeutics, The Clinical use of Drugs. The Point Lippincott Williams & Wilkins
5. Mycek M.J, Gelnet S.B and Perper M.M. Lippincott's Illustrated Reviews-Pharmacology
6. K.D.Tripathi. Essentials of Medical Pharmacology, , JAYPEE Brothers Medical Publishers (P) Ltd, New Delhi.
7. Sharma H. L., Sharma K. K., Principles of Pharmacology, Paras medical publisher Modern Pharmacology with clinical Applications, by Charles R.Craig& Robert,
8. Ghosh MN. Fundamentals of Experimental Pharmacology. Hilton & Company, Kolkata,
9. Kulkarni SK. Handbook of experimental pharmacology. VallabhPrakashan,
10. N.Udupa and P.D. Gupta, Concepts in Chronopharmacology.

BP 603 T. HERBAL DRUG TECHNOLOGY (Theory)

45 hours

Scope: This subject gives the student the knowledge of basic understanding of herbal drug industry, the quality of raw material, guidelines for quality of herbal drugs, herbal cosmetics, natural sweeteners, nutraceutical etc. The subject also emphasizes on Good Manufacturing Practices (GMP), patenting and regulatory issues of herbal drugs

Objectives: Upon completion of this course the student should be able to:

1. understand raw material as source of herbal drugs from cultivation to herbal drug product
2. know the WHO and ICH guidelines for evaluation of herbal drugs
3. know the herbal cosmetics, natural sweeteners, nutraceuticals
4. appreciate patenting of herbal drugs, GMP .

Course content:

UNIT-I **11 Hours**

Herbs as raw materials

Definition of herb, herbal medicine, herbal medicinal product, herbal drug preparation
Source of Herbs
Selection, identification and authentication of herbal materials
Processing of herbal raw material

Biodynamic Agriculture

Good agricultural practices in cultivation of medicinal plants including Organic farming.
Pest and Pest management in medicinal plants: Biopesticides/Bioinsecticides.

Indian Systems of Medicine

a) Basic principles involved in Ayurveda, Siddha, Unani and Homeopathy
b) Preparation and standardization of Ayurvedic formulations viz Aristas and Asawas, Ghutika,Churna, Lehya and Bhasma.

UNIT-II **7 Hours**

Nutraceuticals

General aspects, Market, growth, scope and types of products available in the market. Health benefits and role of Nutraceuticals in ailments like Diabetes, CVS diseases, Cancer, Irritable bowel syndrome and various Gastro intestinal diseases.
Study of following herbs as health food: Alfaalfa, Chicory, Ginger, Fenugreek, Garlic, Honey, Amla, Ginseng, Ashwagandha, Spirulina

Herbal-Drug and Herb-Food Interactions: General introduction to interaction and classification. Study of following drugs and their possible side effects and interactions: Hypercium, kava-kava, Ginkobiloba, Ginseng, Garlic, Pepper & Ephedra.

UNIT-III **10 Hours**

Herbal Cosmetics

Sources and description of raw materials of herbal origin used via, fixed oils, waxes, gums colours, perfumes, protective agents, bleaching agents, antioxidants in products such as skin care, hair care and oral hygiene products.

Herbal excipients:
Herbal Excipients – Significance of substances of natural origin as excipients – colorants, sweeteners, binders, diluents, viscosity builders, disintegrants, flavors & perfumes.

Herbal formulations :
Conventional herbal formulations like syrups, mixtures and tablets and Novel dosage forms like phytosomes

UNIT- IV **10 Hours**

Evaluation of Drugs WHO & ICH guidelines for the assessment of herbal drugs
Stability testing of herbal drugs.

Patenting and Regulatory requirements of natural products:
a) Definition of the terms: Patent, IPR, Farmers right, Breeder's right, Bioprospecting and Biopiracy
b) Patenting aspects of Traditional Knowledge and Natural Products. Case study of Curcuma & Neem.

Regulatory Issues - Regulations in India (ASU DTAB, ASU DCC), Regulation of manufacture of ASU drugs - Schedule Z of Drugs & Cosmetics Act for ASU drugs.

UNIT-V **07 Hours**

General Introduction to Herbal Industry
Herbal drugs industry: Present scope and future prospects.
A brief account of plant based industries and institutions involved in work on medicinal and aromatic plants in India.

Schedule T – Good Manufacturing Practice of Indian systems of medicine
Components of GMP (Schedule – T) and its objectives
Infrastructural requirements, working space, storage area, machinery and equipments, standard operating procedures, health and hygiene, documentation and records.

BP 609 P. HERBAL DRUG TECHNOLOGY (Practical)

4 hours/ week

1. To perform preliminary phytochemical screening of crude drugs.
2. Determination of the alcohol content of Asava and Arista
3. Evaluation of excipients of natural origin
4. Incorporation of prepared and standardized extract in cosmetic formulations like creams, lotions and shampoos and their evaluation.
5. Incorporation of prepared and standardized extract in formulations like syrups, mixtures and tablets and their evaluation as per Pharmacopoeial requirements.
6. Monograph analysis of herbal drugs from recent Pharmacopoeias
7. Determination of Aldehyde content
8. Determination of Phenol content
9. Determination of total alkaloids

Recommended Books: (Latest Editions)

1. Textbook of Pharmacognosy by Trease & Evans.
2. Textbook of Pharmacognosy by Tyler, Brady & Robber.
3. Pharmacognosy by Kokate, Purohit and Gokhale
4. Essential of Pharmacognosy by Dr.S.H.Ansari
5. Pharmacognosy & Phytochemistry by V.D.Rangari
6. Pharmacopoeal standards for Ayurvedic Formulation (Council of Research in Indian Medicine & Homeopathy)
7. Mukherjee, P.W. Quality Control of Herbal Drugs: An Approach to Evaluation of Botanicals. Business Horizons Publishers, New Delhi, India, 2002.

BP 604 T. BIOPHARMACEUTICS AND PHARMACOKINETICS (Theory)

45 Hours

Scope: This subject is designed to impart knowledge and skills of Biopharmaceutics and pharmacokinetics and their applications in pharmaceutical development, design of dose and dosage regimen and in solving the problems arised therein.

Objectives: Upon completion of the course student shall be able to:

1. Understand the basic concepts in biopharmaceutics and pharmacokinetics and their significance.
2. Use of plasma drug concentration-time data to calculate the pharmacokinetic parameters to describe the kinetics of drug absorption, distribution, metabolism, excretion, elimination.
3. To understand the concepts of bioavailability and bioequivalence of drug products and their significance.
4. Understand various pharmacokinetic parameters, their significance & applications.

Course Content:

UNIT-I **10 Hours**

Introduction to Biopharmaceutics

Absorption; Mechanisms of drug absorption through GIT, factors influencing drug absorption though GIT, absorption of drug from Non per oral extra-vascular routes, **Distribution** Tissue permeability of drugs, binding of drugs, apparent, volume of drug distribution, plasma and tissue protein binding of drugs, factors affecting protein-drug binding. Kinetics of protein binding, Clinical significance of protein binding of drugs

UNIT- II **10 Hours**

Elimination: Drug metabolism and basic understanding metabolic pathways renal excretion of drugs, factors affecting renal excretion of drugs, renal clearance, Non renal routes of drug excretion of drugs

Bioavailability and Bioequivalence: Definition and Objectives of bioavailability, absolute and relative bioavailability, measurement of bioavailability, *in-vitro* drug dissolution models, *in-vitro-in-vivo* correlations, bioequivalence studies, methods to enhance the dissolution rates and bioavailability of poorly soluble drugs.

UNIT- III **10 Hours**

Pharmacokinetics: Definition and introduction to Pharmacokinetics, Compartment models, Non compartment models, physiological models, One compartment open model. (a). Intravenous Injection (Bolus) (b). Intravenous infusion and (c) Extra vascular administrations. Pharmacokinetics parameters - K_E ,t1/2,Vd,AUC,Ka, Clt and CL_R- definitions methods of eliminations, understanding of their significance and application

UNIT- IV **08 Hours**

Multicompartment models: Two compartment open model. IV bolus
Kinetics of multiple dosing, steady state drug levels, calculation of loading and mainetnance doses and their significance in clinical settins.

UNIT- V **07 Hours**

Nonlinear Pharmacokinetics: a. Introduction, b. Factors causing Non-linearity.
c. Michaelis-menton method of estimating parameters, Explanation with example of drugs.

Recommended Books: (Latest Editions)

1. Biopharmaceutics and Clinical Pharmacokinetics by, Milo Gibaldi.
2. Biopharmaceutics and Pharmacokinetics; By Robert F Notari
3. Applied biopharmaceutics and pharmacokinetics, Leon Shargel and Andrew B.C.YU 4th edition,Prentice-Hall Inernational edition.USA
4. Bio pharmaceutics and Pharmacokinetics-A Treatise, By D. M. Brahmankar and Sunil B.Jaiswal,Vallabh Prakashan Pitampura, Delhi
5. Pharmacokinetics: By Milo Glbaldi Donald, R. Mercel Dekker Inc.
6. Hand Book of Clinical Pharmacokinetics, By Milo Gibaldi and Laurie Prescott by ADIS Health Science Press.
7. Biopharmaceutics; By Swarbrick
8. Clinical Pharmacokinetics, Concepts and Applications: By Malcolm Rowland and
9. Thomas, N. Tozen, Lea and Febrger, Philadelphia, 1995.
10. Dissolution, Bioavailability and Bioequivalence, By Abdou H.M, Mack, Publishing Company,Pennsylvania 1989.
11. Biopharmaceutics and Clinical Pharmacokinetics-An introduction 4th edition Revised and expanded by Rebort F Notari Marcel Dekker Inn, New York and Basel, 1987.
12. Remington's Pharmaceutical Sciences, By Mack Publishing Company, Pennsylvnia

BP 605 T. PHARMACEUTICAL BIOTECHNOLOGY (Theory)

45 Hours

Scope:

- Biotechnology has a long promise to revolutionize the biological sciences and technology.
- Scientific application of biotechnology in the field of genetic engineering, medicine and fermentation technology makes the subject interesting.
- Biotechnology is leading to new biological revolutions in diagnosis, prevention and cure of diseases, new and cheaper pharmaceutical drugs.
- Biotechnology has already produced transgenic crops and animals and the future promises lot more.
- It is basically a research-based subject.

Objectives: Upon completion of the subject student shall be able to;

1. Understanding the importance of Immobilized enzymes in Pharmaceutical Industries
2. Genetic engineering applications in relation to production of pharmaceuticals
3. Importance of Monoclonal antibodies in Industries
4. Appreciate the use of microorganisms in fermentation technology

Unit I **10 Hours**

a) Brief introduction to Biotechnology with reference to Pharmaceutical Sciences.

b) Enzyme Biotechnology- Methods of enzyme immobilization and applications.

c) Biosensors- Working and applications of biosensors in Pharmaceutical Industries.

d) Brief introduction to Protein Engineering.

e) Use of microbes in industry. Production of Enzymes- General consideration - Amylase, Catalase, Peroxidase, Lipase, Protease, Penicillinase.

f) Basic principles of genetic engineering.

Unit II **10 Hours**

a) Study of cloning vectors, restriction endonucleases and DNA ligase.

b) Recombinant DNA technology. Application of genetic engineering in medicine.

c) Application of r DNA technology and genetic engineering in the production of:

i) Interferon ii) Vaccines- hepatitis- B iii) Hormones-Insulin.

d) Brief introduction to PCR

Unit III **10 Hours**

Types of immunity- humoral immunity, cellular immunity

a) Structure of Immunoglobulins

b) Structure and Function of MHC

c) Hypersensitivity reactions, Immune stimulation and Immune suppressions.

d) General method of the preparation of bacterial vaccines, toxoids, viral vaccine, antitoxins, serum-immune blood derivatives and other products relative to immunity.

e) Storage conditions and stability of official vaccines

f) Hybridoma technology- Production, Purification and Applications

g) Blood products and Plasma Substituties.

Unit IV **08Hours**

a) Immuno blotting techniques- ELISA, Western blotting, Southern blotting.

b) Genetic organization of Eukaryotes and Prokaryotes

c) Microbial genetics including transformation, transduction, conjugation, plasmids and transposons.

d) Introduction to Microbial biotransformation and applications.

e) Mutation: Types of mutation/mutants.

Unit V **07 Hours**

a) Fermentation methods and general requirements, study of media, equipments, sterilization methods, aeration process, stirring.

b) Large scale production fermenter design and its various controls.

c) Study of the production of - penicillins, citric acid, Vitamin B12, Glutamic acid, Griseofulvin,

d) Blood Products: Collection, Processing and Storage of whole human blood, dried human plasma, plasma Substituties.

Recommended Books (Latest edition):

1. B.R. Glick and J.J. Pasternak: Molecular Biotechnology: Principles and Applications of RecombinantDNA: ASM Press Washington D.C.
2. RA Goldshy et. al., : Kuby Immunology.
3. J.W. Goding: Monoclonal Antibodies.
4. J.M. Walker and E.B. Gingold: Molecular Biology and Biotechnology by Royal

Society of Chemistry.
5. Zaborsky: Immobilized Enzymes, CRC Press, Degraland, Ohio.
6. S.B. Primrose: Molecular Biotechnology (Second Edition) Blackwell Scientific Publication.
7. Stanbury F., P., Whitakar A., and Hall J., S., Principles of fermentation technology, 2nd edition, Aditya books Ltd., New Delhi

BP606TPHARMACEUTICAL QUALITY ASSURANCE (Theory)

45 Hours

Scope: This course deals with the various aspects of quality control and quality assurance aspects of pharmaceutical industries. It deals with the important aspects like cGMP, QC tests, documentation, quality certifications and regulatory affairs.

Objectives: Upon completion of the course student shall be able to:

- understand the cGMP aspects in a pharmaceutical industry
- appreciate the importance of documentation
- understand the scope of quality certifications applicable to pharmaceutical industries
- understand the responsibilities of QA & QC departments

Course content:

UNIT – I **10 Hours**

Quality Assurance and Quality Management concepts: Definition and concept of Quality control, Quality assurance and GMP

Total Quality Management (TQM): Definition, elements, philosophies

ICH Guidelines: purpose, participants, process of harmonization, Brief overview of QSEM, with special emphasis on Q-series guidelines, ICH stability testing guidelines

Quality by design (QbD): Definition, overview, elements of QbD program, tools

ISO 9000 & ISO14000: Overview, Benefits, Elements, steps for registration

NABL accreditation : Principles and procedures

UNIT - II **10 Hours**

Organization and personnel: Personnel responsibilities, training, hygiene and personal records.

Premises: Design, construction and plant layout, maintenance, sanitation, environmental control, utilities and maintenance of sterile areas, control of contamination.

Equipments and raw materials: Equipment selection, purchase specifications, maintenance, purchase specifications and maintenance of stores for raw materials.

UNIT – III **10 Hours**

Quality Control: Quality control test for containers, rubber closures and secondary packing

materials.

Good Laboratory Practices: General Provisions, Organization and Personnel, Facilities, Equipment, Testing Facilities Operation, Test and Control Articles, Protocol for Conduct of a Nonclinical Laboratory Study, Records and Reports, Disqualification of Testing Facilities

UNIT – IV **08 Hours**

Complaints: Complaints and evaluation of complaints, Handling of return good, recalling and waste disposal.

Document maintenance in pharmaceutical industry: Batch Formula Record, Master Formula Record, SOP, Quality audit, Quality Review and Quality documentation, Reports and documents, distribution records.

UNIT – V **07 Hours**

Calibration and Validation: Introduction, definition and general principles of calibration, qualification and validation, importance and scope of validation, types of validation, validation master plan. Calibration of pH meter, Qualification of UV-Visible spectrophotometer, General principles of Analytical method Validation.

Warehousing: Good warehousing practice, materials management

Recommended Books: (Latest Edition)

1. Quality Assurance Guide by organization of Pharmaceutical Products of India.
2. Good Laboratory Practice Regulations, 2nd Edition, Sandy Weinberg Vol. 69.
3. Quality Assurance of Pharmaceuticals- A compendium of Guide lines and Related materials Vol I WHO Publications.
4. A guide to Total Quality Management- Kushik Maitra and Sedhan K Ghosh
5. How to Practice GMP's – P P Sharma.
6. ISO 9000 and Total Quality Management – Sadhank G Ghosh
7. The International Pharmacopoeia – Vol I, II, III, IV- General Methods of Analysis and Quality specification for Pharmaceutical Substances, Excipients and Dosage forms
8. Good laboratory Practices – Marcel Deckker Series
9. ICH guidelines, ISO 9000 and 14000 guidelines

SEMESTER VII

BP701T. INSTRUMENTAL METHODS OF ANALYSIS (Theory)

45 Hours

Scope: This subject deals with the application of instrumental methods in qualitative and quantitative analysis of drugs. This subject is designed to impart a fundamental knowledge on the principles and instrumentation of spectroscopic and chromatographic technique. This also emphasizes on theoretical and practical knowledge on modern analytical instruments that are used for drug testing.

Objectives: Upon completion of the course the student shall be able to

1. Understand the interaction of matter with electromagnetic radiations and its applications in drug analysis
2. Understand the chromatographic separation and analysis of drugs.
3. Perform quantitative & qualitative analysis of drugs using various analytical instruments.

Course Content:

UNIT –I **10 Hours**

UV Visible spectroscopy

Electronic transitions, chromophores, auxochromes, spectral shifts, solvent effect on absorption spectra, Beer and Lambert's law, Derivation and deviations.

Instrumentation - Sources of radiation, wavelength selectors, sample cells, detectors- Photo tube, Photomultiplier tube, Photo voltaic cell, Silicon Photodiode.

Applications - Spectrophotometric titrations, Single component and multi component analysis

Fluorimetry

Theory, Concepts of singlet, doublet and triplet electronic states, internal and external conversions, factors affecting fluorescence, quenching, instrumentation and applications

UNIT –II **10 Hours**

IR spectroscopy

Introduction, fundamental modes of vibrations in poly atomic molecules, sample handling, factors affecting vibrations

Instrumentation - Sources of radiation, wavelength selectors, detectors - Golay cell, Bolometer, Thermocouple, Thermister, Pyroelectric detector and applications

Flame Photometry-Principle, interferences, instrumentation and applications

Atomic absorption spectroscopy- Principle, interferences, instrumentation and applications

Nepheloturbidometry- Principle, instrumentation and applications

UNIT –III **10 Hours**

Introduction to chromatography

Adsorption and partition column chromatography-Methodology, advantages, disadvantages and applications.

Thin layer chromatography- Introduction, Principle, Methodology, Rf values, advantages, disadvantages and applications.

Paper chromatography-Introduction, methodology, development techniques, advantages, disadvantages and applications

Electrophoresis– Introduction, factors affecting electrophoretic mobility, Techniques of paper, gel, capillary electrophoresis, applications

UNIT –IV **08 Hours**

Gas chromatography - Introduction, theory, instrumentation, derivatization, temperature programming, advantages, disadvantages and applications

High performance liquid chromatography (HPLC)-Introduction, theory, instrumentation, advantages and applications.

UNIT –V **07 Hours**

Ion exchange chromatography- Introduction, classification, ion exchange resins, properties, mechanism of ion exchange process, factors affecting ion exchange, methodology and applications

Gel chromatography- Introduction, theory, instrumentation and applications

Affinity chromatography- Introduction, theory, instrumentation and applications

BP705P. INSTRUMENTAL METHODS OF ANALYSIS (Practical)

4 Hours/Week

1. Determination of absorption maxima and effect of solvents on absorption maxima of organic compounds
2. Estimation of dextrose by colorimetry
3. Estimation of sulfanilamide by colorimetry
4. Simultaneous estimation of ibuprofen and paracetamol by UV spectroscopy
5. Assay of paracetamol by UV- Spectrophotometry
6. Estimation of quinine sulfate by fluorimetry
7. Study of quenching of fluorescence
8. Determination of sodium by flame photometry
9. Determination of potassium by flame photometry
10. Determination of chlorides and sulphates by nephelo turbidometry
11. Separation of amino acids by paper chromatography
12. Separation of sugars by thin layer chromatography
13. Separation of plant pigments by column chromatography
14. Demonstration experiment on HPLC
15. Demonstration experiment on Gas Chromatography

Recommended Books (Latest Editions)

1. Instrumental Methods of Chemical Analysis by B.K Sharma
2. Organic spectroscopy by Y.R Sharma
3. Text book of Pharmaceutical Analysis by Kenneth A. Connors
4. Vogel's Text book of Quantitative Chemical Analysis by A.I. Vogel
5. Practical Pharmaceutical Chemistry by A.H. Beckett and J.B. Stenlake
6. Organic Chemistry by I. L. Finar
7. Organic spectroscopy by William Kemp
8. Quantitative Analysis of Drugs by D. C. Garrett
9. Quantitative Analysis of Drugs in Pharmaceutical Formulations by P. D. Sethi
10. Spectrophotometric identification of Organic Compounds by Silverstein

BP 702 T. INDUSTRIAL PHARMACYII (Theory)

45 Hours

Scope: This course is designed to impart fundamental knowledge on pharmaceutical product development and translation from laboratory to market

Objectives: Upon completion of the course, the student shall be able to:

1. Know the process of pilot plant and scale up of pharmaceutical dosage forms
2. Understand the process of technology transfer from lab scale to commercial batch
3. Know different Laws and Acts that regulate pharmaceutical industry
4. Understand the approval process and regulatory requirements for drug products

Course Content:

UNIT-I **10 Hours**

Pilot plant scale up techniques: General considerations - including significance of personnel requirements, space requirements, raw materials, Pilot plant scale up considerations for solids, liquid orals, semi solids and relevant documentation, SUPAC guidelines, Introduction to platform technology

UNIT-II **10 Hours**

Technology development and transfer: WHO guidelines for Technology Transfer(TT): Terminology, Technology transfer protocol, Quality risk management, Transfer from R & D to production (Process, packaging and cleaning), Granularity of TT Process (API, excipients, finished products, packaging materials) Documentation, Premises and equipments, qualification and validation, quality control, analytical method transfer, Approved regulatory bodies and agencies, Commercialization - practical aspects and problems (case studies), TT agencies in India - APCTD, NRDC, TIFAC, BCIL, TBSE / SIDBI; TT related documentation - confidentiality agreement, licensing, MoUs, legal issues

UNIT-III **10 Hours**

Regulatory affairs: Introduction, Historical overview of Regulatory Affairs, Regulatory authorities, Role of Regulatory affairs department, Responsibility of Regulatory Affairs Professionals

Regulatory requirements for drug approval: Drug Development Teams, Non-Clinical Drug Development, Pharmacology, Drug Metabolism and Toxicology, General considerations of Investigational New Drug (IND) Application, Investigator's Brochure (IB) and New Drug Application (NDA), Clinical research / BE studies, Clinical Research Protocols, Biostatistics in Pharmaceutical Product Development, Data Presentation for FDA Submissions, Management of Clinical Studies.

UNIT-IV **08 Hours**

Quality management systems: Quality management & Certifications: Concept of Quality, Total Quality Management, Quality by Design (QbD), Six Sigma concept, Out of Specifications (OOS), Change control, Introduction to ISO 9000 series of quality systems standards, ISO 14000, NABL, GLP

UNIT-V **07 Hours**

Indian Regulatory Requirements: Central Drug Standard Control Organization (CDSCO) and State Licensing Authority: Organization, Responsibilities, Certificate of Pharmaceutical Product (COPP), Regulatory requirements and approval procedures for New Drugs.

Recommended Books: (Latest Editions)

1. Regulatory Affairs from Wikipedia, the free encyclopedia modified on 7th April available at http,//en.wikipedia.org/wiki/Regulatory_ Affairs.
2. International Regulatory Affairs Updates, 2005. available at http://www.iraup.com/about.php
3. Douglas J Pisano and David S. Mantus. Text book of FDA Regulatory Affairs A Guide for Prescription Drugs, Medical Devices, and Biologics' Second Edition.
4. Regulatory Affairs brought by learning plus, inc. available at http.//www.cgmp.com/ra.htm.

BP 703T. PHARMACY PRACTICE (Theory)

45 Hours

Scope: In the changing scenario of pharmacy practice in India, for successful practice of Hospital Pharmacy, the students are required to learn various skills like drug distribution, drug information, and therapeutic drug monitoring for improved patient care. In community pharmacy, students will be learning various skills such as dispensing of drugs, responding to minor ailments by providing suitable safe medication, patient counselling for improved patient care in the community set up.

Objectives: Upon completion of the course, the student shall be able to

1. know various drug distribution methods in a hospital
2. appreciate the pharmacy stores management and inventory control
3. monitor drug therapy of patient through medication chart review and clinical review
4. obtain medication history interview and counsel the patients
5. identify drug related problems
6. detect and assess adverse drug reactions
7. interpret selected laboratory results (as monitoring parameters in therapeutics) of specific disease states
8. know pharmaceutical care services
9. do patient counseling in community pharmacy;
10. appreciate the concept of Rational drug therapy.

Unit I: **10 Hours**

a) Hospital and it's organization

Definition, Classification of hospital- Primary, Secondary and Tertiary hospitals, Classification based on clinical and non- clinical basis, Organization Structure of a Hospital, and Medical staffs involved in the hospital and their functions.

b) Hospital pharmacy and its organization

Definition, functions of hospital pharmacy, Organization structure, Location, Layout and staff requirements, and Responsibilities and functions of hospital pharmacists.

c) Adverse drug reaction

Classifications - Excessive pharmacological effects, secondary pharmacological effects, idiosyncrasy, allergic drug reactions, genetically determined toxicity, toxicity following sudden withdrawal of drugs, Drug interaction- beneficial interactions, adverse interactions, and pharmacokinetic drug interactions, Methods for detecting

drug interactions, spontaneous case reports and record linkage studies, and Adverse drug reaction reporting and management.

d) Community Pharmacy

Organization and structure of retail and wholesale drug store, types and design, Legal requirements for establishment and maintenance of a drug store, Dispensing of proprietary products, maintenance of records of retail and wholesale drug store.

Unit II: 10 Hours

a) Drug distribution system in a hospital

Dispensing of drugs to inpatients, types of drug distribution systems, charging policy and labelling, Dispensing of drugs to ambulatory patients, and Dispensing of controlled drugs.

b) Hospital formulary

Definition, contents of hospital formulary, Differentiation of hospital formulary and Drug list, preparation and revision, and addition and deletion of drug from hospital formulary.

c) Therapeutic drug monitoring

Need for Therapeutic Drug Monitoring, Factors to be considered during the Therapeutic Drug Monitoring, and Indian scenario for Therapeutic Drug Monitoring.

d) Medication adherence

Causes of medication non-adherence, pharmacist role in the medication adherence, and monitoring of patient medication adherence.

e) Patient medication history interview

Need for the patient medication history interview, medication interview forms.

f) Community pharmacy management

Financial, materials, staff, and infrastructure requirements.

Unit III: 10 Hours

a) Pharmacy and therapeutic committee

Organization, functions, Policies of the pharmacy and therapeutic committee in including drugs into formulary, inpatient and outpatient prescription, automatic stop order, and emergency drug list preparation.

b) Drug information services

Drug and Poison information centre, Sources of drug information, Computerised services, and storage and retrieval of information.

c) Patient counseling

Definition of patient counseling; steps involved in patient counseling, and Special cases that require the pharmacist

d) Education and training program in the hospital

Role of pharmacist in the education and training program, Internal and external training program, Services to the nursing homes/clinics, Code of ethics for community pharmacy, and Role of pharmacist in the interdepartmental communication and community health education.

e) Prescribed medication order and communication skills

Prescribed medication order- interpretation and legal requirements, and Communication skills- communication with prescribers and patients.

Unit IV 8 Hours

a) Budget preparation and implementation

Budget preparation and implementation

b) Clinical Pharmacy

Introduction to Clinical Pharmacy, Concept of clinical pharmacy, functions and responsibilities of clinical pharmacist, Drug therapy monitoring - medication chart review, clinical review, pharmacist intervention, Ward round participation, Medication history and Pharmaceutical care.

Dosing pattern and drug therapy based on Pharmacokinetic & disease pattern.

c) Over the counter (OTC) sales

Introduction and sale of over the counter, and Rational use of common over the counter medications.

Unit V 7 Hours

a) Drug store management and inventory control

Organisation of drug store, types of materials stocked and storage conditions, Purchase and inventory control: principles, purchase procedure, purchase order, procurement and stocking, Economic order quantity, Reorder quantity level, and Methods used for the analysis of the drug expenditure

b) Investigational use of drugs

Description, principles involved, classification, control, identification, role of hospital pharmacist, advisory committee.

c) Interpretation of Clinical Laboratory Tests

Blood chemistry, hematology, and urinalysis

Recommended Books (Latest Edition):

1. Merchant S.H. and Dr. J.S.Quadry. *A textbook of hospital pharmacy*, 4th ed. Ahmadabad: B.S. Shah Prakakshan; 2001.
2. Parthasarathi G, Karin Nyfort-Hansen, Milap C Nahata. *A textbook of Clinical Pharmacy Practice- essential concepts and skills,* 1st ed. Chennai: Orient Longman Private Limited; 2004.
3. William E. Hassan. *Hospital pharmacy*, 5th ed. Philadelphia: Lea & Febiger; 1986.
4. Tipnis Bajaj. *Hospital Pharmacy*, 1st ed. Maharashtra: Career Publications; 2008.
5. Scott LT. *Basic skills in interpreting laboratory data*, 4thed. American Society of Health System Pharmacists Inc; 2009.
6. Parmar N.S. *Health Education and Community Pharmacy,* 18th ed. India: CBS Publishers & Distributers; 2008.

Journals:

1. Therapeutic drug monitoring. ISSN: 0163-4356
2. Journal of pharmacy practice. ISSN : 0974-8326
3. American journal of health system pharmacy. ISSN: 1535-2900 (online)
4. Pharmacy times (Monthly magazine)

BP 704T: NOVEL DRUG DELIVERY SYSTEMS (Theory)

45 Hours

Scope: This subject is designed to impart basic knowledge on the area of novel drug delivery systems.

Objectives: Upon completion of the course student shall be able

1. To understand various approaches for development of novel drug delivery systems.
2. To understand the criteria for selection of drugs and polymers for the development of Novel drug delivery systems, their formulation and evaluation

Course content:

Unit-I **10 Hours**

Controlled drug delivery systems: Introduction, terminology/definitions and rationale, advantages, disadvantages, selection of drug candidates.Approaches to design controlled release formulations based on diffusion, dissolution and ion exchange principles. Physicochemical and biological properties of drugs relevant to controlled release formulations

Polymers: Introduction, classification, properties, advantages and application of polymers in formulation of controlled release drug delivery systems.

Unit-II **10 Hours**

Microencapsulation: Definition, advantages and disadvantages, microspheres /microcapsules, microparticles, methods of microencapsulation, applications

Mucosal Drug Delivery system: Introduction, Principles of bioadhesion / mucoadhesion, concepts, advantages and disadvantages, transmucosal permeability and formulation considerations of buccal delivery systems

Implantable Drug Delivery Systems: Introduction, advantages and disadvantages, concept of implantsand osmotic pump

Unit-III **10 Hours**

Transdermal Drug Delivery Systems: Introduction, Permeation through skin, factors affecting permeation, permeation enhancers, basic components of TDDS, formulation approaches

Gastroretentive drug delivery systems: Introduction, advantages, disadvantages, approaches for GRDDS – Floating, high density systems, inflatable and gastroadhesive systems and their applications

Nasopulmonary drug delivery system: Introduction to Nasal and Pulmonary routes of drug delivery, Formulation of Inhalers (dry powder and metered dose), nasal sprays, nebulizers

Unit-IV **08 Hours**

Targeted drug Delivery: Concepts and approaches advantages and disadvantages, introduction to liposomes, niosomes, nanoparticles, monoclonal antibodies and their applications

Unit-V **07 Hours**

Ocular Drug Delivery Systems: Introduction, intra ocular barriers and methods to overcome –Preliminary study, ocular formulations and ocuserts

Intrauterine Drug Delivery Systems: Introduction, advantages and disadvantages, development of intra uterine devices (IUDs) and applications

Recommended Books: (Latest Editions)

1. Y W. Chien, Novel Drug Delivery Systems, 2nd edition, revised and expanded, Marcel Dekker, Inc., New York, 1992.
2. Robinson, J. R., Lee V. H. L, Controlled Drug Delivery Systems, Marcel Dekker, Inc., New York, 1992.
3. Encyclopedia of Controlled Delivery. Edith Mathiowitz, Published by Wiley Interscience Publication, John Wiley and Sons, Inc, New York. Chichester/Weinheim
4. N.K. Jain, Controlled and Novel Drug Delivery, CBS Publishers & Distributors, New Delhi, First edition 1997 (reprint in 2001).
5. S.P. Vyas and R.K. Khar, Controlled Drug Delivery -concepts and advances, Vallabh Prakashan, New Delhi, First edition 2002.

Journals

1. Indian Journal of Pharmaceutical Sciences (IPA)
2. Indian Drugs (IDMA)
3. Journal of Controlled Release (Elsevier Sciences)
4. Drug Development and Industrial Pharmacy (Marcel & Decker)
5. International Journal of Pharmaceutics (Elsevier Sciences)

SEMESTER VIII

BP801T. BIOSTATISITCS AND RESEARCH METHODOLOGY (Theory)

45 Hours

Scope: To understand the applications of Biostatics in Pharmacy. This subject deals with descriptive statistics, Graphics, Correlation, Regression, logistic regression Probability theory, Sampling technique, Parametric tests, Non Parametric tests, ANOVA, Introduction to Design of Experiments, Phases of Clinical trials and Observational and Experimental studies, SPSS, R and MINITAB statistical software's, analyzing the statistical data using Excel**.**

Objectives: Upon completion of the course the student shall be able to

- Know the operation of M.S. Excel, SPSS, R and MINITAB®, DoE (Design of Experiment)
- Know the various statistical techniques to solve statistical problems
- Appreciate statistical techniques in solving the problems**.**

Course content:

Unit-I **10 Hours**

Introduction: Statistics, Biostatistics, Frequency distribution

Measures of central tendency: Mean, Median, Mode- Pharmaceutical examples

Measures of dispersion: Dispersion, Range, standard deviation, Pharmaceutical problems

Correlation: Definition, Karl Pearson's coefficient of correlation, Multiple correlation - Pharmaceuticals examples

Unit-II **10 Hours**

Regression: Curve fitting by the method of least squares, fitting the lines y= a + bx and x = a + by, Multiple regression, standard error of regression– Pharmaceutical Examples

Probability: Definition of probability, Binomial distribution, Normal distribution, Poisson's distribution, properties - problems

Sample, Population, large sample, small sample, Null hypothesis, alternative hypothesis, sampling, essence of sampling, types of sampling, Error-I type, Error-II type, Standard error of mean (SEM) - Pharmaceutical examples

Parametric test: t-test(Sample, Pooled or Unpaired and Paired) , ANOVA, (One way and Two way), Least Significance difference

Unit-III **10 Hours**

Non Parametric tests: Wilcoxon Rank Sum Test, Mann-Whitney U test, Kruskal-Wallis test, Friedman Test

Introduction to Research: Need for research, Need for design of Experiments, Experiential Design Technique, plagiarism

Graphs: Histogram, Pie Chart, Cubic Graph, response surface plot, Counter Plot graph

Designing the methodology: Sample size determination and Power of a study, Report writing and presentation of data, Protocol, Cohorts studies, Observational studies, Experimental studies, Designing clinical trial, various phases.

Unit-IV **8 Hours**

Blocking and confounding system for Two-level factorials

Regression modeling: Hypothesis testing in Simple and Multiple regressionmodels

Introduction to Practical components of Industrial and Clinical Trials Problems: Statistical Analysis Using Excel, SPSS, MINITAB®, DESIGN OF EXPERIMENTS, R - Online Statistical Software's to Industrial and Clinical trial approach

Unit-V **7Hours**

Design and Analysis of experiments:

Factorial Design: Definition, 2^2, 2^3design. Advantage of factorial design

Response Surface methodology: Central composite design, Historical design, Optimization Techniques

Recommended Books (Latest edition):

1. Pharmaceutical statistics- Practical and clinical applications, Sanford Bolton, publisher Marcel Dekker Inc. NewYork.
2. Fundamental of Statistics – Himalaya Publishing House- S.C.Guptha
3. Design and Analysis of Experiments –PHI Learning Private Limited, R. Pannerselvam,
4. Design and Analysis of Experiments – Wiley Students Edition, Douglas and C. Montgomery

BP 802T SOCIAL AND PREVENTIVE PHARMACY

Hours: 45

Scope:
The purpose of this course is to introduce to students a number of health issues and their challenges. This course also introduced a number of national health programmes. The roles of the pharmacist in these contexts are also discussed.

Objectives:
After the successful completion of this course, the student shall be able to:

- Acquire high consciousness/realization of current issuesrelated to health and pharmaceutical problems within the country and worldwide.
- Have a critical way of thinking based on current healthcare development.
- Evaluate alternative ways of solving problems related tohealth and pharmaceutical issues

Course content:

Unit I: 10 Hours

Concept of health and disease: Definition, concepts and evaluation of public health. Understanding the concept of prevention and control of disease, social causes of diseases and social problems of the sick.

Social and health education: Food in relation to nutrition and health, Balanced diet, Nutritional deficiencies, Vitamin deficiencies, Malnutrition and its prevention.

Sociology and health: Socio cultural factors related to health and disease, Impact of urbanization on health and disease, Poverty and health

Hygiene and health: personal hygiene and health care; avoidable habits

Unit II: 10 Hours

Preventive medicine: General principles of prevention and control of diseases such as cholera, SARS, Ebola virus, influenza, acute respiratory infections, malaria, chicken guinea, dengue, lymphatic filariasis, pneumonia, hypertension, diabetes mellitus, cancer, drug addiction-drug substance abuse

Unit III: 10 Hours

National health programs, its objectives, functioning and outcome of the following: HIV AND AIDS control programme, TB, Integrated disease surveillance program (IDSP), National leprosy control programme, National mental health program, National

programme for prevention and control of deafness, Universal immunization programme, National programme for control of blindness, Pulse polio programme.

Unit IV: **08 Hours**

National health intervention programme for mother and child, National family welfare programme, National tobacco control programme, National Malaria Prevention Program, National programme for the health care for the elderly, Social health programme; role of WHO in Indian national program

Unit V: **07 Hours**

Community services in rural, urban and school health: Functions of PHC, Improvement in rural sanitation, national urban health mission, Health promotion and education in school.

Recommended Books (Latest edition)*:*

1. Short Textbook of Preventive and Social Medicine, Prabhakara GN, 2nd Edition, 2010, ISBN: 9789380704104, JAYPEE Publications
2. Textbook of Preventive and Social Medicine (Mahajan and Gupta), Edited by Roy Rabindra Nath, Saha Indranil, 4th Edition, 2013, ISBN: 9789350901878, JAYPEE Publications
3. Review of Preventive and Social Medicine (Including Biostatistics), Jain Vivek, 6th Edition, 2014, ISBN: 9789351522331, JAYPEE Publications
4. Essentials of Community Medicine—A Practical Approach, Hiremath Lalita D, Hiremath Dhananjaya A, 2nd Edition, 2012, ISBN: 9789350250440, JAYPEE Publications
5. Park Textbook of Preventive and Social Medicine, K Park, 21st Edition, 2011, ISBN-14: 9788190128285, BANARSIDAS BHANOT PUBLISHERS.
6. Community Pharmacy Practice, Ramesh Adepu, BSP publishers, Hyderabad

Recommended Journals:

1. Research in Social and Administrative Pharmacy, Elsevier, Ireland

BP803ET. PHARMA MARKETING MANAGEMENT (Theory)

45 Hours

Scope:

The pharmaceutical industry not only needs highly qualified researchers, chemists and, technical people, but also requires skilled managers who can take the industry forward by managing and taking the complex decisions which are imperative for the growth of the industry. The Knowledge and Know-how of marketing management groom the people for taking a challenging role in Sales and Product management.

Course Objective: The course aims to provide an understanding of marketing concepts and techniques and their applications in the pharmaceutical industry.

Unit I **10 Hours**

Marketing:

Definition, general concepts and scope of marketing; Distinction between marketing & selling; Marketing environment; Industry and competitive analysis; Analyzing consumer buying behavior; industrial buying behavior.

Pharmaceutical market:

Quantitative and qualitative aspects; size and composition of the market; demographic descriptions and socio-psychological characteristics of the consumer; market segmentation& targeting.Consumer profile; Motivation and prescribing habits of the physician; patients' choice of physician and retail pharmacist.Analyzing the Market;Role of market research.

Unit II **10 Hours**

Product decision:

Classification, product line and product mix decisions, product life cycle,product portfolio analysis; product positioning; New product decisions; Product branding, packaging and labeling decisions, Product management in pharmaceutical industry.

Unit III **10 Hours**

Promotion:

Methods, determinants of promotional mix, promotional budget; An overview of personal selling, advertising, direct mail, journals, sampling, retailing, medical exhibition, public relations, online promotional techniques for OTC Products.

Unit IV **10 Hours**

Pharmaceutical marketing channels:

Designing channel, channel members, selecting the appropriate channel, conflict in channels, physical distribution management: Strategic importance, tasks in physical distribution management.

Professional sales representative (PSR):

Duties of PSR, purpose of detailing, selection and training, supervising, norms for customer calls, motivating, evaluating, compensation and future prospects of the PSR.

Unit V **10 Hours**

Pricing:

Meaning, importance, objectives, determinants of price; pricing methods and strategies, issues in price management in pharmaceutical industry. An overview of DPCO (Drug Price Control Order)and NPPA (National Pharmaceutical Pricing Authority).

Emerging concepts in marketing:

Vertical & Horizontal Marketing; RuralMarketing; Consumerism; Industrial Marketing; Global Marketing.

Recommended Books: (Latest Editions)

1. Philip Kotler and Kevin Lane Keller: Marketing Management, Prentice Hall of India, New Delhi
2. Walker, Boyd and Larreche : Marketing Strategy- Planning and Implementation, Tata MC GrawHill, New Delhi.
3. Dhruv Grewal and Michael Levy: Marketing, Tata MC Graw Hill
4. Arun Kumar and N Menakshi: Marketing Management, Vikas Publishing, India
5. Rajan Saxena: Marketing Management; Tata MC Graw-Hill (India Edition)
6. Ramaswamy, U.S & Nanakamari, S: Marketing Managemnt:Global Perspective, IndianContext,Macmilan India, New Delhi.
7. Shanker, Ravi: Service Marketing, Excell Books, New Delhi
8. Subba Rao Changanti, Pharmaceutical Marketing in India (GIFT – Excel series) Excel Publications.

BP804 ET: PHARMACEUTICAL REGULATORY SCIENCE (Theory)

45Hours

Scope: This course is designed to impart the fundamental knowledge on the regulatory requirements for approval of new drugs, and drug products in regulated markets of India & other countries like US, EU, Japan, Australia,UK etc. It prepares the students to learn in detail on the regulatory requirements, documentation requirements, and registration procedures for marketing the drug products.

Objectives: Upon completion of the subject student shall be able to;

1. Know about the process of drug discovery and development
2. Know the regulatory authorities and agencies governing the manufacture and sale of pharmaceuticals
3. Know the regulatory approval process and their registration in Indian and international markets

Course content:

Unit I **10Hours**

New Drug Discovery and development

Stages of drug discovery, Drug development process, pre-clinical studies, non-clinical activities, clinical studies, Innovator and generics, Concept of generics, Generic drug product development.

Unit II **10Hours**

Regulatory Approval Process

Approval processes and timelines involved in Investigational New Drug (IND), New Drug Application (NDA), Abbreviated New Drug Application (ANDA). Changes to an approved NDA / ANDA.

Regulatory authorities and agencies

Overview of regulatory authorities of India, United States, European Union, Australia, Japan, Canada (Organization structure and types of applications)

Unit III **10Hours**

Registration of Indian drug product in overseas market

Procedure for export of pharmaceutical products, Technical documentation, Drug Master Files (DMF), Common Technical Document (CTD), electronic Common Technical

Document (eCTD), ASEAN Common Technical Document (ACTD)research.

Unit IV **08Hours**

Clinical trials

Developing clinical trial protocols, Institutional Review Board / Independent Ethics committee - formation and working procedures, Informed consent process and procedures, GCP obligations of Investigators, sponsors & Monitors, Managing and Monitoring clinical trials, Pharmacovigilance - safety monitoring in clinical trials

Unit V **07Hours**

Regulatory Concepts

Basic terminology, guidance, guidelines, regulations, Laws and Acts, Orange book, Federal Register, Code of Federal Regulatory, Purple book

Recommended books (Latest edition):

1. Drug Regulatory Affairs by Sachin Itkar, Dr. N.S. Vyawahare, Nirali Prakashan.
2. The Pharmaceutical Regulatory Process, Second Edition Edited by Ira R. Berry and Robert P. Martin, Drugs and the Pharmaceutical Sciences,Vol.185. Informa Health care Publishers.
3. New Drug Approval Process: Accelerating Global Registrations By Richard A Guarino, MD, 5th edition, Drugs and the Pharmaceutical Sciences,Vol.190.
4. Guidebook for drug regulatory submissions / Sandy Weinberg. By John Wiley & Sons. Inc.
5. FDA Regulatory Affairs: a guide for prescription drugs, medical devices, and biologics /edited by Douglas J. Pisano, David Mantus.
6. Generic Drug Product Development, Solid Oral Dosage forms, Leon Shargel and Isader Kaufer, Marcel Dekker series, Vol.143
7. Clinical Trials and Human Research: A Practical Guide to Regulatory Compliance By Fay A. Rozovsky and Rodney K. Adams
8. Principles and Practices of Clinical Research, Second Edition Edited by John I. Gallin and Frederick P. Ognibene
9. Drugs: From Discovery to Approval, Second Edition By Rick Ng

BP 805T: PHARMACOVIGILANCE (Theory)

45 hours

Scope: This paper will provide an opportunity for the student to learn about development of pharmacovigilance as a science, basic terminologies used in pharmacovigilance, global scenario of Pharmacovigilance, train students on establishing pharmacovigilance programme in an organization, various methods that can be used to generate safety data and signal detection. This paper also develops the skills of classifying drugs, diseases and adverse drug reactions.

Objectives:

At completion of this paper it is expected that students will be able to (know, do, and appreciate):

1. Why drug safety monitoring is important?
2. History and development of pharmacovigilance
3. National and international scenario of pharmacovigilance
4. Dictionaries, coding and terminologies used in pharmacovigilance
5. Detection of new adverse drug reactions and their assessment
6. International standards for classification of diseases and drugs
7. Adverse drug reaction reporting systems and communication in pharmacovigilance
8. Methods to generate safety data during pre clinical, clinical and post approval phases of drugs' life cycle
9. Drug safety evaluation in paediatrics, geriatrics, pregnancy and lactation
10. Pharmacovigilance Program of India (PvPI) requirement for ADR reporting in India
11. ICH guidelines for ICSR, PSUR, expedited reporting, pharmacovigilance planning
12. CIOMS requirements for ADR reporting
13. Writing case narratives of adverse events and their quality.

Course Content

Unit I **10 Hours**

Introduction to Pharmacovigilance

- History and development of Pharmacovigilance
- Importance of safety monitoring of Medicine
- WHO international drug monitoring programme
- Pharmacovigilance Program of India(PvPI)

Introduction to adverse drug reactions

- Definitions and classification of ADRs
- Detection and reporting
- Methods in Causality assessment
- Severity and seriousness assessment
- Predictability and preventability assessment
- Management of adverse drug reactions

Basic terminologies used in pharmacovigilance

- Terminologies of adverse medication related events
- Regulatory terminologies

Unit II **10 hours**

Drug and disease classification

- Anatomical, therapeutic and chemical classification of drugs
- International classification of diseases
- Daily defined doses
- International Non proprietary Names for drugs

Drug dictionaries and coding in pharmacovigilance

- WHO adverse reaction terminologies
- MedDRA and Standardised MedDRA queries
- WHO drug dictionary
- Eudravigilance medicinal product dictionary

Information resources in pharmacovigilance

- Basic drug information resources
- Specialised resources for ADRs

Establishing pharmacovigilance programme

- Establishing in a hospital
- Establishment & operation of drug safety department in industry
- Contract Research Organisations (CROs)
- Establishing a national programme

Unit III **10 Hours**

Vaccine safety surveillance

- Vaccine Pharmacovigilance
- Vaccination failure
- Adverse events following immunization

Pharmacovigilance methods

- Passive surveillance – Spontaneous reports and case series
- Stimulated reporting
- Active surveillance – Sentinel sites, drug event monitoring and registries
- Comparative observational studies – Cross sectional study, case control study and cohort study
- Targeted clinical investigations

Communication in pharmacovigilance

- Effective communication in Pharmacovigilance
- Communication in Drug Safety Crisis management
- Communicating with Regulatory Agencies, Business Partners, Healthcare facilities & Media

Unit IV **8 Hours**

Safety data generation

- Pre clinical phase
- Clinical phase
- Post approval phase (PMS)

ICH Guidelines for Pharmacovigilance

- Organization and objectives of ICH
- Expedited reporting
- Individual case safety reports
- Periodic safety update reports
- Post approval expedited reporting
- Pharmacovigilance planning
- Good clinical practice in pharmacovigilance studies

Unit V **7 hours**

Pharmacogenomics of adverse drug reactions

- Genetics related ADR with example focusing PK parameters.

Drug safety evaluation in special population

- Paediatrics
- Pregnancy and lactation
- Geriatrics

CIOMS

- CIOMS Working Groups
- CIOMS Form

CDSCO (India) and Pharmacovigilance

- D&C Act and Schedule Y
- Differences in Indian and global pharmacovigilance requirements

Recommended Books (Latest edition):

1. Textbook of Pharmacovigilance: S K Gupta, Jaypee Brothers, Medical Publishers.
2. Practical Drug Safety from A to Z By Barton Cobert, Pierre Biron, Jones and Bartlett Publishers.
3. Mann's Pharmacovigilance:Elizabeth B. Andrews, Nicholas, Wiley Publishers.
4. Stephens' Detection of New Adverse Drug Reactions: John Talbot, Patrick Walle, Wiley Publishers.
5. An Introduction to Pharmacovigilance: Patrick Waller,Wiley Publishers.
6. Cobert's Manual of Drug Safety and Pharmacovigilance: Barton Cobert,Jones& Bartlett Publishers.
7. Textbook of Pharmacoepidemiolog edited by Brian L. Strom, Stephen E Kimmel, Sean Hennessy,Wiley Publishers.
8. A Textbook of Clinical Pharmacy Practice -Essential Concepts and Skills:G. Parthasarathi, Karin NyfortHansen,Milap C. Nahata
9. National Formulary of India
10. Text Book of Medicine by Yashpal Munjal

11. Text book of Pharmacovigilance: concept and practice by GP Mohanta and PK Manna

12. http://www.whoumc.org/DynPage.aspx?id=105825&mn1=7347&mn2=7259&mn3=7297
13. http://www.ich.org/
14. http://www.cioms.ch/
15. http://cdsco.nic.in/
16. http://www.who.int/vaccine_safety/en/
17. http://www.ipc.gov.in/PvPI/pv_home.html

BP 806 ET. QUALITY CONTROL AND STANDARDIZATION OF HERBALS (Theory)

Scope: In this subject the student learns about the various methods and guidelines for evaluation and standardization of herbs and herbal drugs. The subject also provides an opportunity for the student to learn cGMP, GAP and GLP in traditional system of medicines.

Objectives: Upon completion of the subject student shall be able to;

1. know WHO guidelines for quality control of herbal drugs
2. know Quality assurance in herbal drug industry
3. know the regulatory approval process and their registration in Indian and international markets
4. appreciate EU and ICH guidelines for quality control of herbal drugs

Unit I **10 hours**

Basic tests for drugs – Pharmaceutical substances, Medicinal plants materials and dosage forms

WHO guidelines for quality control of herbal drugs.

Evaluation of commercial crude drugs intended for use

Unit II **10 hours**

Quality assurance in herbal drug industry of cGMP, GAP, GMP and GLP in traditional system of medicine.

WHO Guidelines on current good manufacturing Practices (cGMP) for Herbal Medicines

WHO Guidelines on GACP for Medicinal Plants.

Unit III **10 hours**

EU and ICH guidelines for quality control of herbal drugs.

Research Guidelines for Evaluating the Safety and Efficacy of Herbal Medicines

Unit IV **08 hours**

Stability testing of herbal medicines.Application of various chromatographic techniques in standardization of herbal products.

Preparation of documents for new drug application and export registration

GMP requirements and Drugs & Cosmetics Act provisions.

Unit V **07 hours**

Regulatory requirements for herbal medicines.

WHO guidelines on safety monitoring of herbal medicines in pharmacovigilance systems

Comparison of various Herbal Pharmacopoeias.

Role of chemical and biological markers in standardization of herbal products

Recommended Books: (Latest Editions

1. Pharmacognosy by Trease and Evans
2. Pharmacognosy by Kokate, Purohit and Gokhale
3. Rangari, V.D., Text book of Pharmacognosy and Phytochemistry Vol. I , Carrier Pub., 2006.
4. Aggrawal, S.S., Herbal Drug Technology. Universities Press, 2002.
5. EMEA. Guidelines on Quality of Herbal Medicinal Products/Traditional Medicinal Products,
6. Mukherjee, P.W. Quality Control of Herbal Drugs: An Approach to Evaluation of Botanicals. Business Horizons Publishers, New Delhi, India, 2002.
7. Shinde M.V., Dhalwal K., Potdar K., Mahadik K. Application of quality control principles to herbal drugs. International Journal of Phytomedicine 1(2009); p. 4-8.
8. WHO. Quality Control Methods for Medicinal Plant Materials, World Health Organization, Geneva, 1998. WHO. Guidelines for the Appropriate Use of Herbal Medicines. WHO Regional Publications, Western Pacific Series No 3, WHO Regional office for the Western Pacific, Manila, 1998.
9. WHO. The International Pharmacopeia, Vol. 2: Quality Specifications, 3rd edn. World Health Organization, Geneva, 1981.
10. WHO. Quality Control Methods for Medicinal Plant Materials. World Health Organization, Geneva, 1999.
11. WHO. WHO Global Atlas of Traditional, Complementary and Alternative Medicine. 2 vol. set. Vol. 1 contains text and Vol. 2, maps. World Health Organization, Geneva, 2005.
12. WHO. Guidelines on Good Agricultural and Collection Practices (GACP) for Medicinal Plants. World Health Organization, Geneva, 2004.

BP 807 ET. COMPUTER AIDED DRUG DESIGN (Theory)

45 Hours

Scope: This subject is designed to provide detailed knowledge of rational drug design process and various techniques used in rational drug design process.

Objectives: Upon completion of the course, the student shall be able to understand

- Design and discovery of lead molecules
- The role of drug design in drug discovery process
- The concept of QSAR and docking
- Various strategies to develop new drug like molecules.
- The design of new drug molecules using molecular modeling software

Course Content:

UNIT-I **10 Hours**

Introduction to Drug Discovery and Development

Stages of drug discovery and development

Lead discovery and Analog Based Drug Design

Rational approaches to lead discovery based on traditional medicine, Random screening, Non-random screening, serendipitous drug discovery, lead discovery based on drug metabolism, lead discovery based on clinical observation.

Analog Based Drug Design: Bioisosterism, Classification, Bioisosteric replacement. Any three case studies

UNIT-II **10 Hours**

Quantitative Structure Activity Relationship (QSAR)

SAR versus QSAR, History and development of QSAR, Types of physicochemical parameters, experimental and theoretical approaches for the determination of physicochemical parameters such as Partition coefficient, Hammet's substituent constant and Tafts steric constant. Hansch analysis, Free Wilson analysis, 3D-QSAR approaches like COMFA and COMSIA.

UNIT-III **10 Hours**

Molecular Modeling and virtual screening techniques

Virtual Screening techniques: Drug likeness screening, Concept of pharmacophore mapping and pharmacophore based Screening,

Molecular docking: Rigid docking, flexible docking, manual docking, Docking based screening. *De novo* drug design.

UNIT-IV **08 Hours**

Informatics & Methods in drug design

Introduction to Bioinformatics, chemoinformatics. ADME databases, chemical, biochemical and pharmaceutical databases.

UNIT-V **07 Hours**

Molecular Modeling: Introduction to molecular mechanics and quantum mechanics.Energy Minimization methods and Conformational Analysis, global conformational minima determination.

Recommended Books (Latest Editions)

1. Robert GCK, ed., "Drug Action at the Molecular Level" University Prak Press Baltimore.
2. Martin YC. "Quantitative Drug Design" Dekker, New York.
3. Delgado JN, Remers WA eds "Wilson & Gisvolds's Text Book of Organic Medicinal & Pharmaceutical Chemistry" Lippincott, New York.
4. Foye WO "Principles of Medicinal chemistry 'Lea & Febiger.
5. Koro lkovas A, Burckhalter JH. "Essentials of Medicinal Chemistry" Wiley Interscience.
6. Wolf ME, ed "The Basis of Medicinal Chemistry, Burger's Medicinal Chemistry" John Wiley & Sons, New York.
7. Patrick Graham, L., An Introduction to Medicinal Chemistry, Oxford University Press.
8. Smith HJ, Williams H, eds, "Introduction to the principles of Drug Design" Wright Boston.
9. Silverman R.B. "The organic Chemistry of Drug Design and Drug Action" Academic Press New York.

BP808ET: CELL AND MOLECULAR BIOLOGY (Elective subject)

45 Hours

Scope:

- Cell biology is a branch of biology that studies cells – their physiological properties, their structure, the organelles they contain, interactions with their environment, their life cycle, division, death and cell function.
- This is done both on a microscopic and molecular level.
- Cell biology research encompasses both the great diversity of single-celled organisms like bacteria and protozoa, as well as the many specialized cells in multi-cellular organismssuch as humans, plants, and sponges.

Objectives: Upon completion of the subject student shall be able to;

- Summarize cell and molecular biology history.
- Summarize cellular functioning and composition.
- Describe the chemical foundations of cell biology.
- Summarize the DNA properties of cell biology.
- Describe protein structure and function.
- Describe cellular membrane structure and function.
- Describe basic molecular genetic mechanisms.
- Summarize the Cell Cycle

Course content:

Unit I **10Hours**

a) Cell and Molecular Biology: Definitions theory and basics and Applications.
b) Cell and Molecular Biology: History and Summation.
c) Properties of cells and cell membrane.
d) Prokaryotic versus Eukaryotic
e) Cellular Reproduction
f) Chemical Foundations – an Introduction and Reactions (Types)

Unit II **10 Hours**

a) DNA and the Flow of Molecular Information
b) DNA Functioning
c) DNA and RNA
d) Types of RNA
e) Transcription and Translation

Unit III **10 Hours**

a) Proteins: Defined **and** Amino Acids
b) Protein Structure

c) Regularities in Protein Pathways
d) Cellular Processes
e) Positive Control and significance of Protein Synthesis

Unit IV **08 Hours**

a) Science of Genetics
b) Transgenics and Genomic Analysis
c) Cell Cycle analysis
d) Mitosis and Meiosis
e) Cellular Activities and Checkpoints

Unit V **07 Hours**

a) Cell Signals: Introduction
b) Receptors for Cell Signals
c) Signaling Pathways: Overview
d) Misregulation of Signaling Pathways
e) Protein-Kinases: Functioning

Recommended Books (latest edition):

1. W.B. Hugo and A.D. Russel: Pharmaceutical Microbiology, Blackwell Scientific publications, Oxford London.
2. Prescott and Dunn., Industrial Microbiology, 4th edition, CBS Publishers & Distributors, Delhi.
3. Pelczar, Chan Kreig, Microbiology, Tata McGraw Hill edn.
4. Malcolm Harris, Balliere Tindall and Cox: Pharmaceutical Microbiology.
5. Rose: Industrial Microbiology.
6. Probisher, Hinsdill et al: Fundamentals of Microbiology, 9th ed. Japan
7. Cooper and Gunn's: Tutorial Pharmacy, CBS Publisher and Distribution.
8. Peppler: Microbial Technology.
9. Edward: Fundamentals of Microbiology.
10. N.K.Jain: Pharmaceutical Microbiology, Vallabh Prakashan, Delhi
11. Bergeys manual of systematic bacteriology, Williams and Wilkins- A Waverly company
12. B.R. Glick and J.J. Pasternak: Molecular Biotechnology: Principles and Applications of RecombinantDNA: ASM Press Washington D.C.
13. RA Goldshy et. al., : Kuby Immunology.

BP809ET. COSMETIC SCIENCE(Theory)

45Hours

UNIT I **10Hours**

Classification of cosmetic and cosmeceutical products

Definition of cosmetics as per Indian and EU regulations, Evolution of cosmeceuticals from cosmetics, cosmetics as quasi and OTC drugs

Cosmetic excipients: Surfactants, rheology modifiers, humectants, emollients, preservatives. Classification and application

Skin: Basic structure and function of skin.

Hair: Basic structure of hair. Hair growth cycle.

Oral Cavity: Common problem associated with teeth and gums**.**

UNIT II **10 Hours**

Principles of formulation and building blocks of skin care products:

Face wash,

Moisturizing cream, Cold Cream, Vanishing cream and their advantages and disadvantages.Application of these products in formulation of cosmecuticals.

Antiperspants & deodorants- Actives & mechanism of action.

Principles of formulation and building blocks of Hair care products:

Conditioning shampoo, Hair conditioner,anti-dandruff shampoo.

Hair oils.

Chemistry and formulation of Para-phylene diamine based hair dye.

Principles of formulation and building blocks of oral care products:

Toothpaste for bleeding gums, sensitive teeth. Teeth whitening, Mouthwash.

UNIT III **10 Hours**

Sun protection, Classification of Sunscreens and SPF.

Role of herbs in cosmetics:

Skin Care: Aloe and turmeric

Hair care: Henna and amla.

Oral care: Neem and clove

Analytical cosmetics: BIS specification and analytical methods for shampoo, skin-cream and toothpaste**.**

UNIT IV **08 Hours**.

Principles of Cosmetic Evaluation:Principles of sebumeter, corneometer. Measurement of TEWL, Skin Color, Hair tensile strength, Hair combing properties

Soaps,and syndet bars. Evolution and skin benfits.

UNIT V **07 Hours**

Oily and dry skin, causes leading to dry skin, skin moisturisation. Basic understanding of the terms Comedogenic, dermatitis.

Cosmetic problems associated with Hair and scalp: Dandruff, Hair fall causes

Cosmetic problems associated with skin: blemishes, wrinkles, acne, prickly heat and body odor.

Antiperspirants and Deodorants- Actives and mechanism of action

References

1) Harry's Cosmeticology, Wilkinson, Moore, Seventh Edition, George Godwin.
2) Cosmetics – Formulations, Manufacturing and Quality Control, P.P. Sharma, 4th Edition, Vandana Publications Pvt. Ltd., Delhi.
3) Text book of cosmelicology by Sanju Nanda & Roop K. Khar, Tata Publishers.

BP810 ET. PHARMACOLOGICAL SCREENING METHODS

45 Hours

Scope: This subject is designed to impart the basic knowledge of preclinical studies in experimental animals including design, conduct and interpretations of results.

Objectives

Upon completion of the course the student shall be able to,

- Appreciate the applications of various commonly used laboratory animals.
- Appreciate and demonstrate the various screening methods used in preclinical research
- Appreciate and demonstrate the importance of biostatistics and researchmethodology
- Design and execute a research hypothesis independently

Unit –I	**08 Hours**
Laboratory Animals: Study of CPCSEA and OECD guidelines for maintenance, breeding and conduct of experiments on laboratory animals, Common lab animals: Description and applications of different species and strains of animals. Popular transgenic and mutant animals. Techniques for collection of blood and common routes of drug administration in laboratory animals, Techniques of blood collection and euthanasia.	
Unit –II	**10 Hours**
Preclinical screening models a. Introduction: Dose selection, calculation and conversions, preparation of drug solution/suspensions, grouping of animals and importance of sham negative and positive control groups. Rationale for selection of animal species and sex for the study. b. **Study of screening animal models for** Diuretics, nootropics, anti-Parkinson's,antiasthmatics, **Preclinical screening models:** for CNS activity- analgesic, antipyretic,anti-inflammatory, general anaesthetics, sedative and hypnotics, antipsychotic, antidepressant, antiepileptic, antiparkinsonism, alzheimer's disease	

Unit –III **Preclinical screening models:** for ANS activity, sympathomimetics, sympatholytics, parasympathomimetics, parasympatholytics, skeletal muscle relaxants, drugs acting on eye, local anaethetics	
Unit –IV **Preclinical screening models:** for CVS activity- antihypertensives, diuretics, antiarrhythmic, antidyslepidemic, anti aggregatory, coagulants, and anticoagulants Preclinical screening models for other important drugs like antiulcer, antidiabetic, anticancer and antiasthmatics.	
Research methodology and Bio-statistics Selection of research topic, review of literature, research hypothesis and study design Pre-clinical data analysis and interpretation using Students 't' test and One-way ANOVA. Graphical representation of data	**05 Hours**

Recommended Books (latest edition):

1. Fundamentals of experimental Pharmacology-by M.N.Ghosh
2. Hand book of Experimental Pharmacology-S.K.Kulakarni
3. CPCSEA guidelines for laboratory animal facility.
4. Drug discovery and Evaluation by Vogel H.G.
5. Drug Screening Methods by Suresh Kumar Gupta and S. K. Gupta
6. Introduction to biostatistics and research methods by PSS Sundar Rao and J Richard

BP 811 ET. ADVANCED INSTRUMENTATION TECHNIQUES

45 Hours

Scope: This subject deals with the application of instrumental methods in qualitative and quantitative analysis of drugs. This subject is designed to impart advanced knowledge on the principles and instrumentation of spectroscopic and chromatographic hyphenated techniques. This also emphasizes on theoretical and practical knowledge on modern analytical instruments that are used for drug testing.

Objectives: Upon completion of the course the student shall be able to

- understand the advanced instruments used and its applications in drug analysis
- understand the chromatographic separation and analysis of drugs.
- understand the calibration of various analytical instruments
- know analysis of drugs using various analytical instruments.

Course Content:

UNIT-I **10 Hours**

Nuclear Magnetic Resonance spectroscopy

Principles of H-NMR and C-NMR, chemical shift, factors affecting chemical shift, coupling constant, Spin - spin coupling, relaxation, instrumentation and applications

Mass Spectrometry- Principles, Fragmentation, Ionization techniques – Electron impact, chemical ionization, MALDI, FAB, Analyzers-Time of flight and Quadrupole, instrumentation, applications

UNIT-II **10 Hours**

Thermal Methods of Analysis: Principles, instrumentation and applications of ThermogravimetricAnalysis (TGA), Differential Thermal Analysis (DTA), Differential Scanning Calorimetry (DSC)

X-Ray Diffraction Methods: Origin of X-rays, basic aspects of crystals, X-ray

Crystallography, rotating crystal technique, single crystal diffraction,powder diffraction, structural elucidation and applications.

UNIT-III **10 Hours**

Calibration and validation-as per ICH and USFDA guidelines

Calibration of following Instruments

Electronic balance, UV-Visible spectrophotometer, IR spectrophotometer,

Fluorimeter, Flame Photometer, HPLC and GC

UNIT-IV **08 Hours**

Radio immune assay: Importance, various components, Principle, different methods, Limitation and Applications of Radio immuno assay

Extraction techniques:General principle and procedure involved in the solid phase extraction and liquid-liquid extraction

UNIT-V **07 Hours**

Hyphenated techniques-LC-MS/MS, GC-MS/MS, HPTLC-MS.

Recommended Books (Latest Editions)

1. Instrumental Methods of Chemical Analysis by B.K Sharma
2. Organic spectroscopy by Y.R Sharma
3. Text book of Pharmaceutical Analysis by Kenneth A. Connors
4. Vogel's Text book of Quantitative Chemical Analysis by A.I. Vogel
5. Practical Pharmaceutical Chemistry by A.H. Beckett and J.B. Stenlake
6. Organic Chemistry by I. L. Finar
7. Organic spectroscopy by William Kemp
8. Quantitative Analysis of Drugs by D. C. Garrett
9. Quantitative Analysis of Drugs in Pharmaceutical Formulations by P. D. Sethi
10. Spectrophotometric identification of Organic Compounds by Silverstein

BP 812 ET. DIETARY SUPPLEMENTS AND NUTRACEUTICALS

No. of hours :3 **Tutorial:1** **Credit point:4**

Scope :

This subject covers foundational topic that are important for understanding the need and requirements of dietary supplements among different groups in the population.

Objective:

This module aims to provide an understanding of the concepts behind the theoretical applications of dietary supplements. By the end of the course, students should be able to :

1. Understand the need of supplements by the different group of people to maintain healthy life.
2. Understand the outcome of deficiencies in dietary supplements.
3. Appreciate the components in dietary supplements and the application.
4. Appreciate the regulatory and commercial aspects of dietary supplements including health claims.

UNIT I **07 hours**

a. Definitions of Functional foods, Nutraceuticals and Dietary supplements. Classification of Nutraceuticals, Health problems and diseases that can be prevented or cured by Nutraceuticals i.e. weight control, diabetes, cancer, heart disease, stress, osteoarthritis, hypertension etc.
b. Public health nutrition, maternal and child nutrition, nutrition and ageing, nutrition education in community.
c. Source, Name of marker compounds and their chemical nature, Medicinal uses and health benefits of following used as nutraceuticals/functional foods: Spirulina, Soyabean, Ginseng, Garlic, Broccoli, Gingko, Flaxseeds

UNIT II **15 hours**

Phytochemicals as nutraceuticals: Occurrence and characteristic features(chemical nature medicinal benefits) of following

a) Carotenoids- α and β-Carotene, Lycopene, Xanthophylls, leutin
b) Sulfides: Diallyl sulfides, Allyl trisulfide.
c) Polyphenolics: Reservetrol
d) Flavonoids- Rutin , Naringin, Quercitin, Anthocyanidins, catechins, Flavones
e) Prebiotics / Probiotics.: Fructo oligosaccharides, Lacto bacillum
f) Phyto estrogens : Isoflavones, daidzein, Geebustin, lignans
g) Tocopherols
h) Proteins, vitamins, minerals, cereal, vegetables and beverages as functional foods: oats, wheat bran, rice bran, sea foods, coffee, tea and the like.

UNIT III **07 hours**

a) Introduction to free radicals: Free radicals, reactive oxygen species, production of free radicals in cells, damaging reactions of free radicals on lipids, proteins, Carbohydrates, nucleic acids.

b) Dietary fibres and complex carbohydrates as functional food ingredients..

UNIT IV **10 hours**

a) Free radicals in Diabetes mellitus, Inflammation, Ischemic reperfusion injury, Cancer, Atherosclerosis, Free radicals in brain metabolism and pathology, kidney damage, muscle damage. Free radicals involvement in other disorders. Free radicals theory of ageing.

b) Antioxidants: Endogenous antioxidants – enzymatic and nonenzymatic antioxidant defence, Superoxide dismutase, catalase, Glutathione peroxidase, Glutathione Vitamin C, Vitamin E, α- Lipoic acid, melatonin
Synthetic antioxidants: Butylated hydroxy Toluene, Butylated hydroxy Anisole.

c) Functional foods for chronic disease prevention

UNIT V **06 hours**

a) Effect of processing, storage and interactions of various environmental factors on the potential of nutraceuticals.

b) Regulatory Aspects; FSSAI, FDA, FPO, MPO, AGMARK. HACCP and GMPs on Food Safety. Adulteration of foods.

c) Pharmacopoeial Specifications for dietary supplements and nutraceuticals.

References:

1. Dietetics by Sri Lakshmi
2. Role of dietary fibres and neutraceuticals in preventing diseases by K.T Agusti and P.Faizal: BSPunblication.
3. Advanced Nutritional Therapies by Cooper. K.A., (1996).
4. The Food Pharmacy by Jean Carper, Simon & Schuster, UK Ltd., (1988).
5. Prescription for Nutritional Healing by James F.Balch and Phyllis A.Balch 2nd Edn., Avery Publishing Group, NY (1997).
6. G. Gibson and C.williams Editors *2000 Functional foods* Woodhead Publ.Co.London.
7. Goldberg, I. *Functional Foods*. 1994. Chapman and Hall, New York.
8. Labuza, T.P. 2000 Functional Foods and Dietary Supplements: Safety, Good Manufacturing Practice (GMPs) and Shelf Life Testing in *Essentials of Functional Foods* M.K. Sachmidl and T.P. Labuza eds. Aspen Press.
9. Handbook of Nutraceuticals and Functional Foods, Third Edition (Modern Nutrition)
10. Shils, ME, Olson, JA, Shike, M. 1994 *Modern Nutrition in Health and Disease*. Eighth edition. Lea and Febiger

Semester VIII – Elective course on Pharmaceutical Product Development

No of Hours: 3 Tutorial:1 Credit points:4

Unit-I **10 Hours**

Introduction to pharmaceutical product development, objectives, regulations related to preformulation, formulation development, stability assessment, manufacturing and quality control testing of different types of dosage forms

Unit-II **10 Hours**

An advanced study of Pharmaceutical Excipients in pharmaceutical product development with a special reference to the following categories

i. Solvents and solubilizers
ii. Cyclodextrins and their applications
iii. Non - ionic surfactants and their applications
iv. Polyethylene glycols and sorbitols
v. Suspending and emulsifying agents
vi. Semi solid excipients

Unit-III **10 Hours**

An advanced study of Pharmaceutical Excipients in pharmaceutical product development with a special reference to the following categories

i. Tablet and capsule excipients
ii. Directly compressible vehicles
iii. Coat materials
iv. Excipients in parenteral and aerosols products
v. Excipients for formulation of NDDS

Selection and application of excipients in pharmaceutical formulations with specific industrial applications

Unit-IV **08 Hours**

Optimization techniques in pharmaceutical product development.A study of various optimization techniques for pharmaceutical product development with specific examples.Optimization by factorial designs and their applications.A study of QbD and its application in pharmaceutical product development.

Unit-V **07 Hours**

Selection and quality control testing of packaging materials for pharmaceutical product development- regulatory considerations.

Recommended Books (Latest editions)

1. Pharmaceutical Statistics Practical and Clinical Applications by Stanford Bolton, CharlesBon; Marcel Dekker Inc.
2. Encyclopedia of Pharmaceutical Technology, edited by James swarbrick, Third Edition,Informa Healthcare publishers.
3. Pharmaceutical Dosage Forms, Tablets, Volume II, edited by Herbert A. Lieberman andLeon Lachman; Marcel Dekker, Inc.
4. The Theory and Practice of Industrial Pharmacy, Fourth Edition, edited by Roop kKhar, S P Vyas, Farhan J Ahmad, Gaurav K Jain; CBS Publishers and Distributors Pvt.Ltd. 2013.
5. Martin's Physical Pharmacy and Pharmaceutical Sciences, Fifth Edition, edited by Patrick J. Sinko, BI Publications Pvt. Ltd.
6. Targeted and Controlled Drug Delivery, Novel Carrier Systems by S. P. Vyas and R. K.Khar, CBS Publishers and Distributors Pvt. Ltd, First Edition 2012.
7. Pharmaceutical Dosage Forms and Drug Delivery Systems, Loyd V. Allen Jr., Nicholas B.Popovich, Howard C. Ansel, 9th Ed. 40
8. Aulton's Pharmaceutics – The Design and Manufacture of Medicines, Michael E. Aulton,3rd Ed.
9. Remington – The Science and Practice of Pharmacy, 20th Ed.
10. Pharmaceutical Dosage Forms – Tablets Vol 1 to 3, A. Liberman, Leon Lachman andJoseph B. Schwartz
11. Pharmaceutical Dosage Forms – Disperse Systems Vol 1 to 3, H.A. Liberman, Martin, M.R and Gilbert S. Banker.
12. Pharmaceutical Dosage Forms – Parenteral Medication Vol 1 & 2, Kenneth E. Avis andH.A. Libermann.
13. Advanced Review Articles related to the topics.

2016

THE MASTER OF PHARMACY (M. PHARM.)

COURSE REGULATION 2014

(BASED ON NOTIFICATION IN THE GAZETTE OF INDIA NO. 362, DATED DECEMBER 11, 2014)

SCHEME AND SYLLABUS

PHARMACY COUNCIL OF INDIA
Combined Council's Building, Kotla Road,
Aiwan-E-Ghalib Marg, New Delhi-110 002.
Website : www.pci.nic.

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The Gazette of India

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PHARMACY COUNCIL OF INDIA

NOTIFICATION

New Delhi, the 10th December, 2014

The Master of Pharmacy (M.Pharm) Course Regulations, 2014

No. 14-136/ 2014-PCI.—In exercise of the powers conferred by Sections 10 and 18 of the Pharmacy Act, 1948 (8 of 1948), the Pharmacy Council of India, with the approval of the Central Government hereby makes the following regulations; namely–

CHAPTER –I:REGULATIONS

1. Short Title and Commencement

These regulations shall be called as "The Revised Regulations for the Master of Pharmacy (M. Pharm.)Degree Program - Credit Based Semester System (CBSS) of the Pharmacy Council of India, New Delhi". They shall come into effect from the Academic Year 2016-17. The regulations framed are subject to modifications from time to time by the authorities of the university.

2. Minimum qualification for admission

A Pass in the following examinations

a) B. Pharm Degree examination of an Indian university established by law in India from an institution approved by Pharmacy Council of India and has scored not less than 55 % of the maximum marks (aggregate of 4 years of B.Pharm.)

b) Every student, selected for admission to post graduate pharmacy program in any PCI approved institution should have obtained registration with the State Pharmacy Council or should obtain the same within one month from the date of his/her admission, failing which the admission of the candidate shall be cancelled.

Note: It is mandatory to submit a migration certificate obtained from the respective university where the candidate had passed his/her qualifying degree (B.Pharm.)

3. Duration of the program

The program of study for M.Pharm. shall extend over a period of four semesters (two academic years). The curricula and syllabi for the program shall be prescribed from time to time by Phamacy Council of India, New Delhi.

4. Medium of instruction and examinations

Medium of instruction and examination shall be in English.

5. Working days in each semester

Each semestershall consist of not less than 100 working days. The odd semesters shall be conducted from the month of June/July to November/December and the even semesters shall be conducted from the month of December/January to May/June in every calendar year.

6. Attendance and progress

A candidate is required to put in at least 80% attendance in individual courses considering theory and practical separately. The candidate shall complete the prescribed course satisfactorily to be eligible to appear for the respective examinations.

7. Program/Course credit structure

As per the philosophy of Credit Based Semester System, certain quantum of academic work viz. theory classes, practical classes, seminars, assignments, etc. are measured in terms of credits. On satisfactory completion of the courses, a candidate earns credits. The amount of credit associated with a course is dependent upon the number of hours of instruction per week in that course. Similarly the credit associated with any of the other academic, co/extra-curricular activities is dependent upon the quantum of work expected to be put in for each of these activities per week/per activity.

7.1. Credit assignment

7.1.1. Theory and Laboratory courses

Courses are broadly classified as Theory and Practical. Theory courses consist of lecture (L) and Practical (P) courses consist of hours spent in the laboratory. Credits (C) for a course is dependent on the number of hours of instruction per week in that course, and is obtained by using a multiplier of one (1) for lecture and a multiplier of half (1/2) for practical (laboratory) hours.Thus, for example, a theory course having four lectures per week throughout the semester carries a credit of 4. Similarly, a practical having four laboratory hours per week throughout semester carries a credit of 2.

The contact hours of seminars, assignments and research work shall be treated as that of practical courses for the purpose of calculating credits. i.e., the contact hours shall be multiplied by 1/2. Similarly, the contact hours of journal club, research work presentations and discussions with the supervisor shall be considered as theory course and multiplied by 1.

7.2. Minimum credit requirements

The minimum credit points required for the award of M. Pharm. degree is 95. However based on the credit points earned by the students under the head of co-curricular activities, a student shall earn a maximum of 100 credit points. These credits are divided into Theory courses, Practical, Seminars, Assignments,Research work, Discussions with the supervisor, Journal club and Co-Curricular activities over the duration of four semesters. The credits

are distributed semester-wise as shown in Table 14. Courses generally progress in sequence, building competencies and their positioning indicates certain academic maturity on the part of the learners. Learners are expected to follow the semester-wise schedule of courses given in the syllabus.

8. Academic work

A regular record of attendance both in Theory, Practical, Seminar, Assignment, Journal club, Discussion with the supervisor, Research work presentation and Dissertation shall be maintained by the department / teaching staff of respective courses.

9. Course of study

The specializations in M.Pharm program is given in Table 1.

Table – 1: List of M.Pharm. Specializations and their Code

S. No.	Specialization	Code
1.	Pharmaceutics	MPH
2.	Industrial Pharmacy	MIP
3.	Pharmaceutical Chemistry	MPC
4.	Pharmaceutical Analysis	MPA
5.	Pharmaceutical Quality Assurance	MQA
6.	Pharmaceutical Regulatory Affairs	MRA
7.	Pharmaceutical Biotechnology	MPB
8.	Pharmacy Practice	MPP
9.	Pharmacology	MPL
10.	Pharmacognosy	MPG

The course of study for M.Pharm specializations shall include Semester wise Theory & Practical as given in Table – 2 to 11. The number of hours to be devoted to each theory and practical course in any semester shall not be less than that shown in Table – 2 to 11.

Table – 2: Course of study for M. Pharm. (Pharmaceutics)

Course Code	Course	Credit Hours	Credit Points	Hrs./wk	Marks
Semester I					
MPH101T	Modern Pharmaceutical Analytical Techniques	4	4	4	100
MPH102T	Drug Delivery System	4	4	4	100
MPH103T	Modern Pharmaceutics	4	4	4	100
MPH104T	Regulatory Affair	4	4	4	100
MPH105P	Pharmaceutics Practical I	12	6	12	150
-	Seminar/Assignment	7	4	7	100
Total		35	26	35	650
Semester II					
MPH201T	Molecular Pharmaceutics (Nano Tech and Targeted DDS)	4	4	4	100
MPH202T	Advanced Biopharmaceutics & Pharmacokinetics	4	4	4	100
MPH203T	Computer Aided Drug Delivery System	4	4	4	100
MPH204T	Cosmetic and Cosmeceuticals	4	4	4	100
MPH205P	Pharmaceutics Practical II	12	6	12	150
-	Seminar/Assignment	7	4	7	100
	Total	35	26	35	650

Table – 3: Course of study for M. Pharm. (Industrial Pharmacy)

Course Code	Course	Credit Hours	Credit Points	Hrs./wk	Marks
Semester I					
MIP101T	Modern Pharmaceutical Analytical Techniques	4	4	4	100
MIP102T	Pharmaceutical Formulation Development	4	4	4	100
MIP103T	Novel drug delivery systems	4	4	4	100
MIP104T	Intellectual Property Rights	4	4	4	100
MIP105P	Industrial Pharmacy Practical I	12	6	12	150
-	Seminar/Assignment	7	4	7	100
Total		35	26	35	650
Semester II					
MIP201T	Advanced Biopharmaceutics and Pharmacokinetics	4	4	4	100
MIP202T	Scale up and Technology Transfer	4	4	4	100
MIP203T	Pharmaceutical Production Technology	4	4	4	100
MIP204T	Entrepreneurship Management	4	4	4	100
MIP205P	Industrial Pharmacy Practical II	12	6	12	150
-	Seminar/Assignment	7	4	7	100
	Total	35	26	35	650

Table – 4: Course of study for M. Pharm. (Pharmaceutical Chemistry)

Course Code	Course	Credit Hours	Credit Points	Hrs./wk	Marks
Semester I					
MPC101T	Modern Pharmaceutical Analytical Techniques	4	4	4	100
MPC1012T	Advanced Organic Chemistry -I	4	4	4	100
MPC103T	Advanced Medicinal chemistry	4	4	4	100
MPC104T	Chemistry of Natural Products	4	4	4	100
MPC105P	Pharmaceutical Chemistry Practical I	12	6	12	150
-	Seminar/Assignment	7	4	7	100
	Total	35	26	35	650
Semester II					
MPC201T	Advanced Spectral Analysis	4	4	4	100
MPC202T	Advanced Organic Chemistry -II	4	4	4	100
MPC203T	Computer Aided Drug Design	4	4	4	100
MPC204T	Pharmaceutical Process Chemistry	4	4	4	100
MPC205P	Pharmaceutical Chemistry Practical II	12	6	12	150
-	Seminar/Assignment	7	4	7	100
	Total	35	26	35	650

Table – 5: Course of study for M. Pharm. (Pharmaceutical Analysis)

Course Code	Course	Credit Hours	Credit Points	Hrs./wk	Marks
Semester I					
MPA101T	Modern Pharmaceutical Analytical Techniques	4	4	4	100
MPA102T	Advanced Pharmaceutical Analysis	4	4	4	100
MPA103T	Pharmaceutical Validation	4	4	4	100
MPA104T	Food Analysis	4	4	4	100
MPA105P	Pharmaceutical Analysis Practical I	12	6	12	150
-	Seminar/Assignment	7	4	7	100
Total		35	26	35	650
Semester II					
MPA201T	Advanced Instrumental Analysis	4	4	4	100
MPA202T	Modern Bio-Analytical Techniques	4	4	4	100
MPA203T	Quality Control and Quality Assurance	4	4	4	100
MPA204T	Herbal and Cosmetic Analysis	4	4	4	100
MPA205P	Pharmaceutical Analysis Practical II	12	6	12	150
-	Seminar/Assignment	7	4	7	100
	Total	35	26	35	650

Table – 6: Course of study for M. Pharm. (Pharmaceutical Quality Assurance)

Course Code	Course	Credit Hours	Credit Points	Hrs./wk	Marks
Semester I					
MQA101T	Modern Pharmaceutical Analytical Techniques	4	4	4	100
MQA102T	Quality Management System	4	4	4	100
MQA103T	Quality Control and Quality Assurance	4	4	4	100
MQA104T	Product Development and Technology Transfer	4	4	4	100
MQA105P	Pharmaceutical Quality Assurance Practical I	12	6	12	150
-	Seminar/Assignment	7	4	7	100
Total		35	26	35	650
Semester II					
MQA201T	Hazards and Safety Management	4	4	4	100
MQA202T	Pharmaceutical Validation	4	4	4	100
MQA203T	Audits and Regulatory Compliance	4	4	4	100
MQA204T	Pharmaceutical Manufacturing Technology	4	4	4	100
MQA205P	Pharmaceutical Quality Assurance Practical II	12	6	12	150
-	Seminar/Assignment	7	4	7	100
	Total	35	26	35	650

Table – 7: Course of study for M. Pharm. (Regulatory Affairs)

Course Code	Course	Credit Hours	Credit Points	Hrs./ wk	Marks
Semester I					
MRA 101T	Good Regulatory Practices	4	4	4	100
MRA 102T	Documentation and Regulatory Writing	4	4	4	100
MRA 103T	Clinical Research Regulations	4	4	4	100
MRA 104T	Regulations and Legislation for Drugs & Cosmetics, Medical Devices, Biologicals & Herbals, and Food & Nutraceuticals In India and Intellectual Property Rights	4	4	4	100
MRA 105P	Regulatory Affairs Practical I	12	6	12	150
	Seminar/Assignment	7	4	7	100
	Total	35	26	35	650
Semester II					
MRA 201T	Regulatory Aspects of Drugs & Cosmetics	4	4	4	100
MRA 202T	Regulatory Aspects of Herbal & Biologicals	4	4	4	100
MRA 203T	Regulatory Aspects of Medical Devices	4	4	4	100
MRA 204T	Regulatory Aspects of Food & Nutraceuticals	4	4	4	100
MRA 205P	Regulatory Affairs Practical II	12	6	12	150
	Seminar/Assignment	7	4	7	100
	Total	35	26	35	650

Table – 8: Course of study for M. Pharm. (Pharmaceutical Biotechnology)

Course Code	Course	Credit Hours	Credit Points	Hrs./wk	Marks
Semester I					
MPB 101T	Modern Pharmaceutical Analytical Techniques	4	4	4	100
MPB 102T	Microbial And Cellular Biology	4	4	4	100
MPB 103T	Bioprocess Engineering and Technology	4	4	4	100
MPB 104T	Advanced Pharmaceutical Biotechnology	4	4	4	100
MPB 105P	Pharmaceutical Biotechnology Practical I	12	6	12	150
-	Seminar/Assignment	7	4	7	100
Total		35	26	35	650
Semester II					
MPB 201T	Proteins and protein Formulation	4	4	4	100
MPB 202T	Immunotechnology	4	4	4	100
MPB 203T	Bioinformatics and Computer Technology	4	4	4	100
MPB 204T	Biological Evaluation of Drug Therapy	4	4	4	100
MPB 205P	Pharmaceutical Biotechnology Practical II	12	6	12	150
-	Seminar/Assignment	7	4	7	100
	Total	35	26	35	650

Table – 9: Course of study for M. Pharm. (Pharmacy Practice)

Course Code	Course	Credit Hours	Credit Points	Hrs./wk	Marks
Semester I					
MPP 101T	Clinical Pharmacy Practice	4	4	4	100
MPP 102T	Pharmacotherapeutics-I	4	4	4	100
MPP 103T	Hospital & Community Pharmacy	4	4	4	100
MPP 104T	Clinical Research	4	4	4	100
MPP 105P	Pharmacy Practice Practical I	12	6	12	150
-	Seminar/Assignment	7	4	7	100
Total		35	26	35	650
Semester II					
MPP 201T	Principles of Quality Use of Medicines	4	4	4	100
MPP 102T	Pharmacotherapeutics II	4	4	4	100
MPP 203T	Clinical Pharmacokinetics and Therapeutic Drug Monitoring	4	4	4	100
MPP 204T	Pharmacoepidemiology & Pharmacoeconomics	4	4	4	100
MPP 205P	Pharmacy Practice Practical II	12	6	12	150
-	Seminar/Assignment	7	4	7	100
	Total	35	26	35	650

Table – 10: Course of study for (Pharmacology)

Course Code	Course	Credit Hours	Credit Points	Hrs./wk	Marks
Semester I					
MPL 101T	Modern Pharmaceutical Analytical Techniques	4	4	4	100
MPL 102T	Advanced Pharmacology-I	4	4	4	100
MPL 103T	Pharmacological and Toxicological Screening Methods-I	4	4	4	100
MPL 104T	Cellular and Molecular Pharmacology	4	4	4	100
MPL 105P	Pharmacology Practical I	12	6	12	150
-	Seminar/Assignment	7	4	7	100
Total		35	26	35	650
Semester II					
MPL 201T	Advanced Pharmacology II	4	4	4	100
MPL 202T	Pharmacological and Toxicological Screening Methods-II	4	4	4	100
MPL 203T	Principles of Drug Discovery	4	4	4	100
MPL 204T	Experimental Pharmacology practical- II	4	4	4	100
MPL 205P	Pharmacology Practical II	12	6	12	150
-	Seminar/Assignment	7	4	7	100
	Total	35	26	35	650

Table – 11: Course of study for M. Pharm. (Pharmacognosy)

Course Code	Course	Credit Hours	Credit Points	Hrs./wk	Marks
Semester I					
MPG101T	Modern Pharmaceutical Analytical Techniques	4	4	4	100
MPG102T	Advanced Pharmacognosy-1	4	4	4	100
MPG103T	Phytochemistry	4	4	4	100
MPG104T	Industrial Pharmacognostical Technology	4	4	4	100
MPG105P	Pharmacognosy Practical I	12	6	12	150
-	Seminar/Assignment	7	4	7	100
Total		35	26	35	650
Semester II					
MPG201T	Medicinal Plant biotechnology	4	4	4	100
MPG102T	Advanced Pharmacognosy-II	4	4	4	100
MPG203T	Indian system of medicine	4	4	4	100
MPG204T	Herbal cosmetics	4	4	4	100
MPG205P	Pharmacognosy Practical II	12	6	12	150
-	Seminar/Assignment	7	4	7	100
	Total	35	26	35	650

Table – 12: Course of study for M. Pharm. III Semester
(Common for All Specializations)

Course Code	Course	Credit Hours	Credit Points
MRM 301T	Research Methodology and Biostatistics*	4	4
-	Journal club	1	1
-	Discussion / Presentation (Proposal Presentation)	2	2
-	Research Work	28	14
Total		35	21

* Non University Exam

Table – 13: Course of study for M. Pharm. IV Semester
(Common for All Specializations)

Course Code	Course	Credit Hours	Credit Points
-	Journal Club	1	1
-	Research Work	31	16
-	Discussion/Final Presentation	3	3
Total		35	20

Table – 14: Semester wise credits distribution

Semester	Credit Points
I	26
II	26
III	21
IV	20
Co-curricular Activities (Attending Conference, Scientific Presentations and Other Scholarly Activities)	Minimum=02 Maximum=07*
Total Credit Points	Minimum=95 Maximum=100*

*Credit Points for Co-curricular Activities

Table – 15: Guidelines for Awarding Credit Points for Co-curricular Activities

Name of the Activity	Maximum Credit Points Eligible / Activity
Participation in National Level Seminar/Conference/Workshop/Symposium/ Training Programs (related to the specialization of the student)	01
Participation in international Level Seminar/Conference/Workshop/Symposium/ Training Programs (related to the specialization of the student)	02
Academic Award/Research Award from State Level/National Agencies	01
Academic Award/Research Award from International Agencies	02
Research / Review Publication in National Journals (Indexed in Scopus / Web of Science)	01
Research / Review Publication in International Journals (Indexed in Scopus / Web of Science)	02

Note: International Conference: Held Outside India

International Journal: The Editorial Board Outside India

*The credit points assigned for extracurricular and or co-curricular activities shall be given by the Principals of the colleges and the same shall be submitted to the University. The criteria to acquire this credit point shall be defined by the colleges from time to time.

10. Program Committee

1. The M. Pharm. programme shall have a Programme Committee constituted by the Head of the institution in consultation with all the Heads of the departments.

2. The composition of the Programme Committee shall be as follows:
A teacher at the cadre of Professor shall be the Chairperson; One Teacher from eachM.Pharm specialization and four student representatives (two from each academic year), nominated by the Head of the institution.

3. Duties of the Programme Committee:
   i. Periodically reviewing the progress of the classes.
   ii. Discussing the problems concerning curriculum, syllabus and the conduct of classes.
   iii. Discussing with the course teachers on the nature and scope of assessment for the course and the same shall be announced to the students at the beginning of respective semesters.

iv. Communicating its recommendation to the Head of the institution on academic matters.
v. The Programme Committee shall meet at least twice in a semester preferably at the end of each sessionalexam and before the end semester exam.

11. Examinations/Assessments

The schemes for internal assessment and end semester examinations are given in Table – 16.

11.1. End semester examinations

The End Semester Examinations for each theory and practical coursethrough semesters I to IVshall beconducted by the respective university except for the subject with asterix symbol (*) in table I and II for which examinations shall be conducted by the subject experts at college level and the marks/grades shall be submitted to the university.

Tables – 1616 : Schemes for internal assessments and end semester

(Pharmaceutics- MPH)

Course Code	Course	Internal Assessment				End Semester Exams		Total Marks
		Continuous Mode	Sessional Exams		Total	Marks	Duration	
			Marks	Duration				
SEMESTER I								
MPH 101T	Modern Pharmaceutical Analytical Techniques	10	15	1 Hr	25	75	3 Hrs	100
MPH 102T	Drug Delivery System	10	15	1 Hr	25	75	3 Hrs	100
MPH 103T	Modern Pharmaceutics	10	15	1 Hr	25	75	3 Hrs	100
MPH 104T	Regulatory Affair	10	15	1 Hr	25	75	3 Hrs	100
MPH 105P	Pharmaceutics Practical I	20	30	6 Hrs	50	100	6 Hrs	150
-	Seminar /Assignment	-	-	-	-	-	-	100
Total								650
SEMESTER II								
MPH 201T	Molecular Pharmaceutics(Nano Tech and Targeted DDS)	10	15	1 Hr	25	75	3 Hrs	100
MPH 202T	Advanced Biopharmaceutics & Pharmacokinetics	10	15	1 Hr	25	75	3 Hrs	100
MPH 203T	Computer Aided Drug Delivery System	10	15	1 Hr	25	75	3 Hrs	100
MPH	Cosmetic	10	15	1 Hr	25	75	3 Hrs	100

204T	and Cosmeceuticals							
MPH 205P	Pharmaceutics Practical I	20	30	6 Hrs	50	100	6 Hrs	150
-	Seminar /Assignment	-	-	-	-	-	-	100
Total								650

Tables – 1717 : Schemes for internal assessments and end semester
(Industrial Pharmacy- MIP)

Course Code	Course	Internal Assessment				End Semester Exams		Total Marks
		Continuous Mode	Sessional Exams		Total			
			Marks	Duration		Marks	Duration	
SEMESTER I								
MIP101T	Modern Pharmaceutical Analytical Techniques	10	15	1 Hr	25	75	3 Hrs	100
MIP102T	Pharmaceutical Formulation Development	10	15	1 Hr	25	75	3 Hrs	100
MIP103T	Novel drug delivery systems	10	15	1 Hr	25	75	3 Hrs	100
MIP104T	Intellectual Property Rights	10	15	1 Hr	25	75	3 Hrs	100
MIP105P	Industrial Pharmacy Practical I	20	30	6 Hrs	50	100	6 Hrs	150
-	Seminar /Assignment	-	-	-	-	-	-	100
Total								650
SEMESTER II								
MIP201T	Advanced Biopharmaceutics and Pharmacokinetics	10	15	1 Hr	25	75	3 Hrs	100
MIP202T	Scale up and Technology Transfer	10	15	1 Hr	25	75	3 Hrs	100
MIP203T	Pharmaceutical Production Technology	10	15	1 Hr	25	75	3 Hrs	100
MIP204T	Entrepreneurship Management	10	15	1 Hr	25	75	3 Hrs	100

MIP205P	Industrial Pharmacy Practical II	20	30	6 Hrs	50	100	6 Hrs	150
-	Seminar /Assignment	-	-	-	-	-	-	100
Total								650

(Pharmaceutical Chemistry-MPC)

Course Code	Course	Internal Assessment				End Semester Exams		Total Marks
		Continuous Mode	Sessional Exams		Total	Marks	Duration	
			Marks	Duration				
SEMESTER I								
MPC101T	Modern Pharmaceutical Analytical Techniques	10	15	1 Hr	25	75	3 Hrs	100
MPC102T	Advanced Organic Chemistry -I	10	15	1 Hr	25	75	3 Hrs	100
MPC103T	Advanced Medicinal chemistry	10	15	1 Hr	25	75	3 Hrs	100
MPC104T	Chemistry of Natural Products	10	15	1 Hr	25	75	3 Hrs	100
MPC105P	Pharmaceutical Chemistry Practical I	20	30	6 Hrs	50	100	6 Hrs	150
-	Seminar /Assignment	-	-	-	-	-	-	100
Total								650
SEMESTER II								
MPC201T	Advanced Spectral Analysis	10	15	1 Hr	25	75	3 Hrs	100
MPC202T	Advanced Organic Chemistry -II	10	15	1 Hr	25	75	3 Hrs	100
MPC203T	Computer Aided Drug Design	10	15	1 Hr	25	75	3 Hrs	100
MPC204T	Pharmaceutical Process Chemistry	10	15	1 Hr	25	75	3 Hrs	100
MPC205P	Pharmaceutic	20	30	6 Hrs	50	100	6	150

	al Chemistry Practical II						Hrs	
-	Seminar /Assignment	-	-	-	-	-	-	100
Total								650

Tables – 19: Schemes for internal assessments and end semester examinations (Pharmaceutical Analysis-MPA)

Course Code	Course	Internal Assessment				End Semester Exams		Total Marks
		Continuous Mode	Sessional Exams		Total			
			Marks	Duration		Marks	Duration	
SEMESTER I								
MPA101T	Modern Pharmaceutical Analysis	10	15	1 Hr	25	75	3 Hrs	100
MPA102T	Advanced Pharmaceutical Analysis	10	15	1 Hr	25	75	3 Hrs	100
MPA103T	Pharmaceutical Validation	10	15	1 Hr	25	75	3 Hrs	100
MPA104T	Food Analysis	10	15	1 Hr	25	75	3 Hrs	100
MPA105P	Pharmaceutical Analysis-I	20	30	6 Hrs	50	100	6 Hrs	150
-	Seminar /Assignment	-	-	-	-	-	-	100
Total								650
SEMESTER II								
MPA201T	Advanced Instrumental Analysis	10	15	1 Hr	25	75	3 Hrs	100
MPA202T	Modern Bio-Analytical Techniques	10	15	1 Hr	25	75	3 Hrs	100
MPA203T	Quality Control and Quality	10	15	1 Hr	25	75	3 Hrs	100

	Assurance							
MPA204T	Herbal and Cosmetic analysis	10	15	1 Hr	25	75	3 Hrs	100
MPA205P	Pharmaceutical Analysis-II	20	30	6 Hrs	50	100	6 Hrs	150
-	Seminar /Assignment	-	-	-	-	-	-	100
Total								650

Tables – 20: Schemes for internal assessments and end semester examinations (Pharmaceutical Quality Assurance-MQA)

Course Code	Course	Internal Assessment				End Semester Exams		Total Marks
		Continuous Mode	Sessional Exams		Total			
			Marks	Duration		Marks	Duration	
SEMESTER I								
MQA101T	Modern Pharmaceutical Analytical Techniques	10	15	1 Hr	25	75	3 Hrs	100
MQA102T	Quality Management System	10	15	1 Hr	25	75	3 Hrs	100
MQA103T	Quality Control and Quality Assurance	10	15	1 Hr	25	75	3 Hrs	100
MQA104T	Product Development and Technology Transfer	10	15	1 Hr	25	75	3 Hrs	100
MQA105P	Pharmaceutical Quality Assurance Practical I	20	30	6 Hrs	50	100	6 Hrs	150
-	Seminar /Assignment	-	-	-	-	-	-	100
Total								650
SEMESTER II								
MQA201T	Hazards and Safety Management	10	15	1 Hr	25	75	3 Hrs	100
MQA202T	Pharmaceutical Validation	10	15	1 Hr	25	75	3 Hrs	100
MQA203T	Audits and Regulatory Compliance	10	15	1 Hr	25	75	3 Hrs	100
MQA204T	Pharmaceutical Manufacturing Technology	10	15	1 Hr	25	75	3 Hrs	100
MQA205P	Pharmaceutical Quality Assurance Practical II	20	30	6 Hrs	50	100	6 Hrs	150
-	Seminar /Assignment	-	-	-	-	-	-	100
Total								650

Tables – 21: Schemes for internal assessments and end semester examinations (Pharmaceutical Regulatory Affairs-MRA)

Course Code	Course	Internal Assessment				End Semester Exams		Total Marks
		Continuous Mode	Sessional Exams		Total			
			Marks	Duration		Marks	Duration	
SEMESTER I								
MRA101T	Good Pharmaceutical Practices	10	15	1 Hr	25	75	3 Hrs	100
MRA102T	Documentation and Regulatory Writing	10	15	1 Hr	25	75	3 Hrs	100
MRA103T	Clinical Research Regulations	10	15	1 Hr	25	75	3 Hrs	100
MRA104T	Regulations and Legislation for Drugs & Cosmetics, Medical Devices, Biologicals & Herbals, and Food & Nutraceuticals In India and Intellectual Property Rights	10	15	1 Hr	25	75	3 Hrs	100
MRA105T	Pharmaceutical Regulatory Affairs Practical I	20	30	6 Hrs	50	100	6 Hrs	150
-	Seminar /Assignment	-	-	-	-	-	-	100
Total								650
SEMESTER II								
MRA201T	Regulatory Aspects of Drugs & Cosmetics	10	15	1 Hr	25	75	3 Hrs	100

MRA202T	Regulatory Aspects of Herbal & Biologicals	10	15	1 Hr	25	75	3 Hrs	100
MRA203T	Regulatory Aspects of Medical Devices	10	15	1 Hr	25	75	3 Hrs	100
MRA204T	Regulatory Aspects of Food & Nutraceuticals	10	15	1 Hr	25	75	3 Hrs	100
MRA205P	Pharmaceutical Regulatory Affairs Practical II	20	30	6 Hrs	50	100	6 Hrs	150
-	Seminar /Assignment	-	-	-	-	-	-	100
Total								650

Tables – 22: Schemes for internal assessments and end semester examinations (Pharmaceutical Biotechnology-MPB)

Course Code	Course	Internal Assessment				End Semester Exams		Total Marks
		Continuous Mode	Sessional Exams		Total	Marks	Duration	
			Marks	Duration				
SEMESTER I								
MPB101T	Modern Pharmaceutical Analytical Techniques	10	15	1 Hr	25	75	3 Hrs	100
MPB102T	Microbial And Cellular Biology	10	15	1 Hr	25	75	3 Hrs	100
MPB103T	Bioprocess Engineering and Technology	10	15	1 Hr	25	75	3 Hrs	100
MPB104T	Advanced Pharmaceutical Biotechnology	10	15	1 Hr	25	75	3 Hrs	100
MPB105P	Pharmaceutical Biotechnology Practical I	20	30	6 Hrs	50	100	6 Hrs	150
-	Seminar /Assignment	-	-	-	-	-	-	100
Total								650
SEMESTER II								
MPB201T	Proteins and protein Formulation	10	15	1 Hr	25	75	3 Hrs	100
MPB202T	Immunotechnology	10	15	1 Hr	25	75	3 Hrs	100
MPB203T	Bioinformatics and Computer Technology	10	15	1 Hr	25	75	3 Hrs	100
MPB204T	Biological Evaluation of Drug Therapy	10	15	1 Hr	25	75	3 Hrs	100
MPB205P	Pharmaceutical Biotechnology Practical II	20	30	6 Hrs	50	100	6 Hrs	150
-	Seminar /Assignment	-	-	-	-	-	-	100
Total								650

Tables – 23: Schemes for internal assessments and end semester examinations (Pharmacy Practice-MPP)

Course Code	Course	Internal Assessment				End Semester Exams		Total Marks
		Continuous Mode	Sessional Exams		Total	Marks	Duration	
			Marks	Duration				
SEMESTER I								
MPP101T	Clinical Pharmacy Practice	10	15	1 Hr	25	75	3 Hrs	100
MPP102T	Pharmacotherapeutics-I	10	15	1 Hr	25	75	3 Hrs	100
MPP103T	Hospital & Community Pharmacy	10	15	1 Hr	25	75	3 Hrs	100
MPP104T	Clinical Research	10	15	1 Hr	25	75	3 Hrs	100
MPP105P	Pharmacy Practice Practical I	20	30	6 Hrs	50	100	6 Hrs	150
-	Seminar /Assignment	-	-	-	-	-	-	100
Total								650
SEMESTER II								
MPP201T	Principles of Quality Use of Medicines	10	15	1 Hr	25	75	3 Hrs	100
MPP102T	Pharmacotherapeutics II	10	15	1 Hr	25	75	3 Hrs	100
MPP203T	Clinical Pharmacokinetics and Therapeutic Drug Monitoring	10	15	1 Hr	25	75	3 Hrs	100
MPP204T	Pharmacoepidemiology & Pharmacoeconomics	10	15	1 Hr	25	75	3 Hrs	100
MPP205P	Pharmacy Practice Practical II	20	30	6 Hrs	50	100	6 Hrs	150
-	Seminar /Assignment	-	-	-	-	-	-	100
Total								650

Tables – 24: Schemes for internal assessments and end semester examinations (Pharmacology-MPL)

Course Code	Course	Internal Assessment				End Semester Exams		Total Marks
		Continuous Mode	Sessional Exams		Total	Marks	Duration	
			Marks	Duration				
SEMESTER I								
MPL101T	Modern Pharmaceutical Analytical Techniques	10	15	1 Hr	25	75	3 Hrs	100
MPL102T	Advanced Pharmacology-I	10	15	1 Hr	25	75	3 Hrs	100
MPL103T	Pharmacological and Toxicological Screening Methods-I	10	15	1 Hr	25	75	3 Hrs	100
MPL104T	Cellular and Molecular Pharmacology	10	15	1 Hr	25	75	3 Hrs	100
MPL105P	Experimental Pharmacology - I	20	30	6 Hrs	50	100	6 Hrs	150
-	Seminar /Assignment	-	-	-	-	-	-	100
Total								650
SEMESTER II								
MPL201T	Advanced Pharmacology II	10	15	1 Hr	25	75	3 Hrs	100
MPL102T	Pharmacological and Toxicological Screening Methods-II	10	15	1 Hr	25	75	3 Hrs	100
MPL203T	Principles of Drug Discovery	10	15	1 Hr	25	75	3 Hrs	100
MPL204T	Clinical research and pharmacovigilance	10	15	1 Hr	25	75	3 Hrs	100
MPL205P	Experimental Pharmacology - II	20	30	6 Hrs	50	100	6 Hrs	150
-	Seminar /Assignment	-	-	-	-	-	-	100
Total								650

Tables – 25: Schemes for internal assessments and end semester examinations (Pharmacognosy-MPG)

Course Code	Course	Internal Assessment				End Semester Exams		Total Marks
		Continuous Mode	Sessional Exams		Total	Marks	Duration	
			Marks	Duration				
SEMESTER I								
MPG101T	Modern Pharmaceutical Analytical Techniques	10	15	1 Hr	25	75	3 Hrs	100
MPG102T	Advanced Pharmacognosy-1	10	15	1 Hr	25	75	3 Hrs	100
MPG103T	Phytochemistry	10	15	1 Hr	25	75	3 Hrs	100
MPG104T	Industrial Pharmacognostical Technology	10	15	1 Hr	25	75	3 Hrs	100
MPG105P	Pharmacognosy Practical I	20	30	6 Hrs	50	100	6 Hrs	150
-	Seminar /Assignment	-	-	-	-	-	-	100
Total								650
SEMESTER II								
MPG201T	Medicinal Plant biotechnology	10	15	1 Hr	25	75	3 Hrs	100
MPG102T	Advanced Pharmacognosy-II	10	15	1 Hr	25	75	3 Hrs	100
MPG203T	Indian system of medicine	10	15	1 Hr	25	75	3 Hrs	100
MPG204T	Herbal cosmetics	10	15	1 Hr	25	75	3 Hrs	100
MPG205P	Pharmacognosy Practical II	20	30	6 Hrs	50	100	6 Hrs	150
-	Seminar /Assignment	-	-	-	-	-	-	100
Total								650

Tables – 26: Schemes for internal assessments and end semester examinations (Semester III& IV)

Course Code	Course	Internal Assessment				End Semester Exams		Total Marks
		Continuous Mode	Sessional Exams		Total	Marks	Duration	
			Marks	Duration				
SEMESTER III								
MRM301T	Research Methodology and Biostatistics*	10	15	1 Hr	25	75	3 Hrs	100
-	Journal club	-	-	-	25	-	-	25
-	Discussion / Presentation (Proposal Presentation)	-	-	-	50	-	-	50
-	Research work*	-	-	-	-	350	1 Hr	350
Total								525
SEMESTER IV								
-	Journal club	-	-	-	25	-	-	25
-	Discussion / Presentation (Proposal Presentation)	-	-	-	75	-	-	75
-	Research work and Colloquium	-	-	-	-	400	1 Hr	400
Total								500

*Non University Examination

11.2. Internal assessment: Continuous mode

The marks allocated for Continuous mode of Internal Assessment shall be awarded as per the scheme given below.

Table – 27: Scheme for awarding internal assessment: Continuous mode

Theory	
Criteria	Maximum Marks
Attendance (Refer Table – 28)	8
Student – Teacher interaction	2
Total	10
Practical	
Attendance (Refer Table – 28	10
Based on Practical Records, Regular viva voce, etc.	10
Total	20

Table – 28: Guidelines for the allotment of marks for attendance

Percentage of Attendance	Theory	Practical
95 – 100	8	10
90 – 94	6	7.5
85 – 89	4	5
80 – 84	2	2.5
Less than 80	0	0

11.2.1. Sessional Exams

Two sessional exams shall be conducted for each theory / practical course as per the schedule fixed by the college(s). The scheme of question paper for theory and practical sessional examinations is given in the table. The average marks of two sessional exams shall be computed for internal assessment as per the requirements given in tables.

12. Promotion and award of grades

A student shall be declared PASS and eligible for getting grade in a course of M.Pharm.programme if he/she secures at least 50% marks in that particular courseincluding internal assessment.

13. Carry forward of marks

In case a student fails to secure the minimum 50% in any Theory or Practical course as specified in 12, then he/she shall reappear for the end semester examination of that course. However his/her marks of the Internal Assessment shall be carried over and he/she shall be entitled for grade obtained by him/her on passing.

14. Improvement of internal assessment

A student shall have the opportunity to improve his/her performance only once in the sessional exam component of the internal assessment. The re-conduct of the sessional exam shall be completed before the commencement of next end semester theory examinations.

15. Reexamination of end semester examinations

Reexamination of end semester examination shall be conducted as per the schedule given in table 29. The exact dates of examinations shall be notified from time to time.

Table – 29: Tentative schedule of end semester examinations

Semester	For Regular Candidates	For Failed Candidates
I and III	November / December	May / June
II and IV	May / June	November / December

16. Allowed to keep terms (ATKT):

No student shall be admitted to any examination unless he/she fulfills the norms given in 6. ATKT rules are applicable as follows:

A student shall be eligible to carry forward all the courses of I and IIsemesters till the III semester examinations. However, he/she shall not be eligible to attend the courses of IV semester until all the courses of I, II and III semesters are successfully completed.

A student shall be eligible to get his/her CGPA upon successful completion of the courses of I to IV semesters within the stipulated time period as per the norms.

Note: Grade AB should be considered as failed and treated as one head for deciding ATKT. Such rules are also applicable for those students who fail to register for examination(s) of any course in any semester.

17. Grading of performances

17.1. Letter grades and grade points allocations:

Based on the performances, each student shall be awarded a final letter grade at the end of the semester for each course.The letter grades and their corresponding grade points are given in Table – 30.

Table – 30: Letter grades and grade points equivalent to Percentage of marks and performances

Percentage of Marks Obtained	Letter Grade	Grade Point	Performance
90.00 – 100	O	10	Outstanding
80.00 – 89.99	A	9	Excellent
70.00 – 79.99	B	8	Good
60.00 – 69.99	C	7	Fair
50.00 – 59.99	D	6	Average
Less than 50	F	0	Fail
Absent	AB	0	Fail

A learner who remains absent for any end semester examination shall be assigned a letter grade of AB and a corresponding grade point of zero. He/she should reappear for the said evaluation/examination in due course.

18. The Semester grade point average (SGPA)

The performance of a student in a semester is indicated by a number called 'Semester Grade Point Average' (SGPA). The SGPA is the weighted average of the grade points obtainedin all the courses by the student during the semester. For example, if a student takes five courses (Theory/Practical) in a semester with credits C1, C2, C3 and C4 and the student's grade points in these courses are G1, G2, G3 and G4, respectively, and then students' SGPA is equal to:

$$SGPA = \frac{C_1G_1 + C_2G_2 + C_3G_3 + C_4G_4}{C_1 + C_2 + C_3 + C_4}$$

The SGPA is calculated to two decimal points. It should be noted that, the SGPA for any semester shall take into consideration the F and ABS grade awarded in that semester. For example if a learner has a F or ABS grade in course 4, theSGPA shall then be computed as:

$$SGPA = \frac{C_1G_1 + C_2G_2 + C_3G_3 + C_4 * ZERO}{C_1 + C_2 + C_3 + C_4}$$

19. Cumulative Grade Point Average (CGPA)

The CGPA is calculated with the SGPA of all the IV semesters to two decimal points and is indicated in final grade report card/final transcript showing the grades of all IV semesters and their courses. The CGPA shall reflect the failed statusin case of F grade(s), till the course(s) is/are passed. When the course(s) is/are passedby obtaining a pass grade on subsequent examination(s) theCGPA

shall only reflect the new grade and not the fail grades earned earlier.The CGPA is calculated as:

$$CGPA = \frac{C_1S_1 + C_2S_2 + C_3S_3 + C_4S_4}{C_1 + C_2 + C_3 + C_4}$$

where C_1, C_2, C_3,.... is the total number of credits for semester I,II,III,.... and S_1,S_2, S_3,....is the SGPA of semester I,II,III,.... .

20. Declaration of class

The class shall be awarded on the basis of CGPA as follows:

First Class with Distinction	= CGPA of. 7.50 and above
First Class	= CGPA of 6.00 to 7.49
Second Class	= CGPA of 5.00 to 5.99

21. Project work

All the students shall undertake a project under the supervision of a teacher in Semester III to IV and submit a report. 4 copies of the project report shall be submitted (typed & bound copy not less than 75 pages).

The internal and external examiner appointed by the University shall evaluate the project at the time of the Practical examinations of other semester(s). The projects shall be evaluated as per the criteria given below.

Evaluation of Dissertation Book:

Objective(s) of the work done	50 Marks
Methodology adopted	150 Marks
Results and Discussions	250 Marks
Conclusions and Outcomes	50 Marks
Total	500 Marks

Evaluation of Presentation:

Presentation of work	100 Marks
Communication skills	50 Marks
Question and answer skills	100 Marks
Total	250 Marks

22. Award of Ranks

Ranks and Medals shall be awarded on the basis of final CGPA. However, candidates who fail in one or more courses during the M.Pharm program shall not be eligible for award of ranks. Moreover, the candidates should have completed the M. Pharm program in minimum prescribed number of years, (two years) for the award of Ranks.

23. Award of degree

Candidates who fulfill the requirements mentioned above shall be eligible for award of degree during the ensuing convocation.

24. Duration for completion of the program of study

The duration for the completion of the program shall be fixed as double the actual duration of the program and the students have to pass within the said period, otherwise they have to get fresh Registration.

25. Revaluation I Retotaling of answer papers

There is no provision for revaluation of the answer papers in any examination. However, the candidates can apply for retotaling by paying prescribed fee.

26. Re-admission after break of study

Candidate who seeks re-admission to the program after break of study has to get the approval from the university by paying a condonation fee.

PHARMACEUTICS(MPH)

MODERN PHARMACEUTICAL ANALYTICAL TECHNIQUES (MPH 101T)

Scope

This subject deals with various advanced analytical instrumental techniques for identification, characterization and quantification of drugs. Instruments dealt are NMR, Mass spectrometer, IR, HPLC, GC etc.

Objectives

After completion of course student is able to know,

- Chemicals and Excipients
- The analysis of various drugs in single and combination dosage forms
- Theoretical and practical skills of the instruments

THEORY 60 HOURS

1. a. UV-Visible spectroscopy: Introduction, Theory, Laws, Instrumentation associated with UV-Visible spectroscopy, Choice of solvents and solvent effect and Applications of UV-Visible spectroscopy. 11 Hrs

   b. IR spectroscopy: Theory, Modes of Molecular vibrations, Sample handling, Instrumentation of Dispersive and Fourier - Transform IR Spectrometer, Factors affecting vibrational frequencies and Applications of IR spectroscopy

   c. Spectroflourimetry: Theory of Fluorescence, Factors affecting fluorescence, Quenchers, Instrumentation and Applications of fluorescence spectrophotometer.

   d. Flame emission spectroscopy and Atomic absorption spectroscopy: Principle, Instrumentation, Interferences and Applications.

2 NMR spectroscopy: Quantum numbers and their role in NMR, Principle, Instrumentation, Solvent requirement in NMR, Relaxation process, NMR signals in various compounds, Chemical shift, Factors influencing chemical shift, Spin-Spin coupling, Coupling constant, Nuclear magnetic double resonance, Brief outline of principles of FT-NMR and 13C NMR. Applications of NMR spectroscopy. 11 Hrs

3	Mass Spectroscopy: Principle, Theory, Instrumentation of Mass Spectroscopy, Different types of ionization like electron impact, chemical, field, FAB and MALDI, APCI, ESI, APPI Analyzers of Quadrupole and Time of Flight, Mass fragmentation and its rules, Meta stable ions, Isotopic peaks and Applications of Mass spectroscopy	11 Hrs
4	Chromatography: Principle, apparatus, instrumentation, chromatographic parameters, factors affecting resolution and applications of the following: a) Paper chromatography b) Thin Layer chromatography c) Ion exchange chromatography d) Column chromatography e) Gas chromatography f) High Performance Liquid chromatography g) Affinity chromatography	11 Hrs
5	a. Electrophoresis: Principle, Instrumentation, Working conditions, factors affecting separation and applications of the following: a) Paper electrophoresis b) Gel electrophoresis c) Capillary electrophoresis d) Zone electrophoresis e) Moving boundary electrophoresis f) Iso electric focusing b. X ray Crystallography: Production of X rays, Different X ray diffraction methods, Bragg's law, Rotating crystal technique, X ray powder technique, Types of crystals and applications of X-ray diffraction.	11 Hrs
6	Immunological assays : RIA (Radio immuno assay), ELISA, Bioluminescence assays.	5 Hrs

REFERENCES

1. Spectrometric Identification of Organic compounds - Robert M Silverstein, Sixth edition, John Wiley & Sons, 2004.
2. Principles of Instrumental Analysis - Doglas A Skoog, F. James Holler, Timothy A. Nieman, 5th edition, Eastern press, Bangalore, 1998.
3. Instrumental methods of analysis – Willards, 7th edition, CBS publishers.
4. Practical Pharmaceutical Chemistry – Beckett and Stenlake, Vol II, 4th edition, CBS Publishers, New Delhi, 1997.
5. Organic Spectroscopy - William Kemp, 3rd edition, ELBS, 1991.
6. Quantitative Analysis of Drugs in Pharmaceutical formulation - P D Sethi, 3rd Edition, CBS Publishers, New Delhi, 1997.
7. Pharmaceutical Analysis- Modern methods – Part B - J W Munson, Volume 11, Marcel Dekker Series

DRUG DELIVERY SYSTEMS
(MPH 102T)

SCOPE

This course is designed to impart knowledge on the area of advances in novel drug delivery systems.

OBJECTIVES

Upon completion of the course, student shall be able to understand

The various approaches for development of novel drug delivery systems.

The criteria for selection of drugs and polymers for the development of delivering system

The formulation and evaluation of Novel drug delivery systems..

THEORY 60 Hrs

1.	Sustained Release(SR) and Controlled Release (CR) formulations: Introduction & basic concepts, advantages/ disadvantages, factors influencing, Physicochemical & biological approaches for SR/CR formulation, Mechanism of Drug Delivery from SR/CR formulation. Polymers: introduction, definition, classification, properties and application Dosage Forms for Personalized Medicine: Introduction, Definition, Pharmacogenetics, Categories of Patients for Personalized Medicines: Customized drug delivery systems, Bioelectronic Medicines, 3D printing of pharmaceuticals, Telepharmacy.	10 Hrs
2	Rate Controlled Drug Delivery Systems: Principles & Fundamentals, Types, Activation; Modulated Drug Delivery Systems;Mechanically activated, pH activated, Enzyme activated, and Osmotic activated Drug Delivery Systems Feedback regulated Drug Delivery Systems; Principles & Fundamentals.	10 Hrs
3	Gastro-Retentive Drug Delivery Systems: Principle, concepts advantages and disadvantages, Modulation of GI transit time approaches to extend GI transit. Buccal Drug Delivery Systems: Principle of muco adhesion, advantages and disadvantages, Mechanism of drug permeation, Methods of formulation and its evaluations.	10 Hrs
4	Occular Drug Delivery Systems: Barriers of drug permeation, Methods to overcome barriers.	06 Hrs

5	Transdermal Drug Delivery Systems: Structure of skin and barriers, Penetration enhancers, Transdermal Drug Delivery Systems, Formulation and evaluation.	10 Hrs
6	Protein and Peptide Delivery: Barriers for protein delivery. Formulation and Evaluation of delivery systems of proteins and other macromolecules.	08 Hrs
7	Vaccine delivery systems: Vaccines, uptake of antigens, single shot vaccines, mucosal and transdermal delivery of vaccines.	06 Hrs

REFERENCES

1. Y W. Chien, Novel Drug Delivery Systems, 2nd edition, revised and expanded,
Marcel Dekker, Inc., New York, 1992.
2. Robinson, J. R., Lee V. H. L, Controlled Drug Delivery Systems, Marcel Dekker,Inc., New York, 1992.
3. Encyclopedia of controlled delivery, Editor- Edith Mathiowitz, Published by WileyInterscience Publication, John Wiley and Sons, Inc, New York! Chichester/Weinheim
4. N.K. Jain, Controlled and Novel Drug Delivery, CBS Publishers & Distributors, New Delhi, First edition 1997 (reprint in 2001).
5. S.P.Vyas and R.K.Khar, Controlled Drug Delivery - concepts and advances, Vallabh Prakashan, New Delhi, First edition 2002

JOURNALS

1. Indian Journal of Pharmaceutical Sciences (IPA)
2. Indian drugs (IDMA)
3. Journal of controlled release (Elsevier Sciences) desirable
4. Drug Development and Industrial Pharmacy (Marcel & Decker) desirable

MODERN PHARMACEUTICS
(MPH 103T)

Scope

Course designed to impart advanced knowledge and skills required to learn various aspects and concepts at pharmaceutical industries

Objectives

Upon completion of the course, student shall be able to understand

- The elements of preformulation studies.
- The Active Pharmaceutical Ingredients and Generic drug Product development
- Industrial Management and GMP Considerations.
- Optimization Techniques & Pilot Plant Scale Up Techniques
- Stability Testing, sterilization process & packaging of dosage forms.

THEORY 60 HRS

1.	a. Preformation Concepts – Drug Excipient interactions - different methods, kinetics of stability, Stability testing. Theories of dispersion and pharmaceutical Dispersion (Emulsion and Suspension, SMEDDS) preparation and stability Large and small volume parental - physiological and formulation consideration, Manufacturing and evaluation.	10 Hrs
	b. Optimization techniques in Pharmaceutical Formulation: Concept and parameters of optimization, Optimization techniques in pharmaceutical formulation and processing. Statistical design, Response surface method, Contour designs, Factorial designs and application in formulation	10 Hrs
2	Validation : Introduction to Pharmaceutical Validation, Scope & merits of Validation, Validation and calibration of Master plan, ICH & WHO guidelines for calibration and validation of equipments, Validation of specific dosage form, Types of validation. Government regulation, Manufacturing Process Model, URS, DQ, IQ, OQ & P.Q. of facilities.	10 Hrs
3	cGMP & Industrial Management: Objectives and policies of current good manufacturing practices, layout of buildings, services, equipments and their maintenance Production management: Production organization, , materials management, handling and transportation, inventory management and control, production and planning control, Sales forecasting, budget and cost control, industrial and personal relationship. Concept of Total Quality Management.	10 Hrs

4	Compression and compaction: Physics of tablet compression, compression, consolidation, effect of friction, distribution of forces, compaction profiles. Solubility.	10 Hrs
5	Study of consolidation parameters; Diffusion parameters, Dissolution parameters and Pharmacokinetic parameters, Heckel plots, Similarity factors – f2 and f1, Higuchi and Peppas plot, Linearity Concept of significance, Standard deviation , Chi square test, students T-test , ANOVA test.	10 Hrs

REFERENCES

1. Theory and Practice of Industrial Pharmacy By Lachmann and Libermann
2. Pharmaceutical dosage forms: Tablets Vol. 1-3 by Leon Lachmann.
3. Pharmaceutical Dosage forms: Disperse systems, Vol, 1-2; By Leon Lachmann.
4. Pharmaceutical Dosage forms: Parenteral medications Vol. 1-2; By Leon Lachmann.
5. Modern Pharmaceutics; By Gillbert and S. Banker.
6. Remington's Pharmaceutical Sciences.
7. Advances in Pharmaceutical Sciences Vol. 1-5; By H.S. Bean & A.H. Beckett.
8. Physical Pharmacy; By Alfred martin
9. Bentley's Textbook of Pharmaceutics – by Rawlins.
10. Good manufacturing practices for Pharmaceuticals: A plan for total quality control, Second edition; By Sidney H. Willig.
11. Quality Assurance Guide; By Organization of Pharmaceutical producers of India.
12. Drug formulation manual; By D.P.S. Kohli and D.H.Shah. Eastern publishers, New Delhi.
13. How to practice GMPs; By P.P.Sharma. Vandhana Publications, Agra.
14. Pharmaceutical Process Validation; By Fra. R. Berry and Robert A. Nash.
15. Pharmaceutical Preformulations; By J.J. Wells.
16. Applied production and operations management; By Evans, Anderson, Sweeney and Williams.
17. Encyclopaedia of Pharmaceutical technology, Vol I – III.

REGULATORY AFFAIRS
(MPH 104T)

Scope

Course designed to impart advanced knowledge and skills required to learn the concept of generic drug and their development, various regulatory filings in different countries, different phases of clinical trials and submitting regulatory documents : filing process of IND, NDA and ANDA

- To know the approval process of
- To know the chemistry, manufacturing controls and their regulatory importance
- To learn the documentation requirements for
- To learn the importance and

Objectives:

Upon completion of the course, it is expected that the students will be able to understand

- The Concepts of innovator and generic drugs, drug development process
- The Regulatory guidance's and guidelines for filing and approval process
- Preparation of Dossiers and their submission to regulatory agencies in different countries
- Post approval regulatory requirements for actives and drug products
- Submission of global documents in CTD/ eCTD formats
- Clinical trials requirements for approvals for conducting clinical trials
- Pharmacovigilence and process of monitoring in clinical trials.

THEORY 60 Hrs

1. a. Documentation in Pharmaceutical industry: Master formula record, DMF (Drug Master File), distribution records. Generic drugs product development Introduction , Hatch-Waxman act and amendments, CFR (CODE OF FEDERAL REGULATION) ,drug product performance, in-vitro, ANDA regulatory approval process, NDA approval process, BE and drug product assessment, in –vivo, scale up process approval changes, post marketing surveillance, outsourcing BA and BE to CRO. 12 Hrs

   b. Regulatory requirement for product approval: API, biologics, novel, therapies obtaining NDA, ANDA for generic drugs ways and means of US registration for foreign drugs

2	CMC, post approval regulatory affairs. Regulation for combination products and medical devices.CTD and ECTD format, industry and FDA liaison. ICH - Guidelines of ICH-Q, S E, M. Regulatory requirements of EU, MHRA, TGA and ROW countries.	12 Hrs
3	Non clinical drug development: Global submission of IND, NDA, ANDA. Investigation of medicinal products dossier, dossier (IMPD) and investigator brochure (IB).	12 Hrs
4	Clinical trials: Developing clinical trial protocols. Institutional review board/ independent ethics committee Formulation and working procedures informed Consent process and procedures. HIPAA- new, requirement to clinical study process, pharmacovigilance safety monitoring in clinical trials.	12 Hrs

REFERENCES

1. Generic Drug Product Development, Solid Oral Dosage forms, Leon Shargel and IsaderKaufer,Marcel Dekker series, Vol.143
2. The Pharmaceutical Regulatory Process, Second Edition Edited by Ira R. Berry and Robert P.Martin, Drugs and the Pharmaceutical Sciences,Vol.185, Informa Health care Publishers.
3. New Drug Approval Process: Accelerating Global Registrations By Richard A Guarino, MD,5th edition, Drugs and the Pharmaceutical Sciences,Vol.190.
4. Guidebook for drug regulatory submissions / Sandy Weinberg. By John Wiley & Sons.Inc.
5. FDA regulatory affairs: a guide for prescription drugs, medical devices, and biologics/edited By Douglas J. Pisano, David Mantus.
6. Clinical Trials and Human Research: A Practical Guide to Regulatory Compliance By Fay A.Rozovsky and Rodney K. Adams
7. www.ich.org/
8. www.fda.gov/
9. europa.eu/index_en.htm
10. https://www.tga.gov.au/tga-basics

PHARMACEUTICS PRACTICALS - I
(MPH 105P)

1. Analysis of pharmacopoeial compounds and their formulations by UV Vis spectrophotometer
2. Simultaneous estimation of multi component containing formulations by UV spectrophotometry
3. Experiments based on HPLC
4. Experiments based on Gas Chromatography
5. Estimation of riboflavin/quinine sulphate by fluorimetry
6. Estimation of sodium/potassium by flame photometry
7. To perform In-vitro dissolution profile of CR/ SR marketed formulation
8. Formulation and evaluation of sustained release matrix tablets
9. Formulation and evaluation osmotically controlled DDS
10. Preparation and evaluation of Floating DDS- hydro dynamically balanced DDS
11. Formulation and evaluation of Muco adhesive tablets.
12. Formulation and evaluation of trans dermal patches.
13. To carry out preformulation studies of tablets.
14. To study the effect of compressional force on tablets disintegration time.
15. To study Micromeritic properties of powders and granulation.
16. To study the effect of particle size on dissolution of a tablet.
17. To study the effect of binders on dissolution of a tablet.
18. To plot Heckal plot, Higuchi and peppas plot and determine similarity factors.

MOLECULAR PHARMACEUTICS (NANO TECHNOLOGY & TARGETED DDS) (NTDS)
(MPH 201T)

Scope

This course is designed to impart knowledge on the area of advances in novel drug delivery systems.

Objectives

Upon completion of the course student shall be able to understand

- The various approaches for development of novel drug delivery systems.
- The criteria for selection of drugs and polymers for the development of NTDS
- The formulation and evaluation of novel drug delivery systems.

THEORY 60 Hrs

1.	Targeted Drug Delivery Systems: Concepts, Events and biological process involved in drug targeting. Tumor targeting and Brain specific delivery.	12 Hrs
2	Targeting Methods: introduction preparation and evaluation. Nano Particles & Liposomes: Types, preparation and evaluation.	12 Hrs
3	Micro Capsules / Micro Spheres: Types, preparation and evaluation , Monoclonal Antibodies ; preparation and application, preparation and application of Niosomes, Aquasomes, Phytosomes, Electrosomes.	12 Hrs
4	Pulmonary Drug Delivery Systems : Aerosols, propellents, ContainersTypes, preparation and evaluation, Intra Nasal Route Delivery systems; Types, preparation and evaluation.	12 Hrs
5	Nucleic acid based therapeutic delivery system : Gene therapy, introduction (ex-vivo & in-vivo gene therapy). Potential target diseases for gene therapy (inherited disorder and cancer). Gene expression systems (viral and nonviral gene transfer). Liposomal gene delivery systems. Biodistribution and Pharmacokinetics. knowledge of therapeutic antisense molecules and aptamers as drugs of future.	12 Hrs

REFERENCES

1. Y W. Chien, Novel Drug Delivery Systems, 2nd edition, revised and expanded,Marcel Dekker, Inc., New York, 1992.
2. S.P.Vyas and R.K.Khar, Controlled Drug Delivery - concepts and advances, VallabhPrakashan, New Delhi, First edition 2002.
3. N.K. Jain, Controlled and Novel Drug Delivery, CBS Publishers & Distributors, NewDelhi, First edition 1997 (reprint in 2001).

ADVANCED BIOPHARMACEUTICS & PHARMACOKINETICS
(MPH 202T)

Scope

This course is designed to impart knowledge and skills necessary for dose calculations, dose adjustments and to apply biopharmaceutics theories in practical problem solving. Basic theoretical discussions of the principles of biopharmaceutics and pharmacokinetics are provided to help the students' to clarify the concepts.

Objectives

Upon completion of this course it is expected that students will be able understand,

- The basic concepts in biopharmaceutics and pharmacokinetics.
- The use raw data and derive the pharmacokinetic models and parameters the best describe the process of drug absorption, distribution, metabolism and elimination.
- The critical evaluation of biopharmaceutic studies involving drug product equivalency.
- The design and evaluation of dosage regimens of the drugs using pharmacokinetic and biopharmaceutic parameters.
- The potential clinical pharmacokinetic problems and application of basics of pharmacokinetic

THEORY 60 Hrs

1. Drug Absorption from the Gastrointestinal Tract: Gastrointestinal tract, Mechanism of drug absorption, Factors affecting drug absorption, pH–partition theory of drug absorption. Formuulation and physicochemical factors: Dissolution rate, Dissolution process, Noyes–Whitney equation and drug dissolution, Factors affecting the dissolution rate. Gastrointestinal absorption: role of the dosage form: Solution (elixir, syrup and solution) as a dosage form ,Suspension as a dosage form, Capsule as a dosage form, Tablet as a dosage form ,Dissolution methods ,Formulation and processing factors, Correlation of in vivo data with in vitro dissolution data.Transport model: Permeability-Solubility-Charge State and the pH Partition Hypothesis, Properties of the Gastrointestinal Tract (GIT), pH Microclimate Intracellular pH Environment, Tight-Junction Complex. 12 Hrs

2	Biopharmaceutic considerations in drug product design and In Vitro Drug Product Performance: Introduction, biopharmaceutic factors affecting drug bioavailability, rate-limiting steps in drug absorption, physicochemical nature of the drug formulation factors affecting drug product performance, in vitro: dissolution and drug release testing, compendial methods of dissolution, alternative methods of dissolution testing,meeting dissolution requirements,problems of variable control in dissolution testingperformance of drug products. In vitro–in vivo correlation, dissolution profile comparisons, drug product stability,considerations in the design of a drug product.	12 Hrs
3	Pharmacokinetics: Basic considerations, pharmacokinetic models, compartment modeling: one compartment model- IV bolus, IV infusion, extra-vascular. Multi compartment model:two compartment - model in brief, non-linear pharmacokinetics: cause of non-linearity, Michaelis – Menten equation, estimation of k_{max} and v_{max}. Drug interactions: introduction, the effect of protein-binding interactions,the effect of tissue-binding interactions,cytochrome p450-based drug interactions,drug interactions linked to transporters.	12 Hrs
4	Drug Product Performance, In Vivo: Bioavailability and Bioequivalence: drug product performance, purpose of bioavailability studies, relative and absolute availability. methods for assessing bioavailability, bioequivalence studies, design and evaluation of bioequivalence studies, study designs, crossover study designs, evaluation of the data, bioequivalence example, study submission and drug review process. biopharmaceutics classification system, methods. Permeability: In-vitro, in-situ and In-vivo methods.generic biologics (biosimilar drug products),clinical significance of bioequivalence studies, special concerns in bioavailability and bioequivalence studies, generic substitution.	12 Hrs
5	Application of Pharmacokinetics: Modified-Release Drug Products, Targeted Drug Delivery Systems and Biotechnological Products. Introduction to Pharmacokinetics and pharmacodynamic, drug interactions. Pharmacokinetics and pharmacodynamics of biotechnology drugs. Introduction, Proteins and peptides, Monoclonal antibodies, Oligonucleotides, Vaccines (immunotherapy), Gene therapies.	12 Hrs

REFERENCES

1. Biopharmaceutics and Clinical Pharmacokinetics by Milo Gibaldi, 4th edition,Philadelphia, Lea and Febiger, 1991
2. Biopharmaceutics and Pharmacokinetics, A. Treatise, D .M. Brahmankar and Sunil B. Jaiswal., VallabPrakashan, Pitampura, Delhi
3. Applied Biopharmaceutics and Pharmacokinetics by Shargel. Land YuABC, 2nd edition, Connecticut Appleton Century Crofts, 1985
4. Textbook of Biopharmaceutics and Pharmacokinetics, Dr. Shobha Rani R. Hiremath,Prism Book
5. Pharmacokinetics by Milo Gibaldi and D. Perrier, 2nd edition, Marcel Dekker Inc.,New York, 1982
6. Current Concepts in Pharmaceutical Sciences: Biopharmaceutics, Swarbrick. J, Leaand Febiger, Philadelphia, 1970
7. Clinical Pharmacokinetics, Concepts and Applications 3rd edition by MalcolmRowland and Thom~ N. Tozer, Lea and Febiger, Philadelphia, 1995
8. Dissolution, Bioavailability and Bioequivalence, Abdou. H.M, Mack PublishingCompany, Pennsylvania 1989
9. Biopharmaceutics and Clinical Pharmacokinetics, An Introduction, 4th edition,revised and expande by Robert. E. Notari, Marcel Dekker Inc, New York and Basel,1987.
10. Biopharmaceutics and Relevant Pharmacokinetics by John. G Wagner and M.Pemarowski, 1st edition, Drug Intelligence Publications, Hamilton, Illinois, 1971.
11. Encyclopedia of Pharmaceutical Technology, Vol 13, James Swarbrick, James. G.Boylan, Marcel Dekker Inc, New York, 1996.
12. Basic Pharmacokinetics,1 st edition,Sunil S JambhekarandPhilip J Breen,pharmaceutical press, RPS Publishing,2009.
13. Absorption and Drug Development- Solubility, Permeability, and Charge State, Alex Avdeef, John Wiley & Sons, Inc,2003.

COMPUTER AIDED DRUG DEVELOPMENT
(MPH 203T)

Scope

This course is designed to impart knowledge and skills necessary for computer Applications in pharmaceutical research and development who want to understand the application of computers across the entire drug research and development process. Basic theoretical discussions of the principles of more integrated and coherent use of computerized information (informatics) in the drug development process are provided to help the students to clarify the concepts.

Objectives

Upon completion of this course it is expected that students will be able to understand,

- History of Computers in Pharmaceutical Research and Development
- Computational Modeling of Drug Disposition
- Computers in Preclinical Development
- Optimization Techniques in Pharmaceutical Formulation
- Computers in Market Analysis
- Computers in Clinical Development
- Artificial Intelligence (AI) and Robotics
- Computational fluid dynamics(CFD)

THEORY		60 Hrs
1.	a. Computers in Pharmaceutical Research and Development: A General Overview: History of Computers in Pharmaceutical Research and Development. Statistical modeling in Pharmaceutical research and development: Descriptive versus Mechanistic Modeling, Statistical Parameters, Estimation, Confidence Regions, Nonlinearity at the Optimum, Sensitivity Analysis, Optimal Design, Population Modeling b. Quality-by-Design In Pharmaceutical Development: Introduction, ICH Q8 guideline, Regulatory and industry views on QbD, Scientifically based QbD - examples of application.	12 Hrs
2	Computational Modeling Of Drug Disposition: Introduction ,Modeling Techniques: Drug Absorption, Solubility, Intestinal Permeation, Drug Distribution ,Drug Excretion, Active Transport; P-gp, BCRP, Nucleoside Transporters, hPEPT1, ASBT, OCT, OATP, BBB-Choline Transporter.	12 Hrs

3	Computer-aided formulation development:: Concept of optimization, Optimization parameters, Factorial design, Optimization technology & Screening design. Computers in Pharmaceutical Formulation: Development of pharmaceutical emulsions, microemulsion drug carriers Legal Protection of Innovative Uses of Computers in R&D, The Ethics of Computing in Pharmaceutical Research, Computers in Market analysis	12 Hrs
4	a. Computer-aided biopharmaceutical characterization: Gastrointestinal absorption simulation. Introduction, Theoretical background, Model construction, Parameter sensitivity analysis, Virtual trial, Fed vs. fasted state, In vitro dissolution and in vitro-in vivo correlation, Biowaiver considerations b. Computer Simulations in Pharmacokinetics and Pharmacodynamics: Introduction, Computer Simulation: Whole Organism, Isolated Tissues, Organs, Cell, Proteins and Genes. c. Computers in Clinical Development: Clinical Data Collection and Management, Regulation of Computer Systems	12 Hrs
5	Artificial Intelligence (AI), Robotics and Computational fluid dynamics: General overview, Pharmaceutical Automation, Pharmaceutical applications, Advantages and Disadvantages. Current Challenges and Future Directions.	12 Hrs

REFERENCES

1. Computer Applications in Pharmaceutical Research and Development, Sean Ekins, 2006, John Wiley & Sons.
2. Computer-Aided Applications in Pharmaceutical Technology, 1st Edition, Jelena Djuris, Woodhead Publishing
3. Encyclopedia of Pharmaceutical Technology, Vol 13, James Swarbrick, James. G.Boylan, Marcel Dekker Inc, New York, 1996.

COSMETICS AND COSMECEUTICALS
(MPH 204T)

Scope

This course is designed to impart knowledge and skills necessary forthefundamental need for cosmetic and cosmeceutical products.

Objectives

Upon completion of the course, the students shall be able to understand

- Key ingredients used in cosmetics and cosmeceuticals.
- Key building blocks for various formulations.
- Current technologies in the market
- Various key ingredients and basic science to develop cosmetics and cosmeceuticals
- Scientific knowledge to develop cosmetics and cosmeceuticals with desired Safety, stability, and efficacy.

THEORY 60 Hrs

1. Cosmetics – Regulatory : Definition of cosmetic products as per Indian regulation. Indian regulatory requirements for labeling of cosmetics Regulatory provisions relating to import of cosmetics., Misbranded and spurious cosmetics. Regulatory provisions relating to manufacture of cosmetics - Conditions for obtaining license, prohibition of manufacture and sale of certain cosmetics, loan license, offences and penalties. 12 Hrs

2 Cosmetics - Biological aspects : Structure of skin relating to problems like dry skin, acne, pigmentation, prickly heat, wrinkles and body odor. Structure of hair and hair growth cycle. Common problems associated with oral cavity. Cleansing and care needs for face, eye lids, lips, hands, feet, nail, scalp, neck, body and under-arm. 12 Hrs

3 Formulation Building blocks: Building blocks for different product formulations of cosmetics/cosmeceuticals. Surfactants – Classification and application. Emollients, rheological additives: classification and application. Antimicrobial used as preservatives, their merits and demerits. Factors affecting microbial preservative efficacy. Building blocks for formulation of a moisturizing cream, vanishing cream, cold cream, shampoo and toothpaste. Soaps and syndetbars. 12 Hrs

Perfumes; Classification of perfumes. Perfume ingredients listed as allergens in EU regulation.

	Controversial ingredients: Parabens, formaldehyde liberators, dioxane.	
4	Design of cosmeceutical products: Sun protection, sunscreens classification and regulatory aspects. Addressing dry skin, acne, sun-protection, pigmentation, prickly heat, wrinkles, body odor., dandruff, dental cavities, bleeding gums, mouth odor and sensitive teeth through cosmeceutical formulations.	12 Hrs
5	Herbal Cosmetics : Herbal ingredients used in Hair care, skin care and oral care. Review of guidelines for herbal cosmetics by private bodies like cosmos with respect to preservatives, emollients, foaming agents, emulsifiers and rheology modifiers. Challenges in formulating herbal cosmetics.	12 Hrs

REFERENCES

1. Harry's Cosmeticology. 8th edition.
2. Poucher'sperfumecosmeticsandSoaps,10th edition.
3. Cosmetics - Formulation, Manufacture and quality control, PP.Sharma,4th edition
4. Handbook of cosmetic science and Technology A.O.Barel, M.Paye and H.I. Maibach. 3rd edition
5. Cosmetic and Toiletries recent suppliers catalogue.
6. CTFA directory.

PHARMACEUTICS PRACTICALS - II
(MPH 205P)

1. To study the effect of temperature change , non solvent addition, incompatible polymer addition in microcapsules preparation
2. Preparation and evaluation of Alginate beads
3. Formulation and evaluation of gelatin /albumin microspheres
4. Formulation and evaluation of liposomes/niosomes
5. Formulation and evaluation of spherules
6. Improvement of dissolution characteristics of slightly soluble drug by Solid dispersion technique.
7. Comparison of dissolution of two different marketed products /brands
8. Protein binding studies of a highly protein bound drug & poorly protein bound drug
9. Bioavailability studies of Paracetamol in animals.
10. Pharmacokinetic and IVIVC data analysis by Winnoline^{R} software
11. In vitro cell studies for permeability and metabolism
12. DoE Using Design Expert® Software
13. Formulation data analysis Using Design Expert® Software
14. Quality-by-Design in Pharmaceutical Development
15. Computer Simulations in Pharmacokinetics and Pharmacodynamics
16. Computational Modeling Of Drug Disposition
17. To develop Clinical Data Collection manual
18. To carry out Sensitivity Analysis, and Population Modeling.
19. Development and evaluation of Creams
20. Development and evaluation of Shampoo and Toothpaste base
21. To incorporate herbal and chemical actives to develop products
22. To address Dry skin, acne, blemish, Wrinkles, bleeding gums and dandruff

INDUSTRIALPHARMACY(MIP)

MODERN PHARMACEUTICAL ANALYTICAL TECHNIQUES

(MIP 101T)

Scope

This subject deals with various advanced analytical instrumental techniques for identification, characterization and quantification of drugs. Instruments dealt are NMR, Mass spectrometer, IR, HPLC, GC etc.

Objectives

After completion of course student is able to know,

- The analysis of various drugs in single and combination dosage forms
- Theoretical and practical skills of the instruments

THEORY 60 HOURS

1. UV-Visible spectroscopy: Introduction, Theory, Laws, Instrumentation associated with UV-Visible spectroscopy, Choice of solvents and solvent effect and Applications of UV-Visible spectroscopy. 11 Hrs

   IR spectroscopy: Theory, Modes of Molecular vibrations, Sample handling, Instrumentation of Dispersive and Fourier - Transform IR Spectrometer, Factors affecting vibrational frequencies and Applications of IR spectroscopy

   Spectroflourimetry: Theory of Fluorescence, Factors affecting fluorescence, Quenchers, Instrumentation and Applications of fluorescence spectrophotometer.

   Flame emission spectroscopy and Atomic absorption spectroscopy: Principle, Instrumentation, Interferences and Applications.

2 NMR spectroscopy: Quantum numbers and their role in NMR, Principle, Instrumentation, Solvent requirement in NMR, Relaxation process, NMR signals in various compounds, Chemical shift, Factors influencing chemical shift, Spin-Spin coupling, Coupling constant, Nuclear magnetic double resonance, Brief outline of principles of FT-NMR and 13C NMR. Applications of NMR spectroscopy. 11 Hrs

3	Mass Spectroscopy: Principle, Theory, Instrumentation of Mass Spectroscopy, Different types of ionization like electron impact, chemical, field, FAB and MALDI, APCI, ESI, APPI Analyzers of Quadrupole and Time of Flight, Mass fragmentation and its rules, Meta stable ions, Isotopic peaks and Applications of Mass spectroscopy	11 Hrs
4	Chromatography: Principle, apparatus, instrumentation, chromatographic parameters, factors affecting resolution and applications of the following: a) Paper chromatography b) Thin Layer chromatography c) Ion exchange chromatography d) Column chromatography e) Gas chromatography f) High Performance Liquid chromatography g) Affinity chromatography	11 Hrs
5	Electrophoresis: Principle, Instrumentation, Working conditions, factors affecting separation and applications of the following: a) Paper electrophoresis b) Gel electrophoresis c) Capillary electrophoresis d) Zone electrophoresis e) Moving boundary electrophoresis f) Iso electric focusing X ray Crystallography: Production of X rays, Different X ray methods, Bragg's law, Rotating crystal technique, X ray powder technique, Types of crystals and applications of X-ray diffraction.	11 Hrs
6.	Immunological Assays: Radioimmunology assay (RIA), ELISA (Theory & practical) and knowledge on Bioluminescence assays.	5 Hrs

REFERENCES

1. Spectrometric Identification of Organic compounds - Robert M Silverstein, 6th edition, John Wiley & Sons, 2004.
2. Principles of Instrumental Analysis - Doglas A Skoog, F. James Holler, Timothy A. Nieman, 5th edition, Eastern press, Bangalore, 1998.
3. Instrumental methods of analysis – Willards, 7th edition, CBS publishers.
4. Practical Pharmaceutical Chemistry – Beckett and Stenlake, Vol II, 4th edition, CBS Publishers, New Delhi, 1997.
5. Organic Spectroscopy - William Kemp, 3rd edition, ELBS, 1991.
6. Quantitative Analysis of Drugs in Pharmaceutical formulation - P D Sethi, 3rd Edition, CBS Publishers, New Delhi, 1997.
7. Pharmaceutical Analysis- Modern methods – Part B - J W Munson, Volume 11, Marcel Dekker Series

PHARMACEUTICAL FORMULATION DEVELOPMENT
(MIP 102T)

Scope

This course is designed to impart knowledge and skills necessary to train the students on par with the routine of Industrial activities in R&D and F&D.

Objectives

On completion of this course it is expected that students will be able to understand-

- The scheduled activities in a Pharmaceutical firm.
- The pre formulation studies of pilot batches of pharmaceutical industry.
- The significance of dissolution and product stability

THEORY 60 Hrs

1. Preformulation Studies: Molecular optimization of APIs (drug substances), crystal morphology and variations, powder flow, structure modification, drug-excipient compatibility studies, methods of determination. 12 Hrs

2 Formulation Additives: Study of different formulation additives, factors influencing their incorporation, role of formulation development and processing, new developments in excipient science. Design of experiments – factorial design for product and process development. 12 Hrs

3 Solubility: Importance, experimental determination, phase-solubility analysis, pH-solubility profile, solubility techniques to improve solubility and utilization of analytical methods – cosolvency, salt formation, complexation, solid dispersion, micellar solubilization and hydrotropy. 12 Hrs

4 Dissolution: Theories, mechanisms of dissolution, in-vitro dissolution testing models – sink and non-sink. Factors influencing dissolution and intrinsic dissolution studies. Dissolution test apparatus – designs, dissolution testing for conventional and controlled release products. Data handling and correction factor. Biorelevent media, in-vitro and in-vivo correlations, levels of correlations. 12 Hrs

5 Product Stability: Degradation kinetics, mechanisms, stability testing of drugs and pharmaceuticals, factors influencing-media effects and pH effects, accelerated stability studies, interpretation of kinetic data (API & tablets). Solid state stability and shelf life assignment. Stability protocols, reports and ICH guidelines. 12 Hrs

REFERENCES

1. Lachman L, Lieberman HA, Kanig JL. The Theory and Practice Of Industrial Pharmacy, 3rd ed., Varghese Publishers, Mumbai 1991.
2. Sinko PJ. Martin's physical pharmacy and pharmaceutical sciences, 5th ed., B.I. Publications Pvt. Ltd, Noida, 2006.
3. Lieberman HA, Lachman L, Schwartz JB. Pharmaceutical dosage forms: tablets Vol. I-III, 2nd ed., CBS Publishers & distributors, New Delhi, 2005.
4. Conners KA. A Text book of pharmaceutical analysi Wells JI. Pharmaceutical preformulation: The physicochemical properties of drug substances. Ellis Horwood Ltd., England, 1998.
5. Yalkowsky SH. Techniques of solubilization of drugs. Vol-12. Marcel Dekker Inc., New York, 1981
6. Dressman J, Kramer J. Pharmaceutical dissolution testing. Saurah printer pvt. Ltd., New Delhi,2005.
7. Sethi PD. Quantitative analysis of drugs in pharmaceutical formulations, 3rd ed., CBS publications, New Delhi, 2008.
8. Carstensen JT, Rhodes CT. Drug stability principles and practices, 3rd ed., CBS Publishers & distributors, New Delhi, 2005.
9. Yoshioka S, Stella VJ. Stability of drugs and dosage forms, Springer (India) Pvt. Ltd., New Delhi, 2006.
10. Banker GS, Rhodes CT. Modern Pharmaceutics, 4th ed., Marcel Dekker Inc, New York, 2005.
11. W. Grimm - Stability testing of drug products.
12. Mazzo DJ. International stability testing. Eastern Press Pvt. Ltd., Bangalore, 1999. 13. Beckett AH, Stenlake JB. Practical pharmaceutical chemistry, Part I & II., 4th ed., CBS Publishers & distributors, New Delhi, 2004.
14. Indian Pharmacopoeia. Controller of Publication. Delhi, 1996.
15. British Pharmacopoeia. British Pharmacopoeia Commission Office, London, 2008.
16. United States Pharmacopoeia. United States Pharmacopeial Convention, Inc, USA, 2003.
17. Encyclopaedia of Pharm. Technology, Vol I – III.
18. Wells J. I. Pharmaceutical Preformulation : The physicochemical properties of drug substances, Ellis Horwood Ltd. England, 1988.

NOVEL DRUG DELIVERY SYSTEMS
(MIP 103T)

Scope

This course is designed to impart knowledge and skills necessary to train the students in the area of novel drug delivery systems.

Objective

On completion of this course it is expected that students will be able to understand,

- The need, concept, design and evaluation of various customized, sustained and controlled release dosage forms.
- To formulate and evaluate various novel drug delivery systems

THEORY 60 Hrs

1.	Concept & Models for NDDS: Classification of rate controlled drug delivery systems (DDS), rate programmed release, activation modulated & feedback regulated DDS, effect of system parameters in controlled drug delivery, computation of desired release rate and dose for controlled release DDS, pharmacokinetic design for DDS – intermittent, zero order & first order release. Carriers for Drug Delivery: Polymers / co-polymers-introduction, classification, characterization, polymerization techniques, application in CDDS / NDDS, biodegradable & natural polymers.	12 Hrs
2	Study of Various DDS: Concepts, design, formulation & evaluation of controlled release oral DDS, Mucoadhesive DDS (buccal, nasal, pulmonary) Pulsatile, colon specific, liquid sustained release systems, Ocular delivery systems	12 Hrs
3	Transdermal Drug Delivery Systems: Theory, design, formulation & evaluation including iontophoresis and other latest developments in skin delivery systems.	08 Hrs
4	Sub Micron Cosmeceuticals: Biology, formulation science and evaluation of various cosmetics for skin, hair, nail, eye etc and it's regulatory aspects.	04 Hrs

5	Targeted Drug Delivery Systems: Importance, concept, biological process and events involved in drug targeting, design, formulation & evaluation, methods in drug targeting – nanoparticles, liposomes, niosomes, pharmacosomes, resealed erythrocytes, microspheres, magnetic microspheres. Specialized pharmaceutical emulsions – multiple emulsions, micro-emulsions.	12 Hrs
6	Protein / Peptide Drug Delivery Systems: Concepts, delivery techniques, formulation, stability testing, causes of protein destabilization, stabilization methods.	
7	Biotechnology in Drug Delivery Systems: Brief review of major areas-recombinant DNA technology, monoclonal antibodies, gene therapy.	06 Hrs
8	New trends for Personalized Medicine: Introduction, Definition, Pharmacogenetics, Categories of Patients for Personalized Medicines: Customized drug delivery systems, Bioelectronic Medicines, 3D printing of pharmaceuticals, Telepharmacy.	06 Hrs

REFERENCES

1. Novel Drug Delivery System, Y.W. Chein, Vol 50, Marcel Dekker, NY.
2. Controlled Drug Delivery Systems, Robinson, Vol 29, Marcel Dekker, NY.
3. Transdermal Controlled Systemic Medications, YW Chein, Vol 31, Marcel Dekker, NY.
4. Bioadhesive DDS, E. Mathiowitz, Vol 98, Marcel Dekker, NY.
5. Nasal System Drug Delivery, K.S.E. Su, Vol 39, Marcel Dekker, NY.
6. Drug Delivery Devices, Vol 32, P Tyle Marcel Dekker, NY.
7. Polymers for Controlled Drug Delivery, P.J. Tarcha, CRC Press.
8. Pharmaceutical Biotechnology, Vyas, CBS, Delhi.
9. Biotechnology of Industrial Antibiotics, E.J. Vandamme, Marcel Dekker, NY.
10. Protein Formulation & Delivery, E.J. McNally, Vol 99, Marcel Dekker, NY.
11. Drug Targeting, M.H. Rubinstein, John Wiley, NY.

INTELLECTUAL PROPERTY RIGHTS
(MIP 104T)

Scope

This course is designed to impart knowledge and skills necessary to train the students to be on par with the routine of Industrial activities in drug regulatory affairs

Objectives

On completion of this course it is expected that students will be able to understand,

- Assist in Regulatory Audit process.
- Establish regulatory guidelines for drug and drug products
- The Regulatory requirements for contract research organization

THEORY		60 Hrs
1.	Definition, Need for patenting, Types of Patents, Conditions to be satisfied by an invention to be patentable, Introduction to patent search. Parts of patents. Filling of patents. The essential elements of patent; Guidelines for preparation of laboratory note book, Non-obviousness in Patent.	12 Hrs
2	Role of GATT, TRIPS, and WIPO	12 Hrs
3	Brief introduction to Trademark protection and WHO Patents. IPR's and its types, Major bodies regulating Indian Pharmaceutical sector.	12 Hrs
4	Brief introduction to CDSCO. WHO, USFDA, EMEA, TGA, MHRA, MCC, ANVISA	12 Hrs
5	Regulatory requirements for contract research organization. Regulations for Biosimilars.	12 Hrs

REFERENCES :

1. Pharmaceutical Process Validation: By Fra R. Berry and Robert A. Nash, Vol 57, 2nd Edition
2. Applied Production and Operation Management By Evans, Anderson and Williams
3. GMP for pharmaceuticals Material Management by K.K. Ahuja Published by CBS publishers
4. ISO 9000-Norms and explanations
5. GMP for pharmaceuticals- Willing S.H. Marcel and Dekker

INDUSTRIAL PHARMACY PRACTICAL - I
(MIP 105P)

1. Analysis of pharmacopoeial compounds and their formulations by UV Vis spectrophotometer
2. Simultaneous estimation of multi component containing formulations by UV spectrophotometry
3. Experiments based on HPLC / GC
4. Estimation of riboflavin/quinine sulphate by fluorimetry
5. Estimation of sodium/potassium by flame photometry
6. Effect of surfactants on the solubility of drugs.
7. Effect of pH on the solubility of drugs.
8. Stability testing of solution and solid dosage forms for photo degradation..
9. Stability studies of drugs in dosage forms at 25 ^{o}C, 60% RH and 40 ^{o}C, 75% RH.
10. Compatibility evaluation of drugs and excipients (DSC & FTIR).
11. Preparation and evaluation of different polymeric membranes.
12. Formulation and evaluation of sustained release oral matrix tablet/ oral reservoir system.
13. Formulation and evaluation of microspheres / microcapsules.
14. Formulation and evaluation of transdermal drug delivery systems.
15. Design and evaluation of face wash, body- wash, creams, lotions, shampoo, toothpaste, lipstick.
16. Electrophoresis of protein solution.
17. Preparation and evaluation of Liposome delivery system.

ADVANCED BIOPHARMACEUTICS & PHARMACOKINETICS
(MIP 201T)

Scope

This course is designed to impart knowledge and skills necessary for dose calculations, dose adjustments and to apply Biopharmaceutics theories in practical problem solving.

Objectives

On completion of this course it is expected that students will be able to understand,

- The basic concepts in Biopharmaceutics and pharmacokinetics.
- The use of raw data and derive the pharmacokinetic models and parameters the best describe the process of drug absorption, distribution, metabolism and elimination.
- To critically evaluate Biopharmaceutics studies involving drug product equivalency.
- To design and evaluate dosage regimens of the drugs using pharmacokinetic and biopharmaceutic parameters.

THEORY 60 Hrs

1. Drug Absorption From The Gastrointestinal Tract: Gastrointestinal tract, Mechanism of drug absorption, Factors affecting, pH–partition theory, Formulation and physicochemical factors: Dissolution rate, Dissolution process, Noyes–Whitney equation and drug dissolution, Factors affecting the dissolution rate. Gastrointestinal absorption: role of the dosage form: Solution (elixir, syrup and solution) as a dosage form ,Suspension as a dosage form, Capsule as a dosage form, Tablet as a dosage form ,Dissolution methods ,Formulation and processing factors, Correlation of in vivo data with in vitro dissolution data. Transport model: Permeability-Solubility-Charge State and the pH Partition Hypothesis, Properties of the Gastrointestinal Tract (GIT), pH Microclimate Intracellular pH Environment, Tight-Junction Complex. Solubility: Experimental methods. Permeability: In-vitro, in-situ and In-vivo methods. 12 Hrs

2 Biopharmaceutic Considerations in Drug Product Design and In Vitro Drug Product Performance: Introduction, Biopharmaceutic Factors Affecting Drug Bioavailability, Rate-Limiting Steps in Drug Absorption, Physicochemical Nature of the 12 Hrs

	Drug Formulation Factors Affecting Drug Product Performance, In Vitro: Dissolution and Drug Release Testing, Compendial Methods of Dissolution, Alternative Methods of Dissolution Testing, Meeting Dissolution Requirements, Problems of Variable Control in Dissolution Testing Performance of Drug Products: In Vitro–In Vivo Correlation, Dissolution Profile Comparisons, Drug Product Stability, Considerations in the Design of a Drug Product.	
3	Pharmacokinetics: Basic considerations, Pharmacokinetic models, Compartment modeling: One compartment model- IV bolus, IV infusion, Extra-vascular; Multi Compartment model: Two compartment - model in brief, Non-Linear Pharmacokinetics: Cause of non-linearity, Michaelis – Menten equation, Estimation Kmax and Vmax. Drug interactions: Introduction, The effect of protein-binding interactions, The effect of tissue-binding interactions, Cytochrome P450-based drug interactions, Drug interactions linked to transporters.	12 Hrs
4	Drug Product Performance, In Vivo: Bioavailability and Bioequivalence: Drug Product Performance, Purpose of Bioavailability Studies, Relative and Absolute Availability, , Methods for Assessing Bioavailability, Bioequivalence Studies, Design and Evaluation of Bioequivalence Studies, Study Designs, Crossover Study Designs, Evaluation of the Data, Bioequivalence Example, Study Submission and Drug Review Process, The Biopharmaceutics Classification System, Generic Biologics (Biosimilar Drug Products),Clinical Significance of Bioequivalence Studies, Special Concerns in Bioavailability and Bioequivalence Studies, Generic Substitution.	12 Hrs
5	Application of Pharmacokinetics: Modified-Release Drug Products, Targeted Drug Delivery Systems and Biotechnological Products. Relationship between Pharmacokinetics including Pharmacodynamics: Generation of a pharmacokinetic-pharmacodynamic (PKPD) equation, Pharmacokinetic and pharmacodynamic, interactions. Pharmacokinetics and pharmacodynamics of biotechnology drugs: Introduction, Proteins and peptides, Monoclonal antibodies, Oligonucleotides, Vaccines (immunotherapy),Gene therapies.	12 Hrs

REFERENCES

1. Biopharmaceutics and Clinical Pharmacokinetics by Milo Gibaldi, 4th edition,Philadelphia, Lea and Febiger, 1991
2. Biopharmaceutics and Pharmacokinetics, A. Treatise, D .M. Brahmankar and Sunil B.J aiswal., Vallab Prakashan, Pitampura, Delhi
3. Applied Biopharmaceutics and Pharmacokinetics by Shargel. Land YuABC, 2nd edition, Connecticut Appleton Century Crofts, 1985
4. Textbook of Biopharmaceutics and Pharmacokinetics, Dr. Shobha Rani R. Hiremath,Prism Book
5. Pharmacokinetics by Milo Gibaldi and D. Perrier, 2nd edition, Marcel Dekker Inc.,New York, 1982
6. Current Concepts in Pharmaceutical Sciences: Biopharmaceutics, Swarbrick. J, Lea and Febiger, Philadelphia, 1970
7. Clinical Pharmacokinetics, Concepts and Applications 3rd edition by Malcolm Rowland and Thom~ N. Tozer, Lea and Febiger, Philadelphia, 1995
8. Dissolution, Bioavailability and Bioequivalence, Abdou. H.M, Mack Publishing Company, Pennsylvania 1989
9. Biopharmaceutics and Clinical Pharmacokinetics, An Introduction, 4th edition, revised and expande by Robert. E. Notari, Marcel Dekker Inc, New York and Basel,1987.
10. Biopharmaceutics and Relevant Pharmacokinetics by John. G Wagner and M.Pemarowski, 1st edition, Drug Intelligence Publications, Hamilton, Illinois, 1971.
11. Encyclopedia of Pharmaceutical Technology, Vol 13, James Swarbrick, James. G.Boylan, Marcel Dekker Inc, New York, 1996.
12. Basic Pharmacokinetics,1 st edition, Sunil S Jambhekar and Philip J Breen,pharmaceutical press, RPS Publishing,2009.
13. Absorption and Drug Development- Solubility, Permeability, and Charge State, Alex Avdeef, John Wiley & Sons, Inc,2003.

SCALE UP AND TECHNOLOGY TRANSFER
(MIP 202T)

Scope

This course is designed to impart knowledge and skills necessary to train the students to be on scale up, technology transfer process and industrial safety issues.

Objectives:

On completion of this course it is expected that students will be able to understand,

- Manage the scale up process in pharmaceutical industry.
- Assist in technology transfer.
- To establish safety guidelines, which prevent industrial hazards.

THEORY 60 Hrs

1.	Pilot plant design: Basic requirements for design, facility, equipment selection, for tablets, capsules, liquid orals, parentral and semisolid preparations. Scale up: Importance, Technology transfer from R & D to pilot plant to plant scale, process scale up for tablets, capsules, liquid orals, semisolids, parentral, NDDS products – stress on formula, equipments, product uniformity, stability, raw materials, physical layout, input, in-process and finished product specifications, problems encountered during transfer of technology	12 Hrs
2	Validation: General concepts, types, procedures & protocols, documentation, VMF. Analytical method validation, cleaning validation and vender qualification.	12 Hrs
3	Equipment Qualification: Importance, IQ, OQ, PQ for equipments – autoclave, DHS, membrane filter, rapid mixer granulator, cone blender, FBD, tablet compression machine, liquid filling and sealing machine. Aseptic room validation.	12 Hrs
4	Process validation: Importance, validation of mixing, granulation, drying, compression, tablet coating, liquid filling and sealing, sterilization, water process systems, environmental control.	12 Hrs

5	Industrial safety: Hazards – fire, mechanical, electrical, chemical and pharmaceutical, Monitoring & prevention systems, industrial effluent testing & treatment. Control of environmental pollution.	12 Hrs

REFERENCES

1. Pharmaceutical process validation, JR Berry, Nash, Vol 57, Marcel Dekker, NY.
2. Pharmaceutical Production facilities, design and applications, by GC Cole, Taylor and Francis.
3. Pharmaceutical project management, T.Kennedy, Vol 86, Marcel Dekker, NY.
4. The theory & Practice of Industrial Pharmacy, L.Lachman, H.A.Lieberman, Varghese Publ. Bombay.
5. Tablet machine instruments in pharmaceuticals, PR Watt, John Wiloy.
6. Pharmaceutical dosage forms, Tablets, Vol 1, 2, 3 by Lachman, Lieberman, Marcel Dekker, NY.
7. Pharmaceutical dosage forms, Parentral medications, Vol 1, 2 by K.E. Avis, Marcel Dekker, NY.
8. Dispersed system Vol 1, 2, 3 by Lachman, Lieberman, Marcel Dekker, NY.
9. Subrahmanyam, CVS, Pharmaceutical production and Management, 2007, Vallabh Prakashan,Dehli.

PHARMACEUTICAL PRODUCTION TECHNOLOGY
(MIP 203T)

Scope

This course is designed to impart knowledge and skills necessary to train the students to be on par with the routine of Industrial activities in Production

Objectives

On completion of this course it is expected that students will be able to understand,

Handle the scheduled activities in a Pharmaceutical firm.
Manage the production of large batches of pharmaceutical formulations.

THEORY 60 Hrs

1.	Improved Tablet Production: Tablet production process, unit operation improvements, granulation and pelletization equipments, continuous and batch mixing, rapid mixing granulators, rota granulators, spheronizers and marumerisers, and other specialized granulation and drying equipments. Problems encountered. Coating Technology: Process, equipments, particle coating, fluidized bed coating, application techniques. Problems encountered.	12 Hrs
2	Parenteral Production: Area planning & environmental control, wall and floor treatment, fixtures and machineries, change rooms, personnel flow, utilities & utilities equipment location, engineering and maintenance.	12 Hrs
3	Lyophilization & Spray drying Technology: Principles, process, freeze-drying and spray drying equipments.	12 Hrs
4	Capsule Production: Production process, improved capsule manufacturing and filling machines for hard and soft gelatin capsules. Layout and problems encountered. Disperse Systems Production: Production processes, applications of mixers, mills, disperse equipments including fine solids dispersion, problems encountered.	12 Hrs

Packaging Technology: Types of packaging materials, machinery, labeling, package printing for different dosage forms.

5 Air Handling Systems: Study of AHUs, humidity & temperature control, air filtration systems, dust collectors. Water Treatment Process: Techniques and maintenance – RO, DM, ultra – filtration, WFI. 12 Hrs

REFERENCES

1. The Theory & Practice of Industrial Pharmacy, L. Lachman, Varghese Publ, Bombay.
2. Modern Pharmaceutics by Banker, Vol 72, Marcel Dekker, NY.
3. Pharmaceutical Dosage Forms, Vol 1, 2, 3 by Lachman, Lieberman, Marcel Dekker, NY.
4. Pharmaceutical Dosage Forms, Parentral medications, Vol 1, 2 by K.E. Avis, Marcel Dekker, NY.
5. Pharmaceutical Production Facilities, design and applications, by G.C. Cole, Taylor and Francis.
6. Dispersed System Vol 1, 2, 3 by Lachman, Lieberman, Marcel Dekker, NY.
7. Product design and testing of polymeric materials by N.P. Chezerisionoff.
8. Pharmaceutical Project Management, T.Kennedy, Vol 86, Marcel Dekker, NY.
9. Packaging Pharmaceutical and Health Care, H.Lockhard.
10. Quality Control of Packaging Materials in Pharmaceutical Industy, .Kharburn, Marcel Dekker, NY.
11. Freeze drying / Lyophilization of Pharmaceuticals & Biological Products, L. Ray, Vol 96, Marcel Dekker, NY.
12. Tablet Machine Instrumentation In Pharmaceuticals, PR Watt, Ellis Horwoods, UK.

ENTREPRENEURSHIP MANAGEMENT
(MIP 204T)

Scope

This course is designed to impart knowledge and skills necessary to train the students on entrepreneurship management.

Objectives:

On completion of this course it is expected that students will be able to understand,

- The Role of enterprise in national and global economy
- Dynamics of motivation and concepts of entrepreneurship
- Demands and challenges of Growth Strategies And Networking

THEORY 60 Hrs

1.	Conceptual Frame Work: Concept need and process in entrepreneurship development. Role of enterprise in national and global economy. Types of enterprise – Merits and Demerits. Government policies and schemes for enterprise development. Institutional support in enterprise development and management.	12 Hrs
2	Entrepreneur: Entrepreneurial motivation – dynamics of motivation. Entrepreneurial competency –Concepts. Developing Entrepreneurial competencies - requirements and understanding the process of entrepreneurship development, self-awareness, interpersonal skills, creativity, assertiveness, achievement, factors affecting entrepreneur role.	12 Hrs
3	Launching And Organising An Enterprise: Environment scanning – Information, sources, schemes of assistance, problems. Enterprise selection, market assessment, enterprise feasibility study, SWOT Analysis. Resource mobilisation - finance, technology, raw material, site and manpower. Costing and marketing management and quality control. Feedback, monitoring and evaluation.	12 Hrs
4	Growth Strategies And Networking: Performance appraisal and assessment. Profitability and control measures, demands and challenges. Need for diversification. Future Growth – Techniques of expansion and diversification, vision strategies. Concept and dynamics. Methods, Joint venture, co-ordination and feasibility study.	12 Hrs

5	Preparing Project Proposal To Start On New Enterprise Project work – Feasibility report; Planning, resource mobilisation and implementation.	12 Hrs

REFERENCES

1. Akhauri, M.M.P.(1990): Entrepreneurship for Women in India, NIESBUD, New Delhi.
2. Hisrich, R.D & Brush, C.G.(1996) The Women Entrepreneurs, D.C. Health & Co., Toranto.
3. Hisrich, R.D. and Peters, M.P. (1995): Entrepreneurship – Starting, Developing and Managing a New Enterprise, Richard D., Inwin, INC, USA.
4. Meredith, G.G. etal (1982): Practice of Entrepreneurship, ILO, Geneva.
5. Patel, V.C. (1987): Women Entrepreneurship – Developing New Entrepreneurs, Ahmedabad EDII.

INDUSTRIAL PHARMACY PRACTICAL - II
(MIP 205P)

1. Improvement of dissolution characteristics of slightly soluble drug by Solid dispersion technique.
2. Comparison of dissolution of two different marketed products /brands
3. Protein binding studies of a highly protein bound drug & poorly protein bound drug
4. Bioavailability studies of Paracetamol (Animal).
5. Pharmacokinetic and IVIVC data analysis by WinnolineR software
6. In vitro cell studies for permeability and metabolism
7. Formulation and evaluation of tablets
8. Formulation and evaluation of capsules
9. Formulation and evaluation of injections
10. Formulation and evaluation of emulsion
11. Formulation and evaluation of suspension.
12. Formulation and evaluation of enteric coating tablets.
13. Preparation and evaluation of a freeze dried formulation.
14. Preparation and evaluation of a spray dried formulation.

PHARMACEUTICALCHEMISTRY(MPC)

MODERN PHARMACEUTICAL ANALYTICAL TECHNIQUES
(MPC 101T)

Scope

This subject deals with various advanced analytical instrumental techniques for identification, characterization and quantification of drugs. Instruments dealt are NMR, Mass spectrometer, IR, HPLC, GC etc.

Objectives

After completion of course student is able to know about chemicals and excipients

- The analysis of various drugs in single and combination dosage forms
- Theoretical and practical skills of the instruments

THEORY 60 Hrs

1. a. UV-Visible spectroscopy: Introduction, Theory, Laws, Instrumentation associated with UV-Visible spectroscopy, Choice of solvents and solvent effect and Applications of UV-Visible spectroscopy, Difference/ Derivative spectroscopy. — 10 Hrs

   b. IR spectroscopy: Theory, Modes of Molecular vibrations, Sample handling, Instrumentation of Dispersive and Fourier - Transform IR Spectrometer, Factors affecting vibrational frequencies and Applications of IR spectroscopy, Data Interpretation.

   c. Spectroflourimetry: Theory of Fluorescence, Factors affecting fluorescence (Characterestics of drugs that can be analysed by flourimetry), Quenchers, Instrumentation and Applications of fluorescence spectrophotometer.

   d. Flame emission spectroscopy and Atomic absorption spectroscopy: Principle, Instrumentation, Interferences and Applications.

2 NMR spectroscopy: Quantum numbers and their role in NMR, Principle, Instrumentation, Solvent requirement in NMR, Relaxation process, NMR signals in various compounds, Chemical shift, Factors influencing chemical shift, Spin-Spin coupling, Coupling constant, Nuclear magnetic double resonance, Brief outline of principles of FT-NMR and 13C NMR. Applications of NMR spectroscopy. — 10 Hrs

3	Mass Spectroscopy: Principle, Theory, Instrumentation of Mass Spectroscopy, Different types of ionization like electron impact, chemical, field, FAB and MALDI, APCI, ESI, APPI Analyzers of Quadrupole and Time of Flight, Mass fragmentation and its rules, Meta stable ions, Isotopic peaks and Applications of Mass spectroscopy.	10 Hrs
4	Chromatography: Principle, apparatus, instrumentation, chromatographic parameters, factors affecting resolution, isolation of drug from excipients, data interpretation and applications of the following: a) Thin Layer chromatography b) High Performance Thin Layer Chromatography c) Ion exchange chromatography d) Column chromatography e) Gas chromatography f) High Performance Liquid chromatography g) Ultra High Performance Liquid chromatography h) Affinity chromatography i) Gel Chromatography	10 Hrs
5	a. Electrophoresis: Principle, Instrumentation, Working conditions, factors affecting separation and applications of the following: a) Paper electrophoresis b) Gel electrophoresis c) Capillary electrophoresis d) Zone electrophoresis e) Moving boundary electrophoresis f) Iso electric focusing b. X ray Crystallography: Production of X rays, Different X ray methods, Bragg's law, Rotating crystal technique, X ray powder technique, Types of crystals and applications of X-ray diffraction.	10 Hrs
6	a. Potentiometry: Principle, working, Ion selective Electrodes and Application of potentiometry. b. Thermal Techniques: Principle, thermal transitions and Instrumentation (Heat flux and power-compensation and designs), Modulated DSC, Hyper DSC, experimental parameters (sample preparation, experimental conditions, calibration, heating and cooling rates, resolution, source of errors) and their influence, advantage and disadvantages, pharmaceutical applications. Differential Thermal Analysis (DTA): Principle, instrumentation	10 Hrs

and advantage and disadvantages, pharmaceutical applications, derivative differential thermal analysis (DDTA). TGA: Principle, instrumentation, factors affecting results, advantage and disadvantages, pharmaceutical applications.

REFERENCES

1. Spectrometric Identification of Organic compounds - Robert M Silverstein, Sixth edition, John Wiley & Sons, 2004.
2. Principles of Instrumental Analysis - Doglas A Skoog, F. James Holler, Timothy A. Nieman, 5th edition, Eastern press, Bangalore, 1998.
3. Instrumental methods of analysis - Willards, 7th edition, CBS publishers.
4. Practical Pharmaceutical Chemistry - Beckett and Stenlake, Vol II, 4th edition, CBS Publishers, New Delhi, 1997.
5. Organic Spectroscopy - William Kemp, 3rd edition, ELBS, 1991.
6. Quantitative Analysis of Drugs in Pharmaceutical formulation - P D Sethi, 3rd Edition, CBS Publishers, New Delhi, 1997.
7. Pharmaceutical Analysis - Modern Methods - Part B - J W Munson, Vol 11, Marcel. Dekker Series
8. Spectroscopy of Organic Compounds, 2nd edn., P.S/Kalsi, Wiley estern Ltd., Delhi.
9. Textbook of Pharmaceutical Analysis, KA.Connors, 3rd Edition, John Wiley & Sons, 1982.

ADVANCED ORGANIC CHEMISTRY - I
(MPC 102T)

Scope

The subject is designed to provide in-depth knowledge about advances in organic chemistry, different techniques of organic synthesis and their applications to process chemistry as well as drug discovery.

Objectives

Upon completion of course, the student shall be to understand

- The principles and applications of reterosynthesis
- The mechanism & applications of various named reactions
- The concept of disconnection to develop synthetic routes for small target molecule.
- The various catalysts used in organic reactions
- The chemistry of heterocyclic compounds

THEORY 60 Hrs

1. Basic Aspects of Organic Chemistry: 12 Hrs
   1. Organic intermediates: Carbocations, carbanions, free radicals, carbenes and nitrenes. Their method of formation, stability and synthetic applications.
   2. Types of reaction mechanisms and methods of determining them,
   3. Detailed knowledge regarding the reactions, mechanisms and their relative reactivity and orientations.

   Addition reactions

   a) Nucleophilic uni- and bimolecular reactions (SN1 and SN2)
   b) Elimination reactions (E1 & E2; Hoffman & Saytzeff's rule)
   c) Rearrangement reaction

2 Study of mechanism and synthetic applications of following named Reactions: 12 Hrs

Ugi reaction, Brook rearrangement, Ullmann coupling reactions, Dieckmann Reaction, Doebner-Miller Reaction, Sandmeyer Reaction, Mitsunobu reaction, Mannich reaction, Vilsmeyer-Haack Reaction, Sharpless asymmetric epoxidation, Baeyer-Villiger oxidation, Shapiro & Suzuki reaction, Ozonolysis and Michael addition reaction

3 Synthetic Reagents & Applications: 12 Hrs

Aluminiumisopropoxide, N-bromosuccinamide, diazomethane, dicyclohexylcarbodimide, Wilkinson reagent, Witting reagent. Osmium tetroxide, titanium chloride, diazopropane, diethyl azodicarboxylate, Triphenylphosphine, Benzotriazol-1-yloxy) tris (dimethylamino) phosphonium hexafluoro-phosphate (BOP).

Protecting groups

a. Role of protection in organic synthesis
b. Protection for the hydroxyl group, including 1,2-and1,3-diols: ethers, esters, carbonates, cyclic acetals & ketals
c. Protection for the Carbonyl Group: Acetals and Ketals
d. Protection for the Carboxyl Group: amides and hydrazides, esters
e. Protection for the Amino Group and Amino acids: carbamates and amides

4 Heterocyclic Chemistry: 12 Hrs

Organic Name reactions with their respective mechanism and application involved in synthesis of drugs containing five, six membered and fused hetrocyclics such as Debus-Radziszewski imidazole synthesis, Knorr Pyrazole Synthesis Pinner Pyrimidine Synthesis, Combes Quinoline Synthesis, Bernthsen Acridine Synthesis, Smiles rearrangement and Traube purine synthesis.

Synthesis of few representative drugs containing these hetrocyclic nucleus such as Ketoconazole, Metronidazole, Miconazole, celecoxib, antipyrin, Metamizole sodium, Terconazole, Alprazolam, Triamterene, Sulfamerazine, Trimethoprim, Hydroxychloroquine, Quinine, Chloroquine, Quinacrine, Amsacrine, Prochlorpherazine, Promazine, Chlorpromazine,Theophylline , Mercaptopurine and Thioguanine.

5 Synthon approach and retrosynthesis applications 12 Hrs

i. Basic principles, terminologies and advantages of retrosynthesis; guidelines for dissection of molecules. Functional group interconvertion and addition (FGI and FGA)
ii. C-X disconnections; C-C disconnections – alcohols and carbonyl compounds; 1,2-, 1,3-,1,4-, 1,5-, 1,6-difunctionalized compounds
iii. Strategies for synthesis of three, four, five and six-membered ring.

REFERENCES

1. "Advanced Organic chemistry, Reaction, Mechanisms and Structure", J March, John Wiley and Sons, New York.
2. "Mechanism and Structure in Organic Chemistry", ES Gould, Hold Rinchart and Winston, New York.
3. "Organic Chemistry" Clayden, Greeves, Warren and Woihers., Oxford University Press 2001.
4. "Organic Chemistry" Vol I and II. I.L. Finar. ELBS, Pearson Education Lts, Dorling Kindersley 9India) Pvt. Ltd.,.
5. A guide to mechanisms in Organic Chemistry, Peter Skyes (Orient Longman, New Delhi).
6. Reactive Intermediates in Organic Chemistry, Tandom and Gowel, Oxford & IBH Publishers.
7. Combinational Chemistry – Synthesis and applications – Stephen R Wilson & Anthony W Czarnik, Wiley – Blackwell.
8. Carey, Organic Chemistry, 5th Edition (Viva Books Pvt. Ltd.)
9. Organic Synthesis - The Disconnection Approach, S. Warren, Wily India
10. Principles of Organic Synthesis, ROC Norman and JM Coxan, Nelson Thorns.
11. Organic Synthesis – Special Techniques. VK Ahluwalia and R Agarwal, Narosa Publishers.
12. Organic Reaction Mechanisms IVth Edtn, VK Ahluwalia and RK Parashar, Narosa Publishers.

ADVANCED MEDICINAL CHEMISTRY
(MPC 103T)

Scope

The subject is designed to impart knowledge about recent advances in the field of medicinal chemistry at the molecular level including different techniques for the rational drug design.

Objectives

At completion of this course it is expected that students will be able to understand

- Different stages of drug discovery
- Role of medicinal chemistry in drug research
- Different techniques for drug discovery
- Various strategies to design and develop new drug like molecules for biological targets
- Peptidomimetics

THEORY 60 Hrs

1. Drug discovery: Stages of drug discovery, lead discovery; identification, validation and diversity of drug targets. 12 Hrs

   Biological drug targets: Receptors, types, binding and activation, theories of drug receptor interaction, drug receptor interactions, agonists vs antagonists, artificial enzymes.

2 Prodrug Design and Analog design: 12 Hrs

   a) Prodrug design: Basic concept, Carrier linked prodrugs/ Bioprecursors, Prodrugs of functional group, Prodrugs to improve patient acceptability, Drug solubility, Drug absorption and distribution, site specific drug delivery and sustained drug action. Rationale of prodrug design and practical consideration of prodrug design.

   b) Combating drug resistance: Causes for drug resistance, strategies to combat drug resistance in antibiotics and anticancer therapy, Genetic principles of drug resistance.

   c) Analog Design: Introduction, Classical & Non classical, Bioisosteric replacement strategies, rigid analogs,

alteration of chain branching, changes in ring size, ring position isomers, design of stereo isomers and geometric isomers, fragments of a lead molecule, variation in inter atomic distance.

3 a) Medicinal chemistry aspects of the following class of drugs 12 Hrs

Systematic study, SAR, Mechanism of action and synthesis of new generation molecules of following class of drugs:

a) Anti-hypertensive drugs, Psychoactive drugs, Anticonvulsant drugs, H1 & H2 receptor antagonist, COX1 & COX2 inhibitors, Adrenergic & Cholinergic agents, Antineoplastic and Antiviral agents.

b) Stereochemistry and Drug action: Realization that stereo selectivity is a pre-requisite for evolution. Role of chirality in selective and specific therapeutic agents. Case studies, Enantio selectivity in drug adsorption, metabolism, distribution and elimination.

4 Rational Design of Enzyme Inhibitors 12 Hrs

Enzyme kinetics & Principles of Enzyme inhibitors, Enzyme inhibitors in medicine, Enzyme inhibitors in basic research, rational design of non-covalently and covalently binding enzyme inhibitors.

5 Peptidomimetics 12 Hrs

Therapeutic values of Peptidomimetics, design of peptidomimetics by manipulation of the amino acids, modification of the peptide backbone, incorporating conformational constraints locally or globally. Chemistry of prostaglandins, leukotrienes and thromboxones.

REFERENCES

1. Medicinal Chemistry by Burger, Vol I –VI.
2. Wilson and Gisvold's Text book of Organic Medicinal and Pharmaceutical Chemistry, 12th Edition, Lppincott Williams & Wilkins, Woltess Kluwer (India) Pvt.Ltd, New Delhi.
3. Comprehensive Medicinal Chemistry – Corwin and Hansch.
4. Computational and structural approaches to drug design edited by Robert M Stroud and Janet. F Moore

5. Introduction to Quantitative Drug Design by Y.C. Martin.
6. Principles of Medicinal Chemistry by William Foye, 7th Edition, Ippincott Williams & Wilkins, Woltess Kluwer (India) Pvt.Ltd, New Delhi.
7. Drug Design Volumes by Arienes, Academic Press, Elsevier Publishers, Noida, Uttar Pradesh..
8. Principles of Drug Design by Smith.
9. The Organic Chemistry of the Drug Design and Drug action by Richard B.Silverman, II Edition, Elsevier Publishers, New Delhi.
10. An Introduction to Medicinal Chemistry, Graham L.Patrick, III Edition, Oxford University Press, USA.
11. Biopharmaceutics and pharmacokinetics, DM.Brahmankar, Sunil B. Jaiswal II Edition, 2014, Vallabh Prakashan, New Delhi.
12. Peptidomimetics in Organic and Medicinal Chemistry by Antonio Guarna and Andrea Trabocchi, First edition, Wiley publishers.

CHEMISTRY OF NATURAL PRODUCTS
(MPC 104T)

Scope

The subject is designed to provide detail knowledge about chemistry of medicinal compounds from natural origin and general methods of structural elucidation of such compounds. It also emphasizes on isolation, purification and characterization of medicinal compounds from natural origin.

Objectives

At completion of this course it is expected that students will be able to understand-

- Different types of natural compounds and their chemistry and medicinal importance
- The importance of natural compounds as lead molecules for new drug discovery
- The concept of rDNA technology tool for new drug discovery
- General methods of structural elucidation of compounds of natural origin
- Isolation, purification and characterization of simple chemical constituents from natural source

THEORY 60 Hrs

1. Study of Natural products as leads for new pharmaceuticals for the following class of drugs — 12 Hrs
   a) Drugs Affecting the Central Nervous System: Morphine Alkaloids
   b) Anticancer Drugs: Paclitaxel and Docetaxel, Etoposide, and Teniposide
   c) Cardiovascular Drugs: Lovastatin, Teprotide and Dicoumarol
   d) Neuromuscular Blocking Drugs: Curare alkaloids
   e) Anti-malarial drugs and Analogues
   f) Chemistry of macrolid antibiotics (Erythromycin, Azithromycin, Roxithromycin, and Clarithromycin) and β - Lactam antibiotics (Cephalosporins and Carbapenem)
2. a) Alkaloids — 12 Hrs
   General introduction, classification, isolation, purification, molecular modification and biological activity of alkaloids, general methods of structural determination of alkaloids, structural elucidation and stereochemistry of ephedrine, morphine, ergot, emetine and reserpine.

b) Flavonoids

Introduction, isolation and purification of flavonoids, General methods of structural determination of flavonoids; Structural elucidation of quercetin.

c) Steroids

General introduction, chemistry of sterols, sapogenin and cardiac glycosides. Stereochemistry and nomenclature of steroids, chemistry of contraceptive agents male & female sex hormones (Testosterone, Estradiol, Progesterone), adrenocorticoids (Cortisone), contraceptive agents and steroids (Vit – D).

3 a) Terpenoids — 12 Hrs

Classification, isolation, isoprene rule and general methods of structural elucidation of Terpenoids; Structural elucidation of drugs belonging to mono (citral, menthol, camphor), di(retinol, Phytol, taxol) and tri terpenoids (Squalene,Ginsenoside) carotinoids (β carotene).

b) Vitamins

Chemistry and Physiological significance of Vitamin A, B1, B2, B12, C, E, Folic acid and Niacin.

4 a). Recombinant DNA technology and drug discovery — 12 Hrs

rDNA technology, hybridoma technology, New pharmaceuticals derived from biotechnology; Oligonucleotide therapy. Gene therapy: Introduction, Clinical application and recent advances in gene therapy, principles of RNA & DNA estimation

b). Active constituent of certain crude drugs used in Indigenous system Diabetic therapy – Gymnema sylvestre, Salacia reticulate, Pterocarpus marsupiam, Swertia chirata, Trigonella foenum graccum; Liver dysfunction – Phyllanthus niruri; Antitumor – Curcuma longa Linn.

5 Structural Characterization of natural compounds — 12 Hrs

Structural characterization of natural compounds using IR, 1HNMR, 13CNMR and MS Spectroscopy of specific drugs e.g., Penicillin, Morphine, Camphor, Vit-D, Quercetin and Digitalis glycosides.

REFERENCES

1. Modern Methods of Plant Analysis, Peech and M.V.Tracey, Springer – Verlag, Berlin, Heidelberg.
2. Phytochemistry Vol. I and II by Miller, Jan Nostrant Rein Hld.
3. Recent advances in Phytochemistry Vol. I to IV – Scikel Runeckles, Springer Science & Business Media.
4. Chemistry of natural products Vol I onwards IWPAC.
5. Natural Product Chemistry Nakanishi Gggolo, University Science Books, California.
6. Natural Product Chemistry "A laboratory guide" – Rapheal Khan.
7. The Alkaloid Chemistry and Physiology by RHF Manske, Academic Press.
8. Introduction to molecular Phytochemistry – CHJ Wells, Chapmannstall.
9. Organic Chemistry of Natural Products Vol I and II by Gurdeep and Chatwall, Himalaya Publishing House.
10. Organic Chemistry of Natural Products Vol I and II by O.P. Agarwal, Krishan Prakashan.
11. Organic Chemistry Vol I and II by I.L. Finar, Pearson education.
12. Elements of Biotechnology by P.K. Gupta, Rastogi Publishers.
13. Pharmaceutical Biotechnology by S.P.Vyas and V.K.Dixit, CBS Publishers.
14. Biotechnology by Purohit and Mathur, Agro-Bios, 13th edition.
15. Phytochemical methods of Harborne, Springer, Netherlands.
16. Burger's Medicinal Chemistry.

PHARMACEUTICAL CHEMISTRY PRACTICAL - I
(MPC 105P)

1. Analysis of Pharmacopoeial compounds and their formulations by UV Vis spectrophotometer, RNA & DNA estimation
2. Simultaneous estimation of multi component containing formulations by UV spectrophotometry
3. Experiments based on Column chromatography
4. Experiments based on HPLC
5. Experiments based on Gas Chromatography
6. Estimation of riboflavin/quinine sulphate by fluorimetry
7. Estimation of sodium/potassium by flame photometry

To perform the following reactions of synthetic importance

1. Purification of organic solvents, column chromatography
2. Claisen-schimidt reaction.
3. Benzyllic acid rearrangement.
4. Beckmann rearrangement.
5. Hoffmann rearrangement
6. Mannich reaction
7. Synthesis of medicinally important compounds involving more than one step along with purification and Characterization using TLC, melting point and IR spectroscopy (4 experiments)
8. Estimation of elements and functional groups in organic natural compounds
9. Isolation, characterization like melting point, mixed melting point, molecular weight determination, functional group analysis, co-chromatographic technique for identification of isolated compounds and interpretation of UV and IR data.
10. Some typical degradation reactions to be carried on selected plant constituents

ADVANCED SPECTRAL ANALYSIS
(MPC 201T)

Scope

This subject deals with various hyphenated analytical instrumental techniques for identification, characterization and quantification of drugs. Instruments dealt are LC-MS, GC-MS, ATR-IR, DSC etc.

Objectives

At completion of this course it is expected that students will be able to understand-

- Interpretation of the NMR, Mass and IR spectra of various organic compounds
- Theoretical and practical skills of the hyphenated instruments
- Identification of organic compounds

THEORY 60Hrs

1. UV and IR spectroscopy: 12 Hrs
   Wood ward – Fieser rule for 1,3- butadienes, cyclic dienes and α, β-carbonyl compounds and interpretation compounds of enones. ATR-IR, IR Interpretation of organic compounds.

2 NMR spectroscopy: 12 Hrs
   1-D and 2-D NMR, NOESY and COSY, HECTOR, INADEQUATE techniques, Interpretation of organic compounds.

3 Mass Spectroscopy 12 Hrs
   Mass fragmentation and its rules, Fragmentation of important functional groups like alcohols, amines, carbonyl groups and alkanes, Meta stable ions, Mc Lafferty rearrangement, Ring rule, Isotopic peaks, Interpretation of organic compounds.

4 Chromatography: 12 Hrs
   Principle, Instrumentation and Applications of the following :
   a) GC-MS b) GC-AAS c) LC-MS d) LC-FTIR e) LC-NMR f) CE-MS g) High Performance Thin Layer chromatography h) Super critical fluid chromatography i) Ion Chromatography j) I-EC (Ion-Exclusion Chromatography) k) Flash chromatography

5 a). Thermal methods of analysis 12 Hrs

Introduction, principle, instrumentation and application of DSC, DTA and TGA.

b). Raman Spectroscopy

Introduction, Principle, Instrumentation and Applications.

c). Radio immuno assay

Biological standardization , bioassay, ELISA, Radioimmuno assay of digitalis and insulin.

REFERENCES

1. Spectrometric Identification of Organic compounds - Robert M Silverstein, Sixth edition, John Wiley & Sons, 2004.
2. Principles of Instrumental Analysis - Doglas A Skoog, F. James Holler, Timothy A. Nieman, 5th edition, Eastern press, Bangalore, 1998.
3. Instrumental methods of analysis – Willards, 7th edition, CBS publishers.
4. Organic Spectroscopy - William Kemp, 3rd edition, ELBS, 1991.
5. Quantitative analysis of Pharmaceutical formulations by HPTLC - P D Sethi, CBS Publishers, New Delhi.
6. Quantitative Analysis of Drugs in Pharmaceutical formulation - P D Sethi, 3rd Edition, CBS Publishers, New Delhi, 1997.
7. Pharmaceutical Analysis- Modern methods – Part B - J W Munson, Volume 11, Marcel Dekker Series

ADVANCED ORGANIC CHEMISTRY - II
(MPC 202T)

Scope

The subject is designed to provide in-depth knowledge about advances in organic chemistry, different techniques of organic synthesis and their applications to process chemistry as well as drug discovery.

Objectives

Upon completion of course, the student shall able to understand

- The principles and applications of Green chemistry
- The concept of peptide chemistry.
- The various catalysts used in organic reactions
- The concept of stereochemistry and asymmetric synthesis.

THEORY 60 Hrs

1. Green Chemistry: 12 Hrs
   a. Introduction, principles of green chemistry
   b. Microwave assisted reactions: Merit and demerits of its use, increased reaction rates, mechanism, superheating effects of microwave, effects of solvents in microwave assisted synthesis, microwave technology in process optimization, its applications in various organic reactions and heterocycles synthesis
   c. Ultrasound assisted reactions: Types of sonochemical reactions, homogenous, heterogeneous liquid-liquid and liquid-solid reactions, synthetic applications
   d. Continuous flow reactors: Working principle, advantages and synthetic applications.
2. Chemistry of peptides 12 Hrs
   a. Coupling reactions in peptide synthesis
   b. Principles of solid phase peptide synthesis, t-BOC and FMOC protocols, various solid supports and linkers: Activation procedures, peptide bond formation, deprotection and cleavage from resin, low and high HF cleavage protocols, formation of free peptides and peptide amides, purification and case studies, site-specific chemical modifications of peptides
   c. Segment and sequential strategies for solution phase peptide synthesis with any two case studies
   d. Side reactions in peptide synthesis: Deletion peptides, side

reactions initiated by proton abstraction, protonation, over-activation and side reactions of individual amino acids.

3 Photochemical Reactions 12 Hrs

Basic principles of photochemical reactions. Photo-oxidation, photo-addition and photo-fragmentation.

Pericyclic reactions

Mechanism, Types of pericyclic reactions such as cyclo addition, electrocyclic reaction and sigmatrophic rearrangement reactions with examples

4 Catalysis: 12 Hrs

a. Types of catalysis, heterogeneous and homogenous catalysis, advantages and disadvantages
b. Heterogeneous catalysis – preparation, characterization, kinetics, supported catalysts, catalyst deactivation and regeneration, some examples of heterogeneous catalysis used in synthesis of drugs.
c. Homogenous catalysis, hydrogenation, hydroformylation, hydrocyanation, Wilkinson catalysts, chiral ligands and chiral induction, Ziegler-Natta catalysts, some examples of homogenous catalysis used in synthesis of drugs
d. Transition-metal and Organo-catalysis in organic synthesis: Metal-catalyzed reactions
e. Biocatalysis: Use of enzymes in organic synthesis, immobilized enzymes/cells in organic reaction.
f. Phase transfer catalysis - theory and applications

5 Stereochemistry & Asymmetric Synthesis 12 Hrs

a. Basic concepts in stereochemistry – optical activity, specific rotation, racemates and resolution of racemates, the Cahn, Ingold, Prelog (CIP) sequence rule, meso compounds, pseudo asymmetric centres, axes of symmetry, Fischers D and L notation, cis-trans isomerism, E and Z notation.
b. Methods of asymmetric synthesis using chiral pool, chiral auxiliaries and catalytic asymmetric synthesis, enantiopure separation and Stereo selective synthesis with examples.

REFERENCES

1. "Advanced Organic chemistry, Reaction, mechanisms and structure", J March, John Wiley and sons, New York.
2. "Mechanism and structure in organic chemistry", ES Gould, Hold Rinchart and Winston,NewYork.
3. "Organic Chemistry" Clayden, Greeves, Warren and Woihers., Oxford University Press 2001.
4. "Organic Chemistry" Vol I and II. I.L. Finar. ELBS, Sixth ed., 1995.
5. Carey, Organic chemistry, 5th edition (Viva Books Pvt. Ltd.)
6. Organic synthesis-the disconnection approach, S. Warren, Wily India
7. Principles of organic synthesis, ROCNorman and JMCoxan, Nelson thorns
8. Organic synthesis- Special techniques VK Ahluwalia and R Aggarwal, Narosa Publishers.
9. Organic reaction mechanisms IV edtn, VK Ahluwalia and RK Parashar, Narosa Publishers.

COMPUTER AIDED DRUG DESIGN
(MPC 203T)

Scope

The subject is designed to impart knowledge on the current state of the art techniques involved in computer assisted drug design.

Objectives

At completion of this course it is expected that students will be able to understand

- Role of CADD in drug discovery
- Different CADD techniques and their applications
- Various strategies to design and develop new drug like molecules.
- Working with molecular modeling softwares to design new drug molecules
- The in silico virtual screening protocols

Theory — 60 Hrs

1. Introduction to Computer Aided Drug Design (CADD) — 12 Hrs

   History, different techniques and applications.

   Quantitative Structure Activity Relationships: Basics

   History and development of QSAR: Physicochemical parameters and methods to calculate physicochemical parameters: Hammett equation and electronic parameters (sigma), lipophilicity effects and parameters (log P, pi-substituent constant), steric effects (Taft steric and MR parameters) Experimental and theoretical approaches for the determination of these physicochemical parameters.

2 Quantitative Structure Activity Relationships: Applications — 12 Hrs

   Hansch analysis, Free Wilson analysis and relationship between them, Advantages and disadvantages; Deriving 2D-QSAR equations.

   3D-QSAR approaches and contour map analysis.

   Statistical methods used in QSAR analysis and importance of statistical parameters.

3 Molecular Modeling and Docking — 12 Hrs

   a) Molecular and Quantum Mechanics in drug design.

   b) Energy Minimization Methods: comparison between global

minimum conformation and bioactive conformation

c) Molecular docking and drug receptor interactions: Rigid docking, flexible docking and extra-precision docking. Agents acting on enzymes such as DHFR, HMG-CoA reductase and HIV protease, choline esterase (AchE & BchE)

4 Molecular Properties and Drug Design 12 Hrs

a) Prediction and analysis of ADMET properties of new molecules and its importance in drug design.

b) De novo drug design: Receptor/enzyme-interaction and its analysis, Receptor/enzyme cavity size prediction, predicting the functional components of cavities, Fragment based drug design.

c) Homology modeling and generation of 3D-structure of protein.

5 Pharmacophore Mapping and Virtual Screening 12 Hrs

Concept of pharmacophore, pharmacophore mapping, identification of Pharmacophore features and Pharmacophore modeling; Conformational search used in pharmacophore mapping.

In Silico Drug Design and Virtual Screening Techniques

Similarity based methods and Pharmacophore based screening, structure based In-silico virtual screening protocols.

REFERENCES

1. Computational and structural approaches to drug discovery, Robert M Stroud and Janet. F Moore, RCS Publishers.
2. Introduction to Quantitative Drug Design by Y.C. Martin, CRC Press, Taylor & Francis group..
3. Drug Design by Ariens Volume 1 to 10, Academic Press, 1975, Elsevier Publishers.
4. Principles of Drug Design by Smith and Williams, CRC Press, Taylor & Francis.
5. The Organic Chemistry of the Drug Design and Drug action by Richard B. Silverman, Elsevier Publishers.
6. Medicinal Chemistry by Burger, Wiley Publishing Co.

7. An Introduction to Medicinal Chemistry –Graham L. Patrick, Oxford University Press.
8. Wilson and Gisvold's Text book of Organic Medicinal and Pharmaceutical Chemistry, Ippincott Williams & Wilkins.
9. Comprehensive Medicinal Chemistry – Corwin and Hansch, Pergamon Publishers.
10. Computational and structural approaches to drug design edited by Robert M Stroud and Janet. F Moore

PHARMACEUTICAL PROCESS CHEMISTRY
(MPC 204T)

Scope

Process chemistry is often described as scale up reactions, taking them from small quantities created in the research lab to the larger quantities that are needed for further testing and then to even larger quantities required for commercial production. The goal of a process chemist is to develop synthetic routes that are safe, cost-effective, environmentally friendly, and efficient. The subject is designed to impart knowledge on the development and optimization of a synthetic route/s and the pilot plant procedure for the manufacture of Active Pharmaceutical Ingredients (APIs) and new chemical entities (NCEs) for the drug development phase.

Objectives

At completion of this course it is expected that students will be able to understand

- The strategies of scale up process of apis and intermediates
- The various unit operations and various reactions in process chemistry

THEORY — 60 Hrs

1. Process chemistry — 12 Hrs

Introduction, Synthetic strategy

Stages of scale up process: Bench, pilot and large scale process.

In-process control and validation of large scale process.

Case studies of some scale up process of APIs.

Impurities in API, types and their sources including genotoxic impurities

2 Unit operations — 12 Hrs

a) Extraction: Liquid equilibria, extraction with reflux, extraction with agitation, counter current extraction.
b) Filtration: Theory of filtration, pressure and vacuum filtration, centrifugal filtration,
c) Distillation: azeotropic and steam distillation
d) Evaporation: Types of evaporators, factors affecting evaporation.
e) Crystallization: Crystallization from aqueous, non-aqueous solutions factors affecting crystallization, nucleation. Principle and general methods of Preparation of polymorphs, hydrates, solvates and amorphous APIs.

3 Unit Processes - I 12 Hrs

a) Nitration: Nitrating agents, Aromatic nitration, kinetics and mechanism of aromatic nitration, process equipment for technical nitration, mixed acid for nitration,

b) Halogenation: Kinetics of halogenations, types of halogenations, catalytic halogenations. Case study on industrial halogenation process.

c) Oxidation: Introduction, types of oxidative reactions, Liquid phase oxidation with oxidizing agents. Nonmetallic Oxidizing agents such as H_2O_2, sodium hypochlorite, Oxygen gas, ozonolysis.

4 Unit Processes - II 12 Hrs

a) Reduction: Catalytic hydrogenation, Heterogeneous and homogeneous catalyst; Hydrogen transfer reactions, Metal hydrides. Case study on industrial reduction process.

b) Fermentation: Aerobic and anaerobic fermentation. Production of

i. Antibiotics; Penicillin and Streptomycin,
ii. Vitamins: B2 and B12
iii. Statins: Lovastatin, Simvastatin

c) Reaction progress kinetic analysis

i. Streamlining reaction steps, route selection,
ii. Characteristics of expedient routes, characteristics of cost-effective routes, reagent selection, families of reagents useful for scale-up.

5 Industrial Safety 12 Hrs

a) MSDS (Material Safety Data Sheet), hazard labels of chemicals and Personal Protection Equipment (PPE)

b) Fire hazards, types of fire & fire extinguishers

c) Occupational Health & Safety Assessment Series 1800 (OHSAS-1800) and ISO-14001(Environmental Management System), Effluents and its management

REFERENCES

1. Process Chemistry in the Pharmaceutical Industry: Challenges in an Ever-Changing Climate-An Overview; K. Gadamasetti, CRC Press.
2. Pharmaceutical Manufacturing Encyclopedia, 3rd edition, Volume 2.
3. Medicinal Chemistry by Burger, 6th edition, Volume 1-8.
4. W.L. McCabe, J.C Smith, Peter Harriott. Unit operations of chemical engineering, 7th edition, McGraw Hill
5. Polymorphism in Pharmaceutical Solids .Dekker Series Volume 95 Ed: H G Brittain (1999)
6. Regina M. Murphy: Introduction to Chemical Processes: Principles, Analysis, Synthesis
7. Peter J. Harrington: Pharmaceutical Process Chemistry for Synthesis: Rethinking the Routes to Scale-Up
8. P.H.Groggins: Unit processes in organic synthesis (MGH)
9. F.A.Henglein: Chemical Technology (Pergamon)
10. M.Gopal: Dryden's Outlines of Chemical Technology, WEP East-West Press
11. Clausen,Mattson: Principle of Industrial Chemistry, Wiley Publishing Co.,
12. Lowenheim & M.K. Moran: Industrial Chemicals
13. S.D. Shukla & G.N. Pandey: A text book of Chemical Technology Vol. II, Vikas Publishing House
14. J.K. Stille: Industrial Organic Chemistry (PH)
15. Shreve: Chemical Process, Mc Grawhill.
16. B.K.Sharma: Industrial Chemistry, Goel Publishing House
17. ICH Guidelines
18. United States Food and Drug Administration official website www.fda.gov

PHARMACEUTICAL CHEMISTRY PRACTICALS – II
(MPC 205P)

1. Synthesis of organic compounds by adapting different approaches involving (3 experiments)
   a) Oxidation
   b) Reduction/hydrogenation
   c) Nitration
2. Comparative study of synthesis of APIs/intermediates by different synthetic routes (2 experiments)
3. Assignments on regulatory requirements in API (2 experiments)
4. Comparison of absorption spectra by UV and Wood ward – Fieser rule
5. Interpretation of organic compounds by FT-IR
6. Interpretation of organic compounds by NMR
7. Interpretation of organic compounds by MS
8. Determination of purity by DSC in pharmaceuticals
9. Identification of organic compounds using FT-IR, NMR, CNMR and Mass spectra
10. To carry out the preparation of following organic compounds
11. Preparation of 4-chlorobenzhydrylpiperazine. (an intermediate for cetirizine HCl).
12. Preparation of 4-iodotolene from p-toluidine.
13. $NaBH_4$ reduction of vanillin to vanillyl alcohol
14. Preparation of umbelliferone by Pechhman reaction
15. Preparation of triphenyl imidazole
16. To perform the Microwave irradiated reactions of synthetic importance (Any two)
17. Determination of log P, MR, hydrogen bond donors and acceptors of selected drugs using softwares
18. Calculation of ADMET properties of drug molecules and its analysis using softwares
    Pharmacophore modeling
19. 2D-QSAR based experiments
20. 3D-QSAR based experiments
21. Docking study based experiment
22. Virtual screening based experiment

PHARMACEUTICALANALYSIS(MPA)

MODERN PHARMACEUTICAL ANALYTICAL TECHNIQUES (MPA 101T)

Scope

This subject deals with various advanced analytical instrumental techniques for identification, characterization and quantification of drugs. Instruments dealt are NMR, Mass spectrometer, IR, HPLC, GC etc.

Objectives

After completion of course student is able to know about chemicals and excipients

- The analysis of various drugs in single and combination dosage forms
- Theoretical and practical skills of the instruments

	THEORY	60 Hrs
1.	a. UV-Visible spectroscopy: Introduction, Theory, Laws, Instrumentation associated with UV-Visible spectroscopy, Choice of solvents and solvent effect and Applications of UV-Visible spectroscopy, Difference/ Derivative spectroscopy. b. IR spectroscopy: Theory, Modes of Molecular vibrations, Sample handling, Instrumentation of Dispersive and Fourier - Transform IR Spectrometer, Factors affecting vibrational frequencies and Applications of IR spectroscopy, Data Interpretation. c. Spectroflourimetry: Theory of Fluorescence, Factors affecting fluorescence (Characterestics of drugs that can be analysed by flourimetry), Quenchers, Instrumentation and Applications of fluorescence spectrophotometer. d. Flame emission spectroscopy and Atomic absorption spectroscopy: Principle, Instrumentation, Interferences and Applications.	10 Hrs
2	NMR spectroscopy: Quantum numbers and their role in NMR, Principle, Instrumentation, Solvent requirement in NMR, Relaxation process, NMR signals in various compounds, Chemical shift, Factors influencing chemical shift, Spin-Spin coupling, Coupling constant, Nuclear magnetic double resonance, Brief outline of principles of FT-NMR and 13C NMR. Applications of NMR spectroscopy.	10 Hrs
3	Mass Spectroscopy: Principle, Theory, Instrumentation of Mass	10

	Spectroscopy, Different types of ionization like electron impact, chemical, field, FAB and MALDI, APCI, ESI, APPI Analyzers of Quadrupole and Time of Flight, Mass fragmentation and its rules, Meta stable ions, Isotopic peaks and Applications of Mass spectroscopy.	Hrs
4	Chromatography: Principle, apparatus, instrumentation, chromatographic parameters, factors affecting resolution, isolation of drug from excipients, data interpretation and applications of the following: a. Thin Layer chromatography b. High Performance Thin Layer Chromatography c. Ion exchange chromatography d. Column chromatography e. Gas chromatography f. High Performance Liquid chromatography g. Ultra High Performance Liquid chromatography h. Affinity chromatography i. Gel Chromatography	10 Hrs
5	a. Electrophoresis: Principle, Instrumentation, Working conditions, factors affecting separation and applications of the following: a) Paper electrophoresis b) Gel electrophoresis c) Capillary electrophoresis d) Zone electrophoresis e) Moving boundary electrophoresis f) Iso electric focusing b. X ray Crystallography: Production of X rays, Different X ray methods, Bragg's law, Rotating crystal technique, X ray powder technique, Types of crystals and applications of X-ray diffraction	10 Hrs
6	Potentiometry: Principle, working, Ion selective Electrodes and Application of potentiometry. Thermal Techniques: Principle, thermal transitions and Instrumentation (Heat flux and power-compensation and designs), Modulated DSC, Hyper DSC, experimental parameters (sample preparation, experimental conditions, calibration, heating and cooling rates, resolution, source of errors) and their influence, advantage and disadvantages, pharmaceutical applications. Differential Thermal Analysis (DTA): Principle, instrumentation	10 Hrs

and advantage and disadvantages, pharmaceutical applications, derivative differential thermal analysis (DDTA). TGA: Principle, instrumentation, factors affecting results, advantage and disadvantages, pharmaceutical applications.

REFERENCES

1. Spectrometric Identification of Organic compounds - Robert M Silverstein, Sixth edition, John Wiley & Sons, 2004.
2. Principles of Instrumental Analysis - Doglas A Skoog, F. James Holler, Timothy A. Nieman, 5th edition, Eastern press, Bangalore, 1998.
3. Instrumental methods of analysis – Willards, 7th edition, CBS publishers.
4. Practical Pharmaceutical Chemistry – Beckett and Stenlake, Vol II, 4th edition, CBS Publishers, New Delhi, 1997.
5. Organic Spectroscopy - William Kemp, 3rd edition, ELBS, 1991.
6. Quantitative Analysis of Drugs in Pharmaceutical formulation - P D Sethi, 3rd Edition, CBS Publishers, New Delhi, 1997.
7. Pharmaceutical Analysis - Modern Methods – Part B - J W Munson, Vol 11, Marcel. Dekker Series
8. Spectroscopy of Organic Compounds, 2nd edn., P.S/Kalsi, Wiley estern Ltd., Delhi.
9. Textbook of Pharmaceutical Analysis, KA.Connors, 3rd Edition, John Wiley & Sons, 1982.

ADVANCED PHARMACEUTICAL ANALYSIS
(MPA 102T)

Scope

This subject deals with the various aspects of Impurity, Impurities in new drug products, in residual solvents, Elemental impurities, Impurity profiling and characterization of degradents, Stability testing of phytopharmaceuticals and their protocol preparation. It also covers the biological testing of various vaccines and their principle and procedure.

Objective

After completion of the course students shall able to know,

- Appropriate analytical skills required for the analytical method development.
- Principles of various reagents used in functional group analysis that renders necessary support in research methodology and demonstrates its application in the practical related problems.
- Analysis of impurities in drugs, residual solvents and stability studies of drugs and biological products

THEORY 60 Hrs

1. Impurity and stability studies: 10 Hrs

Definition, classification of impurities in drug Substance or Active Pharmaceutical Ingredients and quantification of impurities as per ICH guidelines

Impurities in new drug products:

Rationale for the reporting and control of degradation products, reporting degradation products content of batches, listing of degradation products in specifications, qualification of degradation products

Impurities in residual solvents:

General principles, classification of residual solvents, Analytical procedures, limits of residual solvents, reporting levels of residual solvents

2 Elemental impurities: 10 Hrs

Element classification, control of elemental impurities, Potential Sources of elemental Impurities, Identification of Potential Elemental Impurities, analytical procedures, instrumentation & C, H, N and S analysis

Stability testing protocols:

Selection of batches, container orientation, test parameters, sampling frequency, specification, storage conditions, recording of results, concept of stability, commitment etc. Important mechanistic and stability related information provided by results of study of factors like temperature, pH, buffering species ionic strength and dielectric constant etc. on the reaction rates. With practical considerations.

3	Impurity profiling and degradent characterization: Method development, Stability studies and concepts of validation accelerated stability testing & shelf life calculation, WHO and ICH stability testing guidelines, Stability zones, steps in development, practical considerations. Basics of impurity profiling and degradent characterization with special emphasis. Photostability testing guidelines, ICH stability guidelines for biological products	10 Hrs
4	Stability testing of phytopharmaceuticals: Regulatory requirements, protocols, HPTLC/HPLC finger printing, interactions and complexity.	10 Hrs
5	Biological tests and assays of the following: a. Adsorbed Tetanus vaccine b. Adsorbed Diphtheria vaccine c. Human anti haemophilic vaccine d. Rabies vaccine e. Tetanus Anti toxin f. Tetanus Anti serum g. Oxytocin h. Heparin sodium IP i. Antivenom. PCR, PCR studies for gene regulation, instrumentation (Principle and Procedures)	10 Hrs
6	Immunoassays (IA) Basic principles, Production of antibodies, Separation of bound and unbound drug, Radioimmunoassay, Optical IA, Enzyme IA, Fluoro IA, Luminiscence IA, Quantification and applications of IA.	10 Hrs

REFERENCES

1. Vogel's textbook of quantitative chemical analysis - Jeffery J Bassett, J. Mendham, R. C. Denney, 5th edition, ELBS, 1991.
2. Practical Pharmaceutical Chemistry - Beckett and Stenlake, Vol II, 4th Edition, CBS publishers, New Delhi, 1997.
3. Textbook of Pharmaceutical Analysis - K A Connors, 3rd Edition, John Wiley & Sons, 1982.

4. Pharmaceutical Analysis - Higuchi, Brochmman and Hassen, 2nd Edition, Wiley – Inter science Publication, 1961.
5. Quantitative Analysis of Drugs in Pharmaceutical formulation – P D Sethi, 3rd Edition, CBS Publishers New Delhi, 1997.
6. Pharmaceutical Analysis- Modern methods - J W Munson – Part B, Volume 11, Marcel Dekker Series.
7. The Quantitative analysis of Drugs - D C Carratt, 3rd edition, CBS Publishers, NewDelhi, 1964.
8. Indian Pharmacopoeia Vol I , II & III 2007, 2010, 2014.
9. Methods of sampling and microbiological examination of water, first revision, BIS
10. Practical HPLC method development – Snyder, Kirkland, Glajch, 2nd edition, John Wiley & Sons.
11. Analytical Profiles of drug substances – Klaus Florey, Volume 1 – 20, Elsevier, 2005
12. Analytical Profiles of drug substances and Excipients – Harry G Brittan, Volume 21 – 30, Elsevier, 2005.
13. The analysis of drugs in biological fluids - Joseph Chamberlain, 2nd edition, CRC press, London.
14. ICH Guidelines for impurity profiles and stability studies.

PHARMACEUTICAL VALIDATION
(MPA 103T)

Scope

The main purpose of the subject is to understand about validation and how it can be applied to industry and thus to improve the quality of the products. The subject covers the complete information about validation, types, methodology and application.

Objectives

Upon completion of the subject student shall be able to

- Explain the aspect of validation
- Carryout validation of manufacturing processes
- Apply the knowledge of validation to instruments and equipments
- Validate the manufacturing facilities

THEORY 60 Hrs

1.	Introduction: Definition of Qualification and Validation, Advantage of Validation, Streamlining of Qualification & Validation process and Validation Master Plan. Qualification: User Requirement Specification, Design Qualification, Factory Acceptance Test (FAT)/ Site Acceptance Test (SAT), Installation Qualification, Operational Qualification, Performance Qualification, Re- Qualification (Maintaining status- Calibration Preventive Maintenance, Change management), Qualification of Manufacturing Equipments, Qualification of Analytical Instruments and Laboratory equipments.	12 Hrs
2	Qualification of analytical instruments: Electronic balance, pH meter, UV-Visible spectrophotometer, FTIR, GC, HPLC, HPTLC Qualification of Glassware: Volumetric flask, pipette, Measuring cylinder, beakers and burette.	12 Hrs
3	Validation of Utility systems: Pharmaceutical Water System & pure steam, HVAC system, Compressed air and nitrogen. Cleaning Validation: Cleaning Validation - Cleaning Method development, Validation and validation of analytical method used in cleaning. Cleaning of Equipment, Cleaning of Facilities. Cleaning in place (CIP).	12 Hrs
4	Analytical method validation: General principles, Validation of analytical method as per ICH guidelines and USP.	12 Hrs

Computerized system validation: Electronic records and digital significance-21 CFR part 11 and GAMP 5.

5	General Principles of Intellectual Property: Concepts of Intellectual Property (IP), Intellectual Property Protection (IPP), Intellectual Property Rights (IPR); Economic importance, mechanism for protection of Intellectual Property –patents, Copyright, Trademark; Factors affecting choice of IP protection; Penalties for violation; Role of IP in pharmaceutical industry; Global ramification and financial implications. Filing a patent applications; patent application forms and guidelines. Types patent applications-provisional and non-provisional, PCT and convention patent applications; International patenting requirement procedures and costs; Rights and responsibilities of a patentee; Practical aspects regarding maintaining of a Patent file; Patent infringement meaning and scope. Significance of transfer technology (TOT), IP and ethics-positive and negative aspects of IPP; Societal responsibility, avoiding unethical practices.	12 Hrs

REFERENCES

1. B. T. Loftus & R. A. Nash, "Pharmaceutical Process Validation", Drugs and Pharm Sci. Series, Vol. 129, 3rd Ed., Marcel Dekker Inc., N.Y.
2. The Theory & Practice of Industrial Pharmacy, 3rd edition, Leon Lachman, Herbert A. Lieberman, Joseph. L. Karig, Varghese Publishing House, Bombay.
3. Validation Master plan by Terveeks or Deeks, Davis Harwood International publishing.
4. Validation of Aseptic Pharmaceutical Processes, 2nd Edition, by Carleton & Agalloco, (Marcel Dekker).
5. Michael Levin, Pharmaceutical Process Scale-Up‖, Drugs and Pharm. Sci. Series, Vol. 157,2nd Ed., Marcel Dekker Inc., N.Y.
6. Validation Standard Operating Procedures: A Step by Step Guide for Achieving Compliance in the Pharmaceutical, Medical Device, and Biotech Industries, Syed Imtiaz Haider
7. Pharmaceutical Equipment Validation: The Ultimate Qualification Handbook, Phillip A. Cloud, Interpharm Press
8. Validation of Pharmaceutical Processes: Sterile Products, Frederick J. Carlton (Ed.) and James Agalloco (Ed.), Marcel Dekker, 2nd Ed.
9. Analytical Method validation and Instrument Performance Verification by Churg Chan, Heiman Lam, Y.C. Lee, Yue. Zhang, Wiley Inter Science.

FOOD ANALYSIS
(MPA 104T)

Scope

This course is designed to impart knowledge on analysis of food constituents and finished food products. The course includes application of instrumental analysis in the determination of pesticides in variety of food products.

Objectives

At completion of this course student shall be able to understand various analytical techniques in the determination of

- Food constituents
- Food additives
- Finished food products
- Pesticides in food
- And also student shall have the knowledge on food regulations and legislations

THEORY 60 Hrs

1. Carbohydrates: classification and properties of food carbohydrates, General methods of analysis of food carbohydrates, Changes in food carbohydrates during processing, Digestion, absorption and metabolism of carbohydrates, Dietary fibre, Crude fibre and application of food carbohydrates 12 Hrs
   Proteins: Chemistry and classification of amino acids and proteins, Physico-Chemical properties of protein and their structure, general methods of analysis of proteins and amino acids, Digestion, absorption and metabolism of proteins.

2 Lipids: Classification, general methods of analysis, refining of fats and oils; hydrogenation of vegetable oils, Determination of adulteration in fats and oils, Various methods used for measurement of spoilage of fats and fatty foods. 12 Hrs
   Vitamins: classification of vitamins, methods of analysis of vitamins, Principles of microbial assay of vitamins of B-series.

3 Food additives: Introduction, analysis of Preservatives, antioxidants, artificial sweeteners, flavors, flavor enhancers, stabilizers, thickening and jelling agents. 12 Hrs
   Pigments and synthetic dyes: Natural pigments, their occurrence and characteristic properties, permitted synthetic

dyes, Non-permitted synthetic dyes used by industries, Method of detection of natural, permitted and non-permitted dyes.

4	General Analytical methods for milk, milk constituents and milk products like ice cream, milk powder, butter, margarine, cheese including adulterants and contaminants of milk. Analysis of fermentation products like wine, spirits, beer and vinegar.	12 Hrs
5	Pesticide analysis: Effects of pest and insects on various food, use of pesticides in agriculture, pesticide cycle, organophosphorus and organochlorine pesticides analysis, determination of pesticide residues in grain, fruits, vegetables, milk and milk products. Legislation regulations of food products with special emphasis on BIS, Agmark, FDA and US-FDA.	12 Hrs

REFERENCES

1. The chemical analysis of foods – David Pearson, Seventh edition, Churchill Livingstone, Edinburgh London, 1976
2. Introduction to the Chemical analysis of foods – S. Nielsen, Jones & Bartlett publishers, Boston London, 1994.
3. Official methods of analysis of AOAC International, sixth edition, Volume I & II, 1997.
4. Analysis of Food constituents – Multon, Wiley VCH.
5. Dr. William Horwitz, Official methods of analysis of AOAC International, 18th edition, 2005.

PHARMACEUTICAL ANALYSIS PRACTICALS - II
(MPA 105P)

1. Analysis of Pharmacopoeial compounds and their formulations by UV Vis spectrophotometer
2. Simultaneous estimation of multi component containing formulations by UV spectrophotometry
3. Experiments based on HPLC
4. Experiments based on Gas Chromatography
5. Estimation of riboflavin/quinine sulphate by fluorimetry
6. Estimation of sodium/potassium by flame photometry
7. Assay of official compounds by different titrations
8. Assay of official compounds by instrumental techniques.
9. Quantitative determination of hydroxyl group.
10. Quantitative determination of amino group
11. Colorimetric determination of drugs by using different reagents
12. Imupurity profiling of drugs
13. Calibration of glasswares
14. Calibration of pH meter
15. Calibration of UV-Visible spectrophotometer
16. Calibration of FTIR spectrophotometer
17. Calibration of GC instrument
18. Calibration of HPLC instrument
19. Cleaning validation of any one equipment
20. Determination of total reducing sugar
21. Determination of proteins
22. Determination of saponification value, Iodine value, Peroxide value, Acid value in food products
23. Determination of fat content and rancidity in food products
24. Analysis of natural and synthetic colors in food
25. Determination of preservatives in food
26. Determination of pesticide residue in food products
27. Analysis of vitamin content in food products
28. Determination of density and specific gravity of foods
29. Determination of food additives

ADVANCED INSTRUMENTAL ANALYSIS
(MPA 201T)

Scope

This subject deals with various hyphenated analytical instrumental techniques for identification, characterization and quantification of drugs. Instruments dealt are LC-MS, GC-MS, and hyphenated techniques.

Objectives

After completion of course student is able to know,

- interpretation of the NMR, Mass and IR spectra of various organic compounds
- theoretical and practical skills of the hyphenated instruments
- identification of organic compounds

THEORY 60 Hrs

1. HPLC: Principle, instrumentation, pharmaceutical applications, peak shapes, capacity factor, selectivity, plate number, plate height, resolution, band broadening, pumps, injector, detectors, columns, column problems, gradient HPLC, HPLC solvents, trouble shooting, sample preparation, method development, New developments in HPLC-role and principles of ultra, nano liquid chromatography in pharmaceutical analysis. Immobilized polysaccharide CSP's: Advancement in enantiomeric separations, revised phase Chiral method development and HILIC approaches. HPLC in Chiral analysis of pharmaceuticals. Preparative HPLC, practical aspects of preparative HPLC. — 12 Hrs

2 Biochromatography: Size exclusion chromatography, ion exchange chromatography, ion pair chromatography, affinity chromatography general principles, stationary phases and mobile phases. — 12 Hrs

Gas chromatography: Principles, instrumentation, derivatization, head space sampling, columns for GC, detectors, quantification.

High performance Thin Layer chromatography: Principles, instrumentation, pharmaceutical applications.

3 Super critical fluid chromatography: Principles, instrumentation, pharmaceutical applications. — 12 Hrs

Capillary electrophoresis: Overview of CE in pharmaceutical analysis, basic configuration, CE characteristics, principles of CE, methods and modes of CE. General considerations and method

development in CE, Crown ethers as buffer additives in capillary electrophoresis. CE-MS hyphenation.

4 Mass spectrometry: Principle, theory, instrumentation of mass spectrometry, different types of ionization like electron impact, chemical, field, FAB and MALD, APCI, ESI, APPI mass fragmentation and its rules, meta stable ions, isotopic peaks and applications of mass spectrometry. LC-MS hyphenation and DART MS analysis. Mass analysers (Quadrpole, Time of flight, FT-ICR, ion trap and Orbitrap) instruments. MS/MS systems (Tandem: QqQ, TOF-TOF;Q-IT, Q-TOF, LTQ-FT, LTQ-Orbitrap. 12 Hrs

5 NMR spectroscopy: Quantum numbers and their role in NMR, Principle, Instrumentation, Solvent requirement in NMR, Relaxation process, NMR signals in various compounds, Chemical shift, Factors influencing chemical shift, Spin-Spin coupling, Coupling constant, Nuclear magnetic double resonance, Brief outline of principles of FT-NMR with reference to 13CNMR: Spin spin and spin lattice relaxation phenomenon. 13C NMR, 1-D and 2-D NMR, NOESY and COSY techniques, Interpretation and Applications of NMR spectroscopy. LC-NMR hyphenations. 12 Hrs

REFERENCES

1. Spectrometric Identification of Organic compounds - Robert M Silverstein, Sixth edition, John Wiley & Sons, 2004.
2. Principles of Instrumental Analysis - Doglas A Skoog, F. James Holler, Timothy A. Nieman, 5th edition, Eastern press, Bangalore, 1998.
3. Instrumental methods of analysis – Willards, 7th edition, CBS publishers.
4. Organic Spectroscopy - William Kemp, 3rd edition, ELBS, 1991.
5. Quantitative analysis of Pharmaceutical formulations by HPTLC - P D Sethi, CBS Publishers, New Delhi.
6. Quantitative Analysis of Drugs in Pharmaceutical formulation - P D Sethi, 3rd Edition, CBS Publishers, New Delhi, 1997.
7. Pharmaceutical Analysis- Modern methods – Part B - J W Munson, Volume 11, Marcel Dekker Series.
8. Organic Spectroscopy by Donald L. Paviya, 5th Edition.

MODERN BIO-ANALYTICAL TECHNIQUES
(MPA 202T)

Scope

This subject is designed to provide detailed knowledge about the importance of analysis of drugs in biological matrices.

Objectives

Upon completion of the course, the student shall be able to understand

- Extraction of drugs from biological samples
- Separation of drugs from biological samples using different techniques
- Guidelines for BA/BE studies.

THEORY 60 Hrs

1. Extraction of drugs and metabolites from biological matrices: General need, principle and procedure involved in the Bioanalytical methods such as Protein precipitation, Liquid - Liquid extraction and Solid phase extraction and other novel sample preparation approach. Bioanalytical method validation: USFDA and EMEA guidelines. — 12 Hrs

2 Biopharmaceutical Consideration: Introduction, Biopharmaceutical Factors Affecting Drug Bioavailability, In Vitro: Dissolution and Drug Release Testing, Alternative Methods of Dissolution Testing Transport models, Biopharmaceutics Classification System. Solubility: Experimental methods. Permeability: In-vitro, in-situ and In-vivo methods. — 12 Hrs

3 Pharmacokinetics and Toxicokinetics: Basic consideration, Drug interaction (PK-PD interactions), The effect of protein-binding interactions, The effect of tissue-binding interactions, Cytochrome P450-based drug interactions, Drug interactions linked to transporters. Microsomal assays Toxicokinetics-Toxicokinetic evaluation in preclinical studies, Importance and applications of toxicokinetic studies. LC-MS in bioactivity screening and proteomics. — 12 Hrs

4 Cell culture techniques Basic equipments used in cell culture lab. Cell culture media, various types of cell culture, general procedure for cell cultures; isolation of cells, subculture, cryopreservation, characterization of — 12 Hrs

cells and their applications. Principles and applications of cell viability assays (MTT assays), Principles and applications of flow cytometry.

5 Metabolite identification: 12 Hrs

In-vitro / in-vivo approaches, protocols and sample preparation. Microsomal approaches (Rat liver microsomes (RLM) and Human liver microsomes (HLM) in Met –ID. Regulatory perspectives. In-vitro assay of drug metabolites & drug metabolizing enzymes.

Drug Product Performance, In Vivo: Bioavailability and Bioequivalence:

Drug Product Performance, Purpose of Bioavailability Studies, Relative and Absolute Availability. Methods for Assessing Bioavailability, Bioequivalence Studies, Design and Evaluation of Bioequivalence Studies, Study Designs, Crossover Study Designs, Generic Biologics (Biosimilar Drug Products), Clinical Significance of Bioequivalence Studies.

REFERENCES

1. Analysis of drugs in Biological fluids - Joseph Chamberlain, 2nd Edition. CRC Press, Newyork. 1995.
2. Principles of Instrumental Analysis - Doglas A Skoog, F. James Holler, Timothy A. Nieman, 5th edition, Eastern press, Bangalore, 1998.
3. Pharmaceutical Analysis - Higuchi, Brochmman and Hassen, 2nd Edition, Wiley – Interscience Publications, 1961.
4. Pharmaceutical Analysis- Modern methods – Part B - J W Munson, Volume 11, Marcel Dekker Series
5. Practical HPLC method Development – Snyder, Kirkland, Glaich, 2nd Edition, John Wiley & Sons, New Jercy. USA.
6. Chromatographic Analysis of Pharmaceuticals – John A Adamovics, 2nd Edition, Marcel Dekker, Newyork, USA. 1997.
7. Chromatographic methods in clinical chemistry & Toxicology – Roger L Bertholf, Ruth E Winecker, John Wiley & Sons, New Jercy, USA. 2007.
8. Good Laboratory Practice Regulations, 2nd Edition, Sandy Weinberg Vol. 69, Marcel Dekker Series, 1995.
9. Good laboratory Practice Regulations – Allen F. Hirsch, Volume 38, Marcel Dekker Series, 1989.
10. ICH, USFDA & CDSCO Guidelines.
11. Palmer

QUALITY CONTROL AND QUALITY ASSURANCE
(MPA 203T)

Scope

This course deals with the various aspects of quality control and quality assurance aspects of pharmaceutical industries. It covers the important aspects like cGMP, QC tests, documentation, quality certifications, GLP and regulatory affairs.

Objectives

At the completion of this subject it is expected that the student shall be able to know

- the cGMP aspects in a pharmaceutical industry
- to appreciate the importance of documentation
- to understand the scope of quality certifications applicable to Pharmaceutical industries
- to understand the responsibilities of QA & QC departments

THEORY 60 hrs

1. Concept and Evolution of Quality Control and Quality Assurance — 12 Hrs

   Good Laboratory Practice, GMP, Overview of ICH Guidelines - QSEM, with special emphasis on Q-series guidelines.

   Good Laboratory Practices: Scope of GLP, Definitions, Quality assurance unit, protocol for conduct of non clinical testing, control on animal house, report preparation and documentation.

2. cGMP guidelines according to schedule M, USFDA (inclusive of CDER and CBER) Pharmaceutical Inspection Convention (PIC), WHO and EMEA covering: Organization and personnel responsibilities, training, hygiene and personal records, drug industry location, design, construction and plant lay out, maintenance, sanitation, environmental control, utilities and maintenance of sterile areas, control of contamination and Good Warehousing Practice. CPCSEA guidelines. — 12 Hrs

3. Analysis of raw materials, finished products, packaging materials, in process quality control (IPQC), Developing specification (ICH Q6 and Q3) — 12 Hrs

Purchase specifications and maintenance of stores for raw materials. In process quality control and finished products quality control for following formulation in Pharma industry according to Indian, US and British pharmacopoeias: tablets, capsules, ointments, suppositories, creams, parenterals, ophthalmic and surgical products (How to refer pharmacopoeias), Quality control test for containers, closures and secondary packing materials.

4. Documentation in pharmaceutical industry: Three tier documentation, Policy, Procedures and Work instructions, and records (Formats), Basic principles- How to maintain, retention and retrieval etc. Standard operating procedures (How to write), Master Formula Record, Batch Formula Record, Quality audit plan and reports. Specification and test procedures, Protocols and reports. Distribution records. Electronic data. 12 Hrs

5. Manufacturing operations and controls: Sanitation of manufacturing premises, mix-ups and cross contamination, processing of intermediates and bulk products, packaging operations, IPQC, release of finished product, process deviations, charge-in of components, time limitations on production, drug product inspection, expiry date calculation, calculation of yields, production record review, change control, sterile products, aseptic process control, packaging. 12 Hrs

REFERENCES

1. Quality Assurance Guide by organization of Pharmaceutical Procedures of India, 3rd revised edition, Volume I & II, Mumbai, 1996.
2. Good Laboratory Practice Regulations, 2nd Edition, Sandy Weinberg Vol. 69, Marcel Dekker Series, 1995.
3. Quality Assurance of Pharmaceuticals- A compedium of Guide lines and Related materials Vol I & II, 2nd edition, WHO Publications, 1999.
4. How to Practice GMP's – P P Sharma, Vandana Publications, Agra, 1991.
5. The International Pharmacopoeia – vol I, II, III, IV & V - General Methods of Analysis and Quality specification for Pharmaceutical Substances, Excepients and Dosage forms, 3rd edition, WHO, Geneva, 2005.
6. Good laboratory Practice Regulations – Allen F. Hirsch, Volume 38, Marcel Dekker Series, 1989.
7. ICH guidelines
8. ISO 9000 and total quality management

9. The drugs and cosmetics act 1940 – Deshpande, Nilesh Gandhi, 4th edition, Susmit Publishers, 2006.
10. QA Manual – D.H. Shah, 1st edition, Business Horizons, 2000.
11. Good Manufacturing Practices for Pharmaceuticals a plan for total quality control – Sidney H. Willig, Vol. 52, 3rd edition, Marcel Dekker Series.
12. Steinborn L. GMP/ISO Quality Audit Manual for Healthcare Manufacturers and Their Suppliers, Sixth Edition, (Volume 1 - With Checklists and Software Package). Taylor & Francis; 2003.
13. Sarker DK. Quality Systems and Controls for Pharmaceuticals. John Wiley & Sons; 2008.

HERBAL AND COSMETIC ANALYSIS
(MPA 204T)

Scope

This course is designed to impart knowledge on analysis of herbal products. Regulatory requirements, herbal drug interaction with monographs. Performance evaluation of cosmetic products is included for the better understanding of the equipments used in cosmetic industries for the purpose.

Objectives

At completion of this course student shall be able to understand

- Determination of herbal remedies and regulations
- Analysis of natural products and monographs
- Determination of Herbal drug-drug interaction
- Principles of performance evaluation of cosmetic products.

THEORY 60 Hrs

1. Herbal remedies- Toxicity and Regulations: Herbals vs Conventional drugs, Efficacy of herbal medicine products, Validation of Herbal Therapies, Pharmacodynamic and Pharmacokinetic issues. Herbal drug standardization: WHO and AYUSH guidelines. 12 Hrs

2 Adulteration and Deterioration: Introduction, types of adulteration/substitution of herbal drugs, Causes and Measure of adulteration, Sampling Procedures, Determination of Foreign Matter, DNA Finger printing techniques in identification of drugs of natural origin, heavy metals, pesticide residues, phototoxin and microbial contamination in herbal formulations. 12 Hrs

Regulatory requirements for setting herbal drug industry: Global marketing management, Indian and international patent law as applicable herbal drugs and natural products and its protocol.

3 Testing of natural products and drugs: Effect of herbal medicine on clinical laboratory testing, Adulterant Screening using modern analytical instruments, Regulation and dispensing of herbal drugs, Stability testing of natural products, protocol. 12 Hrs

Monographs of Herbal drugs: Study of monographs of herbal drugs and comparative study in IP, USP, Ayurvedic

Pharmacopoeia, American herbal Pharmacopoeia, British herbal Pharmacopoeia, Siddha and Unani Pharmacopoeia, WHO guidelines in quality assessment of herbal drugs.

4 Herbal drug-drug interaction: WHO and AYUSH guidelines for safety monitoring of natural medicine, Spontaneous reporting schemes for bio drug adverse reactions, bio drug-drug and bio drug-food interactions with suitable examples. Challenges in monitoring the safety of herbal medicines. 12 Hrs

5 Evaluation of cosmetic products: Determination of acid value, ester value, saponification value, iodine value, peroxide value, rancidity, moisture, ash, volatile matter, heavy metals, fineness of powder, density, viscosity of cosmetic raw materials and finished products. Study of quality of raw materials and general methods of analysis of raw material used in cosmetic manufacture as per BIS.

Indian Standard specification laid down for sampling and testing of various cosmetics in finished forms such as baby care products, skin care products, dental products, personal hygiene preparations, lips sticks. Hair products and skin creams by the Bureau Indian Standards. 12 Hrs

REFERENCES

1. Pharmacognosy by Trease and Evans
2. Pharmacognosy by Kokate, Purohit and Gokhale
3. Quality Control Methods for Medicinal Plant, WHO, Geneva
4. Pharmacognosy & Pharmacobiotechnology by Ashutosh Kar
5. Essential of Pharmacognosy by Dr.S.H.Ansari
6. Cosmetics – Formulation, Manufacturing and Quality Control, P.P. Sharma, 4th edition, Vandana Publications Pvt. Ltd., Delhi
7. Indian Standard specification, for raw materials, BIS, New Delhi.
8. Indian Standard specification for 28 finished cosmetics BIS, New Delhi
9. Harry's Cosmeticology 8th edition
10. Suppliers catalogue on specialized cosmetic excipients
11. Wilkinson, Moore, seventh edition, George Godwin. Poucher's Perfumes, Cosmetics and Soaps
12. Hilda Butler, 10th Edition, Kluwer Academic Publishers. Handbook of Cosmetic Science and Technology, 3rd Edition,

PHARMACEUTICAL ANALYSIS PRACTICALS - I
(MPA 205P)

1. Comparison of absorption spectra by UV and Wood ward – Fiesure rule
2. Interpretation of organic compounds by FT-IR
3. Interpretation of organic compounds by NMR
4. Interpretation of organic compounds by MS
5. Determination of purity by DSC in pharmaceuticals
6. Identification of organic compounds using FT-IR, NMR, CNMR and Mass spectra
7. Bio molecules separation utilizing various sample preparation techniques and Quantitative analysis of components by gel electrophoresis.
8. Bio molecules separation utilizing various sample preparation techniques and Quantitative analysis of components by HPLC techniques.
9. Isolation of analgesics from biological fluids (Blood serum and urine).
10. Protocol preparation and performance of analytical/Bioanalytical method validation.
11. Protocol preparation for the conduct of BA/BE studies according to guidelines.
12. In process and finished product quality control tests for tablets, capsules, parenterals and creams
13. Quality control tests for Primary and secondary packing materials
14. Assay of raw materials as per official monographs
15. Testing of related and foreign substances in drugs and raw materials
16. Preparation of Master Formula Record.
17. Preparation of Batch Manufacturing Record.
18. Quantitative analysis of rancidity in lipsticks and hair oil
19. Determination of aryl amine content and Developer in hair dye
20. Determination of foam height and SLS content of Shampoo.
21. Determination of total fatty matter in creams (Soap, skin and hair creams)
22. Determination of acid value and saponification value.
23. Determination of calcium thioglycolate in depilatories

PHARMACEUTICALQUALITYASSURANCE(MQA)

MODERN PHARMACEUTICAL ANALYTICAL TECHNIQUES (MQA 101T)

Scope

This subject deals with various advanced analytical instrumental techniques for identification, characterization and quantification of drugs. Instruments dealt are NMR, Mass spectrometer, IR, HPLC, GC etc.

Objectives

After completion of course student is able to know about chemicals and excipients

- The analysis of various drugs in single and combination dosage forms
- Theoretical and practical skills of the instruments

THEORY 60 Hrs

1.	a. UV-Visible spectroscopy: Introduction, Theory, Laws, Instrumentation associated with UV-Visible spectroscopy, Choice of solvents and solvent effect and Applications of UV-Visible spectroscopy, Difference/ Derivative spectroscopy. b. IR spectroscopy: Theory, Modes of Molecular vibrations, Sample handling, Instrumentation of Dispersive and Fourier - Transform IR Spectrometer, Factors affecting vibrational frequencies and Applications of IR spectroscopy, Data Interpretation. c. Spectroflourimetry: Theory of Fluorescence, Factors affecting fluorescence (Characterestics of drugs that can be analysed by flourimetry), Quenchers, Instrumentation and Applications of fluorescence spectrophotometer. d. Flame emission spectroscopy and Atomic absorption spectroscopy: Principle, Instrumentation, Interferences and Applications.	12 Hrs
2	NMR spectroscopy: Quantum numbers and their role in NMR, Principle, Instrumentation, Solvent requirement in NMR, Relaxation process, NMR signals in various compounds, Chemical shift, Factors influencing chemical shift, Spin-Spin coupling, Coupling constant, Nuclear magnetic double resonance, Brief outline of principles of FT-NMR and 13C NMR. Applications of NMR spectroscopy.	12 Hrs

3	Mass Spectroscopy: Principle, Theory, Instrumentation of Mass Spectroscopy, Different types of ionization like electron impact, chemical, field, FAB and MALDI, APCI, ESI, APPI Analyzers of Quadrupole and Time of Flight, Mass fragmentation and its rules, Meta stable ions, Isotopic peaks and Applications of Mass spectroscopy.	12 Hrs
4	Chromatography: Principle, apparatus, instrumentation, chromatographic parameters, factors affecting resolution, isolation of drug from excipients, data interpretation and applications of the following: • Thin Layer chromatography • High Performance Thin Layer Chromatography • Ion exchange chromatography • Column chromatography • Gas chromatography • High Performance Liquid chromatography • Ultra High Performance Liquid chromatography • Affinity chromatography • Gel Chromatography	12 Hrs
5	a. Electrophoresis: Principle, Instrumentation, Working conditions, factors affecting separation and applications of the following: a) Paper electrophoresis b) Gel electrophoresis c) Capillary electrophoresis d) Zone electrophoresis e) Moving boundary electrophoresis f) Iso electric focusing b. X ray Crystallography: Production of X rays, Different X ray methods, Bragg's law, Rotating crystal technique, X ray powder technique, Types of crystals and applications of X-ray diffraction.	12 Hrs
6	a. Potentiometry: Principle, working, Ion selective Electrodes and Application of potentiometry. b. Thermal Techniques: Principle, thermal transitions and Instrumentation (Heat flux and power-compensation and designs), Modulated DSC, Hyper DSC, experimental parameters (sample preparation, experimental conditions, calibration, heating and cooling rates, resolution, source of errors) and their influence, advantage and disadvantages, pharmaceutical applications. Differential Thermal Analysis (DTA): Principle, instrumentation	12 Hrs

and advantage and disadvantages, pharmaceutical applications, derivative differential thermal analysis (DDTA). TGA: Principle, instrumentation, factors affecting results, advantage and disadvantages, pharmaceutical applications.

REFERENCES

1. Spectrometric Identification of Organic compounds - Robert M Silverstein, Sixth edition, John Wiley & Sons, 2004.
2. Principles of Instrumental Analysis - Doglas A Skoog, F. James Holler, Timothy A. Nieman, 5th edition, Eastern press, Bangalore, 1998.
3. Instrumental methods of analysis - Willards, 7th edition, CBS publishers.
4. Practical Pharmaceutical Chemistry - Beckett and Stenlake, Vol II, 4th edition, CBS Publishers, New Delhi, 1997.
5. Organic Spectroscopy - William Kemp, 3rd edition, ELBS, 1991.
6. Quantitative Analysis of Drugs in Pharmaceutical formulation - P D Sethi, 3rd Edition, CBS Publishers, New Delhi, 1997.
7. Pharmaceutical Analysis - Modern Methods - Part B - J W Munson, Vol 11, Marcel. Dekker Series
8. Spectroscopy of Organic Compounds, 2nd edn., P.S/Kalsi, Wiley estern Ltd., Delhi.
9. Textbook of Pharmaceutical Analysis, KA.Connors, 3rd Edition, John Wiley & Sons, 1982.
10. Textbook of Pharmaceutical Analysis, KA.Connors, 3rd Edition, John Wiley & Sons, 1982.

QUALITY MANAGEMENT SYSTEMS
(MQA 102T)

Scope

This course is designed to impart fundamental knowledge and concepts about various quality management principles and systems utilized in the manufacturing industry. It also aids in understanding the quality evaluation in the pharmaceutical industries.

Objectives

At completion of this course it is expected that students will be able to understand-

- The importance of quality
- ISO management systems
- Tools for quality improvement
- Analysis of issues in quality
- Quality evaluation of pharmaceuticals
- Stability testing of drug and drug substances
- Statistical approaches for quality

THEORY 60 Hrs

1. Introduction to Quality: Evolution of Quality, Definition of Quality, Dimensions of Quality 12 Hrs

   Quality as a Strategic Decision: Meaning of strategy and strategic quality management, mission and vision statements, quality policy, Quality objectives, strategic planning and implementation, McKinsey 7s model, Competitive analysis, Management commitment to quality

   Customer Focus: Meaning of customer and customer focus, Classification of customers, Customer focus, Customer perception of quality, Factors affecting customer perception, Customer requirements, Meeting customer needs and expectations, Customer satisfaction and Customer delight, Handling customer complaints, Understanding customer behavior, concept of internal and external customers. Case studies.

   Cost of Quality: Cost of quality, Categories of cost of Quality, Models of cost of quality, Optimising costs, Preventing cost of quality.

2	Pharmaceutical quality Management: Basics of Quality Management, Total Quality Management (TQM), Principles of Six sigma, ISO 9001:2008, 9001:2015, ISO 14001:2004, Pharmaceutical Quality Management – ICH Q10, Knowledge management, Quality Metrics, Operational Excellence and Quality Management Review. OSHAS guidelines, NABL certification and accreditation, CFR-21 part 11, WHO-GMP requirements.	12 Hrs
3	Six System Inspection model: Quality Management system, Production system, Facility and Equipment system, Laboratory control system, Materials system, Packaging and labeling system. Concept of self inspection. Quality systems: Change Management/ Change control. Deviations, Out of Specifications (OOS), Out of Trend (OOT), Complaints - evaluation and handling, Investigation and determination of root cause, Corrective & Preventive Actions (CAPA), Returns and Recalls, Vendor Qualification, Annual Product Reviews, Batch Review and Batch Release. Concept of IPQC, area clearance/ Line clearance.	12 Hrs
4	Drug Stability: ICH guidelines for stability testing of drug substances and drug products. Study of ICH Q8, Quality by Design and Process development report Quality risk management: Introduction, risk assessment, risk control, risk review, risk management tools, HACCP, risk ranking and filtering according to ICH Q9 guidelines.	12 Hrs
5	Statistical Process control (SPC): Definition and Importance of SPC, Quality measurement in manufacturing, Statistical control charts - concepts and general aspects, Advantages of statistical control, Process capability, Estimating Inherent or potential capability from a control chart analysis, Measuring process control and quality improvement, Pursuit of decreased process variability.	8 Hrs
6	Regulatory Compliance through Quality Management and development of Quality Culture Benchmarking: Definition of benchmarking, Reasons for benchmarking, Types of Benchmarking, Benchmarking process, Advantages of benchmarking, Limitations of benchmarking.	4 Hrs

REFERENCES

1. Implementing Juran's Road Map for Quality Leadership: Benchmarks and Results, By Al Endres, Wiley, 2000
2. Understanding, Managing and Implementing Quality: Frameworks, Techniques and Cases, By Jiju Antony; David Preece, Routledge, 2002
3. Organizing for High Performance: Employee Involvement, TQM, Reengineering, and Knowledge Management in the Fortune 1000: The CEO Report By Edward E. Lawler; Susan Albers Mohrman; George Benson, Jossey-Bass, 2001
4. Corporate Culture and the Quality Organization By James W. Fairfield-Sonn, Quorum Books, 2001
5. The Quality Management Sourcebook: An International Guide to Materials and Resources By Christine Avery; Diane Zabel, Routledge, 1997
6. The Quality Toolbox, Second Edition, Nancy R. Tague, ASQ Publications
7. Juran's Quality Handbook, Sixth Edition, Joseph M. Juran and Joseph A. De Feo, ASQ Publications
8. Root Cause Analysis, The Core of Problem Solving and Corrective Action, Duke Okes, 2009, ASQ Publications.

QUALITY CONTROL AND QUALITY ASSURANCE
(MQA 103T)

Scope

This course deals with the various aspects of quality control and quality assurance aspects of pharmaceutical industries. It covers the important aspects like cGMP, QC tests, documentation, quality certifications, GLP and regulatory affairs.

Objectives

Upon completion of this course the student should be able to

- Understand the cGMP aspects in a pharmaceutical industry
- To appreciate the importance of documentation
- To understand the scope of quality certifications applicable to Pharmaceutical industries
- To understand the responsibilities of QA & QC departments.

THEORY 60 Hrs

1. Introduction: Concept and evolution and scopes of Quality Control and Quality Assurance, Good Laboratory Practice, GMP, Overview of ICH Guidelines - QSEM, with special emphasis on Q-series guidelines. 12 Hrs

   Good Laboratory Practices: Scope of GLP, Definitions, Quality assurance unit, protocol for conduct of non clinical testing, control on animal house, report preparation and documentation. CPCSEA guidelines.

2 cGMP guidelines according to schedule M, USFDA (inclusive of CDER and CBER) Pharmaceutical Inspection Convention(PIC), WHO and EMEA covering: Organization and personnel responsibilities, training, hygiene and personal records, drug industry location, design, construction and plant lay out, maintenance, sanitation, environmental control, utilities and maintenance of sterile areas, control of contamination and Good Warehousing Practice. 12 Hrs

3 Analysis of raw materials, finished products, packaging materials, in process quality control (IPQC), Developing specification (ICH Q6 and Q3), purchase specifications and maintenance of stores for raw materials. 12 Hrs

In process quality control and finished products quality control for following dosage forms in Pharma industry according to Indian, US and British pharmacopoeias: tablets, capsules, ointments, suppositories, creams, parenterals, ophthalmic and surgical products (How to refer pharmacopoeias).

4 Documentation in pharmaceutical industry: Three tier documentation, Policy, Procedures and Work instructions, and records (Formats), Basic principles- How to maintain, retention and retrieval etc. Standard operating procedures (How to write), Master Batch Record, Batch Manufacturing Record, Quality audit plan and reports. Specification and test procedures, Protocols and reports. Distribution records. Electronic data handling. Concepts of controlled and uncontrolled documents. 12 Hrs

Submission documents for regulators DMFs, as Common Technical Document and Electronic Common Technical Documentation (CTD, eCTD). Concept of regulated and non regulated markets.

5 Manufacturing operations and controls: Sanitation of manufacturing premises, mix-ups and cross contamination, processing of intermediates and bulk products, packaging operations, IPQC, release of finished product, process deviations, charge-in of components, time limitations on production, drug product inspection, expiry date calculation, calculation of yields, production record review, change control, sterile products, aseptic process control, packaging, reprocessing, salvaging, handling of waste and scrap disposal. 12 Hrs

Introduction, scope and importance of intellectual property rights. Concept of trade mark, copyright and patents.

REFERENCES

1. Quality Assurance Guide by organization of Pharmaceutical Procedures of India, 3rd revised edition, Volume I & II, Mumbai, 1996.
2. Good Laboratory Practice Regulations, 2nd Edition, Sandy Weinberg Vol. 69, Marcel Dekker Series, 1995.
3. Quality Assurance of Pharmaceuticals- A compedium of Guide lines and Related materials Vol I & II, 2nd edition, WHO Publications, 1999.
4. How to Practice GMP's – P P Sharma, Vandana Publications, Agra, 1991.

5. The International Pharmacopoeia – vol I, II, III, IV & V - General Methods of Analysis and Quality specification for Pharmaceutical Substances, Excepients and Dosage forms, 3rd edition, WHO, Geneva, 2005.
6. Good laboratory Practice Regulations – Allen F. Hirsch, Volume 38, Marcel Dekker Series, 1989.
7. ICH guidelines
8. ISO 9000 and total quality management
9. The drugs and cosmetics act 1940 – Deshpande, Nilesh Gandhi, 4th edition, Susmit Publishers, 2006.
10. QA Manual – D.H. Shah, 1st edition, Business Horizons, 2000.
11. Good Manufacturing Practices for Pharmaceuticals a plan for total quality control – Sidney H. Willig, Vol. 52, 3rd edition, Marcel Dekker Series.
12. Steinborn L. GMP/ISO Quality Audit Manual for Healthcare Manufacturers and Their Suppliers, Sixth Edition, (Volume 1 - With Checklists and Software Package). Taylor & Francis; 2003.
13. Sarker DK. Quality Systems and Controls for Pharmaceuticals. John Wiley & Sons; 2008.
14. Packaging of Pharmaceuticals.
15. Schedule M and Schedule N.

PRODUCT DEVELOPMENT AND TECHNOLOGY TRANSFER
(MQA 104T)

Scope

This deal with technology transfer covers the activities associated with Drug Substance, Drug Product and analytical tests and methods, required following candidate drug selection to completion of technology transfer from R&D to the first receiving site and technology transfer related to post-marketing changes in manufacturing places.

Objectives

Upon completion of this course the student should be able to

- To understand the new product development process
- To understand the necessary information to transfer technology from R&D to actual manufacturing by sorting out various information obtained during R&D
- To elucidate necessary information to transfer technology of existing products between various manufacturing places

THEORY		60 Hrs
1.	Principles of Drug discovery and development: Introduction, Clinical research process. Development and informational content for Investigational New Drugs Application (IND), New Drug Application (NDA), Abbreviated New Drug Application (ANDA), Supplemental New Drug Application (SNDA), Scale Up Post Approval Changes (SUPAC) and Bulk active chemical Post approval changes (BACPAC), Post marketing surveillance, Product registration guidelines - CDSCO, USFDA.	12 Hrs
2	Pre-formulation studies: Introduction/concept, organoleptic properties, purity, impurity profiles, particle size, shape and surface area. Solubility, Methods to improve solubility of Drugs: Surfactants & its importance, co-solvency. Techniques for the study of Crystal properties and polymorphism. Pre-formulation protocol, Stability testing during product development.	12 Hrs
3	Pilot plant scale up: Concept, Significance, design, layout of pilot plant scale up study, operations, large scale manufacturing techniques (formula, equipment, process, stability and quality control) of solids, liquids, semisolid and parenteral dosage forms. New era of drug products: opportunities and challenges.	12 Hrs

4	Pharmaceutical packaging: Pharmaceutical dosage form and their packaging requirments, Pharmaceutical packaging materials, Medical device packaging, Enteral Packaging, Aseptic packaging systems, Container closure systems, Issues facing modern drug packaging, Selection and evaluation of Pharmaceutical packaging materials. Quality control test: Containers, closures and secondary packing materials.	12 Hrs
5	Technology transfer: Development of technology by R & D, Technology transfer from R & D to production, Optimization and Production, Qualitative and quantitative technology models. Documentation in technology transfer: Development report, technology transfer plan and Exhibit.	12 Hrs

REFERENCES

1. The process of new drug discovery and development. I and II Edition (2006) by Charles G. Smith, James T and O. Donnell. CRC Press, Group of Taylor and Francis.
2. Leon Lac Lachman, Herbert A. Liberman, Theory and Practice of Industrial Pharmacy. Marcel Dekker Inc. New York.
3. Sidney H Willing, Murray M, Tuckerman. Williams Hitchings IV, Good manufacturing of pharmaceuticals (A Plan for total quality control) 3rd Edition. Bhalani publishing house Mumbai.
4. Tablets Vol. I, II, III by Leon Lachman, Herbert A. Liberman, Joseph B. Schwartz, 2nd Edn. (1989) Marcel Dekker Inc. New York.
5. Text book of Bio- Pharmaceutics and clinical Pharmacokinetics by Milo Gibaldi, 3rd Edn, Lea & Febriger, Philadelphia.
6. Pharmaceutical product development. Vandana V. Patrevale. John I. Disouza. Maharukh T.Rustomji. CRC Press, Group of Taylor and Francis.
7. Dissolution, Bioavailability and Bio-Equivalence by Abdou H.M, Mack Publishing company, Eastern Pennsylvania.
8. Remingtons Pharmaceutical Sciences, by Alfonso & Gennaro, 19th Edn.(1995)OO2C Lippincott; Williams and Wilkins A Wolters Kluwer Company, Philadelphia.
9. The Pharmaceutical Sciences; the Pharma Path way 'Pure and applied Pharmacy' by D. A Sawant, Pragathi Books Pvt. Ltd.
10. Pharmaceutical Packaging technology by D.A. Dean. E.R. Evans, I.H. Hall. 1st Edition(Reprint 2006). Taylor and Francis. London and New York.

QUALITY ASSURANCE PRACTICAL - I
(MQA 105P)

PRACTICALS

1. Analysis of Pharmacopoeial compounds in bulk and in their formulations (tablet/ capsules/ semisolids) by UV Vis spectrophotometer
2. Simultaneous estimation of multi-drug component containing formulations by UV spectrophotometry
3. Experiments based on HPLC
4. Experiments based on Gas Chromatography
5. Estimation of riboflavin/quinine sulphate by fluorimetry
6. Estimation of sodium/potassium by flame photometry or AAS
7. Case studies on
   - Total Quality Management
   - Six Sigma
   - Change Management/ Change control. Deviations,
   - Out of Specifications (OOS)
   - Out of Trend (OOT)
   - Corrective & Preventive Actions (CAPA)
   - Deviations
8. Development of Stability study protocol
9. Estimation of process capability
10. In process and finished product quality control tests for tablets, capsules, parenterals and semisolid dosage forms.
11. Assay of raw materials as per official monographs
12. Testing of related and foreign substances in drugs and raw materials
13. To carry out pre formulation study for tablets, parenterals (2 experiment).
14. To study the effect of pH on the solubility of drugs, (1 experiment)
15. Quality control tests for Primary and secondary packaging materials
16. Accelerated stability studies (1 experiment)
17. Improved solubility of drugs using surfactant systems (1 experiment)
18. Improved solubility of drugs using co-solvency method (1 experiment)
19. Determination of Pka and Log p of drugs.

HAZARDS AND SAFETY MANAGEMENT
(MQA 201T)

Scope

This course is designed to convey the knowledge necessary to understand issues related to different kinds of hazard and their management. Basic theoretical and practical discussions integrate the proficiency to handle the emergency situation in the pharmaceutical product development process and provides the principle based approach to solve the complex tribulations.

Objectives

At completion of this course it is expected that students will be able to

- Understand about environmental problems among learners.
- Impart basic knowledge about the environment and its allied problems.
- Develop an attitude of concern for the industry environment.
- Ensure safety standards in pharmaceutical industry
- Provide comprehensive knowledge on the safety management
- Empower an ideas to clear mechanism and management in different kinds of hazard management system
- Teach the method of Hazard assessment, procedure, methodology for provide safe industrial atmosphere.

THEORY 60Hrs

1. Multidisciplinary nature of environmental studies: Natural Resources, Renewable and non-renewable resources, Natural resources and associated problems, 12 Hrs

   a) Forest resources; b) Water resources; c) Mineral resources; d) Energy resources; e) Land resources

   Ecosystems: Concept of an ecosystem and Structure and function of an ecosystem. Environmental hazards: Hazards based on Air, Water, Soil and Radioisotopes.

2 Air based hazards: Sources, Types of Hazards, Air circulation maintenance industry for sterile area and non sterile area, Preliminary Hazard Analysis (PHA) Fire protection system: Fire prevention, types of fire extinguishers and critical Hazard management system. 12 Hrs

3 Chemical based hazards: Sources of chemical hazards, Hazards of Organic synthesis, sulphonating hazard, Organic solvent hazard, Control measures for chemical hazards, 12 Hrs

Management of combustible gases, Toxic gases and Oxygen displacing gases management, Regulations for chemical hazard, Management of over-Exposure to chemicals and TLV concept.

4 Fire and Explosion: Introduction, Industrial processes and hazards potential, mechanical electrical, thermal and process hazards. Safety and hazards regulations, Fire protection system: Fire prevention, types of fire extinguishers and critical Hazard management system mechanical and chemical explosion, multiphase reactions, transport effects and global rates. Preventive and protective management from fires and explosion-electricity passivation, ventilation, and sprinkling, proofing, relief systems -relief valves, flares, scrubbers. 12 Hrs

5 Hazard and risk management: Self-protective measures against workplace hazards. Critical training for risk management, Process of hazard management, ICH guidelines on risk assessment and Risk management methods and Tools
Factory act and rules, fundamentals of accident prevention, elements of safety programme and safety management, Physicochemical measurements of effluents, BOD, COD, Determination of some contaminants, Effluent treatment procedure, Role of emergency services. 12 Hrs

REFERENCES

1. Y.K. Sing, Environmental Science, New Age International Pvt, Publishers, Bangalore
2. "Quantitative Risk Assessment in Chemical Process Industries" American Institute of Chemical Industries, Centre for Chemical Process safety.
3. Bharucha Erach, The Biodiversity of India, Mapin Pu blishing Pvt. Ltd., Ahmedabad – 380 013, India,
4. Hazardous Chemicals: Safety Management and Global Regulations, T.S.S. Dikshith, CRC press

PHARMACEUTICAL VALIDATION
(MQA 202T)

Scope

The main purpose of the subject is to understand about validation and how it can be applied to industry and thus improve the quality of the products. The subject covers the complete information about validation, types, methodology and application.

Objectives

At completion of this course, it is expected that students will be able to understand

- The concepts of calibration, qualification and validation
- The qualification of various equipments and instruments
- Process validation of different dosage forms
- Validation of analytical method for estimation of drugs
- Cleaning validation of equipments employed in the manufacture of pharmaceuticals

THEORY 60 Hrs

1. Introduction to validation: Definition of Calibration, Qualification and Validation, Scope, frequency and importance. Difference between calibration and validation. Calibration of weights and measures. Advantages of Validation, scope of Validation, Organization for Validation, Validation Master plan, Types of Validation, Streamlining of qualification & Validation process and Validation Master Plan. 10 Hrs

   Qualification: User requirement specification, Design qualification, Factory Acceptance Test (FAT)/Site Acceptance Test (SAT), Installation qualification, Operational qualification, Performance qualification, Re-Qualification (Maintaining status-Calibration Preventive Maintenance, Change management).

2 Qualification of manufacturing equipment: Dry Powder Mixers, Fluid Bed and Tray dryers, Tablet Compression (Machine), Dry heat sterilization/Tunnels, Autoclaves, Membrane filtration, Capsule filling machine. 10 Hrs

   Qualification of analytical instruments: UV-Visible spectrophotometer, FTIR, DSC, GC, HPLC, HPTLC, LC-MS.

3	Qualification of laboratory equipments: Hardness tester, Friability test apparatus, tap density tester, Disintegration tester, Dissolution test apparatus Validation of Utility systems: Pharmaceutical water system & pure steam, HVAC system, Compressed air and nitrogen.	10 Hrs
4	Process Validation: Concept, Process and documentation of Process Validation. Prospective, Concurrent & Retrospective Validation, Re validation criteria, Process Validation of various formulations (Coated tablets, Capsules, Ointment/Creams, Liquid Orals and aerosols.), Aseptic filling: Media fill validation, USFDA guidelines on Process Validation- A life cycle approach. Analytical method validation: General principles, Validation of analytical method as per ICH guidelines and USP.	10 Hrs
5	Cleaning Validation: Cleaning Method development, Validation of analytical method used in cleaning, Cleaning of Equipment, Cleaning of Facilities. Cleaning in place (CIP). Validation of facilities in sterile and non-sterile plant. Computerized system validation: Electronic records and digital signature - 21 CFR Part 11 and GAMP	10 Hrs
6	General Principles of Intellectual Property: Concepts of Intellectual Property (IP), Intellectual Property Protection (IPP), Intellectual Property Rights (IPR); Economic importance, mechanism for protection of Intellectual Property –patents, Copyright, Trademark; Factors affecting choice of IP protection; Penalties for violation; Role of IP in pharmaceutical industry; Global ramification and financial implications. Filing a patent applications; patent application forms and guidelines. Types patent applications-provisional and non provisional, PCT and convention patent applications; International patenting requirement procedures and costs; Rights and responsibilities of a patentee; Practical aspects regarding maintaining of a Patent file; Patent infringement meaning and scope. Significance of transfer technology (TOT), IP and ethics-positive and negative aspects of IPP; Societal responsibility, avoiding unethical practices.	10 Hrs

REFERENCES

1. B. T. Loftus & R. A. Nash, "Pharmaceutical Process Validation", Drugs and Pharm Sci. Series, Vol. 129, 3rd Ed., Marcel Dekker Inc., N.Y.
2. The Theory & Practice of Industrial Pharmacy, 3rd edition, Leon Lachman, Herbert A. Lieberman, Joseph. L. Karig, Varghese Publishing House, Bombay.
3. Validation Master plan by Terveeks or Deeks, Davis Harwood International publishing.
4. Validation of Aseptic Pharmaceutical Processes, 2nd Edition, by Carleton & Agalloco,
5. (Marcel Dekker).
6. Michael Levin, Pharmaceutical Process Scale-Up", Drugs and Pharm. Sci. Series, Vol. 157,2nd Ed., Marcel Dekker Inc., N.Y.
7. Validation Standard Operating Procedures: A Step by Step Guide for Achieving Compliance in the Pharmaceutical, Medical Device, and Biotech Industries, Syed Imtiaz Haider
8. Pharmaceutical Equipment Validation: The Ultimate Qualification Handbook, Phillip A. Cloud, Interpharm Press
9. Validation of Pharmaceutical Processes: Sterile Products, Frederick J. Carlton (Ed.) and James Agalloco (Ed.), Marcel Dekker
10. Analytical Method validation and Instrument Performance Verification by Churg Chan, Heiman Lam, Y.C. Lee, Yue. Zhang, Wiley Interscience.
11. Huber L. Validation and Qualification in Analytical Laboratories. Informa Healthcare
12. Wingate G. Validating Corporate Computer Systems: Good IT Practice for Pharmaceutical Manufacturers. Interpharm Press
13. LeBlanc DA. Validated Cleaning Technologies for Pharmaceutical Manufacturing. Interpharm Press

AUDITS AND REGULATORY COMPLIANCE
(MPA 203T)

Scope

This course deals with the understanding and process for auditing in pharmaceutical industries. This subject covers the methodology involved in the auditing process of different in pharmaceutical industries.

Objectives

Upon completion of this course the student should be able to

- To understand the importance of auditing
- To understand the methodology of auditing
- To carry out the audit process
- To prepare the auditing report
- To prepare the check list for auditing

THEORY 60 Hrs

1.	Introduction: Objectives, Management of audit, Responsibilities, Planning process, information gathering, administration, Classifications of deficiencies	12 Hrs
2	Role of quality systems and audits in pharmaceutical manufacturing environment: cGMP Regulations, Quality assurance functions, Quality systems approach, Management responsibilities, Resource, Manufacturing operations, Evaluation activities, Transitioning to quality system approach, Audit checklist for drug industries.	12 Hrs
3	Auditing of vendors and production department: Bulk Pharmaceutical Chemicals and packaging material Vendor audit, Warehouse and weighing, Dry Production: Granulation, tableting, coating, capsules, sterile production and packaging.	12 Hrs
4	Auditing of Microbiological laboratory: Auditing the manufacturing process, Product and process information, General areas of interest in the building raw materials, Water, Packaging materials.	12 Hrs

5	Auditing of Quality Assurance and engineering department: Quality Assurance Maintenance, Critical systems: HVAC, Water, Water for Injection systems, ETP.	12 Hrs

REFERENCES

1. Compliance auditing for Pharmaceutical Manufacturers. Karen Ginsbury and Gil Bismuth, Interpharm/CRC, Boca Raton, London New York, Washington D.C.
2. Pharmaceutical Manufacturing Handbook, Regulations and Quality by Shayne Cox Gad. Wiley-Interscience, A John Wiley and sons, Inc., Publications.
3. Handbook of microbiological Quality control. Rosamund M. Baird, Norman A. Hodges, Stephen P. Denyar. CRC Press. 2000.
4. Laboratory auditing for quality and regulatory compliance. Donald C. Singer, Raluca-loana Stefan, Jacobus F. Van Staden. Taylor and Francis (2005).

PHARMACEUTICAL MANUFACTURING TECHNOLOGY
(MQA 204T)

Scope

This course is designed to impart knowledge and skills necessary to train the students with the industrial activities during Pharmaceutical Manufacturing.

Objectives

At completion of this course it is expected that students will be able to understand,

- The common practice in the pharmaceutical industry developments, plant layout and production planning
- Will be familiar with the principles and practices of aseptic process technology, non sterile manufacturing technology and packaging technology.
- Have a better understanding of principles and implementation of Quality by design (QbD) and process analytical technology (PAT) in pharmaceutical manufacturing

THEORY 60 Hrs

1. Pharmaceutical industry developments: Legal requirements and Licenses for API and formulation industry, Plant location-Factors influencing. 12 Hrs

   Plant layout: Factors influencing, Special provisions, Storage space requirements, sterile and aseptic area layout.

   Production planning: General principles, production systems, calculation of standard cost, process planning, routing, loading, scheduling, dispatching of records, production control.

2 Aseptic process technology: Manufacturing, manufacturing flowcharts, in process-quality control tests for following sterile dosage forms: Ointment, Suspension and Emulsion, Dry powder, Solution (Small Volume & large Volume). 12 Hrs

   Advanced sterile product manufacturing technology : Area planning & environmental control, wall and floor treatment, fixtures and machineries, change rooms, personnel flow, utilities & utilities equipment location, engineering and maintenance.

   Process Automation in Pharmaceutical Industry: With specific reference to manufacturing of sterile semisolids, Small Volume Parenterals & Large Volume Parenterals (SVP & LVP), Monitoring of Parenteral manufacturing facility, Cleaning in Place (CIP),

	Sterilization in Place (SIP), Prefilled Syringe, Powdered Jet, Needle Free Injections, and Form Fill Seal Technology (FFS). Lyophilization technology: Principles, process, equipment.	
3	Non sterile manufacturing process technology: Manufacturing, manufacturing flowcharts, in process-quality control tests for following Non-Sterile solid dosage forms: Tablets (compressed & coated), Capsules (Hard & Soft). Advance non-sterile solid product manufacturing technology: Process Automation in Pharmaceutical Industry with specific reference to manufacturing of tablets and coated products, Improved Tablet Production: Tablet production process, granulation and pelletization equipments, continuous and batch mixing, rapid mixing granulators, rota granulators, spheronizers and marumerisers, and other specialized granulation and drying equipments. Problems encountered. Coating technology: Process, equipments, particle coating, fluidized bed coating, application techniques. Problems encountered.	12 Hrs
4	Containers and closures for pharmaceuticals: Types, performance, assuring quality of glass; types of plastics used, Drug plastic interactions, biological tests, modification of plastics by drugs; different types of closures and closure liners; film wrapper; blister packs; bubble packs; shrink packaging; foil / plastic pouches, bottle seals, tape seals, breakable seals and sealed tubes; quality control of packaging material and filling equipment, flexible packaging, product package compatibility, transit worthiness of package, Stability aspects of packaging. Evaluation of stability of packaging material.	12 Hrs
5	Quality by design (QbD) and process analytical technology (PAT): Current approach and its limitations. Why QbD is required, Advantages, Elements of QbD, Terminology: QTPP. CMA, CQA, CPP, RLD, Design space, Design of Experiments, Risk Assessment and mitigation/minimization. Quality by Design, Formulations by Design, QbD for drug products, QbD for Drug Substances, QbD for Excipients, Analytical QbD. FDA initiative on process analytical technology. PAT as a driver for improving quality and reducing costs: quality by design (QbD), QA, QC and GAMP. PAT guidance, standards and regulatory requirements.	12 Hrs

REFERENCES

1. Lachman L, Lieberman HA, Kanig JL. The theory and practice of industrial pharmacy, 3rd ed., Varghese Publishers, Mumbai 1991.
2. Sinko PJ. Martin's physical pharmacy and pharmaceutical sciences, 5th ed., B.I. Publications Pvt. Ltd, Noida, 2006.
3. Lieberman HA, Lachman L, Schwartz JB. Pharmaceutical dosage forms: tablets Vol. I-III, 2nd ed., CBS Publishers & distributors, New Delhi, 2005.
4. Banker GS, Rhodes CT. Modern Pharmaceutics, 4th ed., Marcel Dekker Inc, New York, 2005.
5. Sidney H Willing, Murray M, Tuckerman. Williams Hitchings IV, Good manufacturing of pharmaceuticals (A Plan for total quality control) 3rd Edition. Bhalani publishing house Mumbai.
6. Indian Pharmacopoeia. Controller of Publication. Delhi, 1996.
7. British Pharmacopoeia. British Pharmacopoeia Commission Office, London, 2008.
8. United States Pharmacopoeia. United States Pharmacopeial Convention, Inc, USA, 2003.
9. Dean D A, Evans E R and Hall I H. Pharmaceutical Packaging Technology. London, Taylor & Francis, 1st Edition. UK.
10. Edward J Bauer. Pharmaceutical Packaging Handbook. 2009. Informa Health care USA Inc. New york.
11. Shaybe Cox Gad. Pharmaceutical Manufacturing Handbook. John Willey and Sons, New Jersey, 2008.

QUALITY ASSURANCE PRACTICAL – II PRACTICALS
(MQA 205P)

1. Organic contaminants residue analysis by HPLC
2. Estimation of Metallic contaminants by Flame photometer
3. Identification of antibiotic residue by TLC
4. Estimation of Hydrogen Sulphide in Air.
5. Estimation of Chlorine in Work Environment.
6. Sampling and analysis of SO_2 using Colorimetric method
7. Qualification of following Pharma equipment
   a. Autoclave
   b. Hot air oven
   c. Powder Mixer (Dry)
   d. Tablet Compression Machine
8. Validation of an analytical method for a drug
9. Validation of a processing area
10. Qualification of at least two analytical instruments
11. Cleaning validation of one equipment
12. Qualification of Pharmaceutical Testing Equipment (Dissolution testing apparatus, Friability Apparatus, Disintegration Tester)
13. Check list for Bulk Pharmaceutical Chemicals vendors
14. Check list for tableting production.
15. Check list for sterile production area
16. Check list for Water for injection.
17. Design of plant layout: Sterile and non-sterile
18. Case study on application of QbD
19. Case study on application of PAT

PHARMACEUTICALREGULATORY AFFAIRS(MRA)

GOOD REGULATORY PRACTICES (MRA 101T)

Scope

This course is designed to impart fundamental knowledge on various Good Regulatory Practices viz., cGMP, GLP, GALP and GDP for Pharmaceuticals, Cosmetics, Food & Nutraceuticals, Medical devices, In-vitro Diagnostic Medical Devices (IVDs) and biological products and understand the rationale behind these requirements and will propose ways and means of complying with them.

Objectives

At completion of this course it is expected that students will be able to understand,

- The key regulatory and compliance elements with respect to Good Manufacturing Practices, Good Laboratory Practices, Good Automated Laboratory Practices and Good Documentation Practices.
- Prepare and implement the check lists and SOPs for various Good Regulatory Practices
- Implement Good Regulatory Practices in the Healthcare and related Industries
- Prepare for the readiness and conduct of audits and inspections.

THEORY 60 Hrs

1.	Current Good Manufacturing Practices: Introduction, US cGMP Part 210 and Part 211.EC Principles of GMP (Directive 91/356/EEC) Article 6 to Article 14 and WHO cGMP guidelines GAMP-5; Medical device and IVDs Global Harmonization Task Force(GHTF) Guidance docs.	12 Hrs
2	Good Laboratory Practices: Introduction, USFDA GLP Regulations (Subpart A to Subpart K), Controlling the GLP inspection process, Documentation, Audit, goals of Laboratory Quality Audit, Audit tools, Future of GLP regulations, relevant ISO and Quality Council of India(QCI) Standards	12 Hrs
3	Good Automated Laboratory Practices: Introduction to GALP, Principles of GALP, GALP Requirements, SOPs of GALP, Training Documentation,21 CFR Part 11, General check list of 21CFR Part 11, Software Evaluation checklist, relevant ISO and QCI Standards.	12 Hrs

4	Good Distribution Practices: Introduction to GDP, Legal GDP requirements put worldwide, Principles, Personnel, Documentation, Premises and Equipment, Deliveries to Customers, Returns, Self-Inspection, Provision of information, Stability testing principles, WHO GDP, USP GDP (Supply chain integrity), relevant CDSCO guidance and ISO standards	12 Hrs
5	Quality management systems: Concept of Quality, Total Quality Management, Quality by design, Six Sigma concept, Out of Specifications (OOS), Change control. Validation: Types of Validation, Types of Qualification, Validation master plan (VMP), Analytical Method Validation. Validation of utilities, [Compressed air, steam, water systems, Heat Ventilation and Air conditioning (HVAC)]and Cleaning Validation. The International Conference on Harmonization (ICH) process, ICH guidelines to establish quality, safety and efficacy of drug substances and products, ISO 13485, Sch MIII and other relevant CDSCO regulatory guidance documents.	12 Hrs

REFERENCES

1. Good Laboratory Practice Regulations, by Sandy Weinberg, Fourth Edition Drugs and the Pharmaceutical Sciences, Vol.168
2. Good Pharmaceutical Manufacturing practice, Rational and compliance by John Sharp, CRC Press
3. Establishing a cGMP Laboratory Audit System, A practical Guide by David M.Bleisner, Wiley Publication.
4. How to practice GLP by PP Sharma, Vandana Publications.
5. Laboratory Auditing for Quality and Regulatory compliance bu Donald C.Singer, Drugs and the Pharmaceutical Sciences, Vol.150.
6. Drugs & Cosmetics Act, Rules & Amendments

DOCUMENTATION AND REGULATORY WRITING
(MRA 102T)

Scope

This course is designed to impart fundamental knowledge on documentation and general principles involved in regulatory writing and submission to agencies.

Objectives

Upon completion of the course the student shall be able to,

- Know the various documents pertaining to drugs in pharmaceutical industry
- Understand the basics of regulatory compilation
- Create and assemble the regulation submission as per the requirements of agencies
- Follow up the submissions and post approval document requirements

THEORY 60 Hrs

1. Documentation in pharmaceutical industry: Exploratory Product Development Brief (EPDB) for Drug substance and Drug product, Product Development Plan (PDP), Product Development Report (PDR), Master Formula Record, Batch Manufacturing Record and its calculations, Batch Reconciliation, Batch Packaging Records, Print pack specifications, Distribution records, Certificate of Analysis (CoA), Site Master File and Drug Master Files (DMF). 12 Hrs

2 Dossier preparation and submission: Introduction and overview of dossiers, contents and organization of dossier, binders and sections, compilation and review of dossier. Paper submissions, overview and modules of CTD, electronic CTD submissions; Electronic submission: Planning electronic submission, requirements for submission, regulatory bindings and requirements, Tool and Technologies, electronic dossier submission process and validating the submission, Electronic Submission Gateway (ESG). Non eCTD electronic submissions (NeeS), Asian CTD formats (ACTD) submission. Organizing, process and validation of submission. Submission in Sugam system of CDSCO. 12 Hrs

3	Audits: Introduction, Definition, Summary, Types of audits, GMP compliance audit, Audit policy, Internal and External Audits, Second Party Audits, External third party audits, Auditing strategies, Preparation and conducting audit, Auditing strategies, audit analysis, audit report, audit follow up. Auditing/inspection of manufacturing facilities by regulatory agencies. Timelines for audits/inspection. GHTF study group 4 guidance document. ISO 13485.	12 Hrs
4	Inspections: Pre-approval inspections, Inspection of pharmaceutical manufacturers, Inspection of drug distribution channels, Quality systems requirements for national good manufacturing practice inspectorates, inspection report, model certificate of good manufacturing practices, Root cause analysis, Corrective and Preventive action (CAPA).	12 Hrs
5	Product life cycle management: Prior Approval Supplement (PAS), Post Approval Changes [SUPAC], Changes Being Effected in 30 Days (CBE-30), Annual Report, Post marketing Reporting Requirements, Post approval Labeling Changes, Lifecycle Management, FDA Inspection and Enforcement, Establishment Inspection Report (EIR), Warning Letters, Recalls, Seizure and Injunctions. ISO Risk Management Standard	12 Hrs

REFERENCES

1. Compliance auditing for Pharmaceutical Manufacturers. Karen Ginsbury and Gil Bismuth, Interpharm/CRC, Boca Raton, London New York, Washington D.C.
2. Pharmaceutical Manufacturing Handbook, Regulations and Quality by Shayne Cox Gad. Wiley-Interscience, A John Wiley and sons, Inc., Publications.
3. Handbook of microbiological Quality control. Rosamund M. Baird, Norman A. Hodges, Stephen P. Denyar. CRC Press. 2000.
4. Laboratory auditing for quality and regulatory compliance. Donald C. Singer, Raluca-loana Stefan, Jacobus F. Van Staden. Taylor and Francis (2005).
5. Implementing Juran's Road Map for Quality Leadership: Benchmarks and Results, By Al Endres, Wiley, 2000
6. Understanding, Managing and Implementing Quality: Frameworks, Techniques and Cases, By Jiju Antony; David Preece, Routledge, 2002

7. Organizing for High Performance: Employee Involvement, TQM, Reengineering, and Knowledge Management in the Fortune 1000: The CEO Report By Edward E. Lawler; Susan Albers Mohrman; George Benson, Jossey-Bass, 2001
8. Corporate Culture and the Quality Organization By James W. Fairfield-Sonn, Quorum Books, 2001
9. The Quality Management Sourcebook: An International Guide to Materials and Resources By Christine Avery; Diane Zabel, Routledge, 1997
10. The Quality Toolbox, Second Edition, Nancy R. Tague, ASQ Publications
11. Juran's Quality Handbook, Sixth Edition, Joseph M. Juran and Joseph A. De Feo, ASQ Publications
12. Root Cause Analysis, The Core of Problem Solving and Corrective Action, Duke Okes, 2009, ASQ Publications
13. International Medical Device Regulators Forum (IMDRF) Medical Device Single Audit Program (MDSAP)

CLINICAL RESEARCH REGULATIONS
(MRA 103T)

Scope

This course is designed to impart the fundamental knowledge on the clinical development process of drugs, pharmaceuticals and Medical Devices, phases and conduct of clinical trials and research, regulations and guidance governing the conduct of clinical research in India, USA and EU. It prepares the students to learn in detail on various laws, legislations and guidance related to safety, efficacy, ethical conduct and regulatory approval of clinical research.

Objectives

Upon completion of the course, the student shall be able to (know, do and appreciate)

- History, origin and ethics of clinical and biomedical research and evaluation
- Clinical drug, medical device development process and different types and phases of clinical trials
- Regulatory requirements and guidance for conduct of clinical trials and research

Theory — 60 Hrs

1. Clinical Drug Development Process — 12 Hrs
   - Different types of Clinical Studies
   - Phases of clinical trials, Clinical Trial protocol
   - Phase 0 studies
   - Phase I and subtype studies (single ascending, multiple ascending, dose escalation, methods, food effect studies, drug – drug interaction, PK end points
   - Phase II studies (proof of concept or principle studies to establish efficacy)
   - Phase III studies (Multi ethnicity, global clinical trial, registration studies)
   - Phase IV studies (Post Marketing Studies; PSUR)

   Clinical Investigation and Evaluation of Medical Devices & IVDs

   Different Types of Studies
   Key Concepts of Medical Device Clinical Evaluation
   Key concepts of Clinical Investigation

2 Ethics in Clinical Research: 12 Hrs

- Historical Perspectives: Nuremberg Code, Thalidomide study , Nazis Trials, Tuskegee Syphilis Study, The Belmont Report, The declaration of Helsinki
- Origin of International Conference on Harmonization - Good Clinical Practice (ICH-GCP) guidelines.
- The ethics of randomized clinical trials
- The role of placebo in clinical trials
- Ethics of clinical research in special population
- Institutional Review Board/Independent Ethics Committee/Ethics Committee – composition, roles, responsibilities, review and approval process and ongoing monitoring of safety data
- Data safety monitoring boards.
- Responsibilities of sponsor, CRO, and investigator in ethical conduct of clinical research
  - Ethical principles governing informed consent process
  - Patient Information Sheet and Informed Consent Form
  - The informed consent process and documentation

3 Regulations governing Clinical Trials 12 Hrs

India: Clinical Research regulations in India – Schedule Y & Medical Device Guidance

USA: Regulations to conduct drug studies in USA (FDA)

- NDA 505(b)(1) of the FD&C Act (Application for approval of a new drug)
- NDA 505(b)(2) of the FD&C Act (Application for approval of a new drug that relies, at least in part, on data not developed by the applicant)
- ANDA 505(j) of the FD&C Act (Application for approval of a generic drug product)
- FDA Guidance for Industry - Acceptance of Foreign Clinical Studies
- FDA Clinical Trials Guidance Document: Good Clinical Practice

EU: Clinical Research regulations in European Union (EMA)

4 Clinical Research Related Guidelines 12 Hrs

- Good Clinical Practice Guidelines (ICH GCP E6)
- Indian GCP Guidelines
- ICMR Ethical Guidelines for Biomedical Research
- CDSCO guidelines

GHTF study group 5 guidance documents

Regulatory Guidance on Efficacy and Safety ICH Guidance's

- E4 – Dose Response Information to support Drug Registration
- E7 – Studies in support of General Population: Geriatrics
- E8 – General Considerations of Clinical Trials
- E10 – Choice of Control Groups and Related Issues in Clinical Trials,
- E 11 – Clinical Investigation of Medicinal Products in the Pediatric Population
- General biostatics principle applied in clinical research

5 USA & EU Guidance 12 Hrs

USA: FDA Guidance

- CFR 21Part 50: Protection of Human Subjects
- CFR 21Part 54: Financial Disclosure by Clinical Investigators
- CFR 21Part 312: IND Application
- CFR 21Part 314: Application for FDA Approval to Market a New Drug
- CFR 21Part 320: Bioavailability and bioequivalence requirements
- CFR 21Part 812: Investigational Device Exemptions
- CFR 21Part 822: Post-market surveillance
- FDA Safety Reporting Requirements for INDs and BA/BE Studies
- FDA Med Watch
- Guidance for Industry: Good Pharmacovigilance Practices and Pharmacoepidemiologic Assessment

European Union: EMA Guidance

- EU Directives 2001
- EudraLex (EMEA) Volume 3 – Scientific guidelines for medicinal products for human use
- EU Annual Safety Report (ASR)
- Volume 9A – Pharmacovigilance for Medicinal Products for Human Use
- EU MDD with respect to clinical research
- ISO 14155

REFERENCES

1. Clinical Trials and Human Research: A Practical Guide to Regulatory Compliance By Fay A. Rozovsky and Rodney K. Adams
2. HIPAA and Human Subjects Research: A Question and Answer Reference Guide By Mark Barnes, JD, LLM and Jennifer Kulynych, JD, PhD
3. Principles and Practices of Clinical Research, Second Edition Edited by John I. Gallin and Frederick P. Ognibene
4. Reviewing Clinical Trials: A Guide for the Ethics Committee; Johan PE Karlberg and Marjorie A Speers; Karlberg, Johan Petter Einar, Hong Kong.
5. International Pharmaceutical Product Registration: Aspects of Quality, Safety and Efficacy; Anthony C. Cartwright; Taylor & Francis Inc., USA.
6. New Drug Approval Process: The Global Challenge; Guarino, Richard A; Marcel Dekker Inc., NY.
7. FDA regulatory affairs: a guide for prescription drugs, medical devices, and biologics; Douglas J. Pisano, David Mantus; CRC Press, USA
8. Country Specific Guidelines from official websites.
9. Drugs & Cosmetics Act & Rules and Amendments

RECOMMENDED WEBSITES:

1. EU Clinical Research Directive 2001: http://www.eortc.be/services/doc/clinical-eudirective-04-april-01.pdf
2. Code of Federal Regulations, FDA: http://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfcfr/cfrsearch.cfm
3. Guidelines of International Conference on Harmonization: http://www.ich.org/products/guidelines.html
4. Eudralex Guidelines: http://www.gmpcompliance.info/euguide.htm
5. FDA New Drug Application:
6. http://www.fda.gov/regulatoryinformation/legislation/FederalFoodDrugandCosmetic ActFDCAct/FDCActChapterVDrugsandDevices/ucm108125.htm
7. Medicines and Healthcare products Regulatory Agency: http://www.mhra.gov.uk
8. Central Drugs Standard Control Organization Guidance for Industry: http://cdsco.nic.in/CDSCO-GuidanceForIndustry.pdf
9. ICMR Ethical Guidelines for Biomedical Research: http://icmr.nic.in/ethical_guidelines.pdf

REGULATIONS AND LEGISLATION FOR DRUGS & COSMETICS, MEDICAL DEVICES, BIOLOGICALS & HERBALS, AND FOOD & NUTRACEUTICALS IN INDIA AND INTELLECTUAL PROPERTY RIGHTS

(MRA 104T)

Scope

This course is designed to impart fundamental knowledge on regulations and legislation in India w.r.t. Drugs & Cosmetics, Medical Devices, Biologicals & Herbals, and Food & Nutraceuticals. It prepares the students for basic regulatory requirements in India of Drugs & Cosmetics, Medical Devices, Biologicals & Herbals, and Food & Nutraceuticals. for manufacture, import & registration, export, sale, marketing authorization, clinical trials and intellectual property rights.

Objectives

Upon the completion of the course the student shall be able to:

- Know different Acts and guidelines that regulate Drugs & Cosmetics, Medical Devices, Biologicals & Herbals, and Food & Nutraceuticals industry in India.
- Understand the approval process and regulatory requirements for Drugs & Cosmetics, Medical Devices, Biologicals & Herbals, and Food & Nutraceuticals

THEORY 60 Hrs

1. Biologicals & Herbals, and Food & Nutraceuticals Acts and Rules (with latest amendments): 12 Hrs

    1. Drugs and Cosmetics Act 1940 and Rules 1945: DPCO and NPPA
    2. Other relevant provisions (rules schedules and guidelines for approval of Drugs & Cosmetics, Medical Devices, Biologicals & Herbals, and Food & Nutraceuticals in India

    Other relevant Acts: Narcotics Drugs and Psychotropic Substances Act; Medicinal and Toilet Preparations (Excise Duties) Act, 1955; Pharmacy Act, 1948; Drugs and Magic Remedies (Objectionable Advertisements) Act, 1955; Prevention of Cruelty to Animals Act.

2	Regulatory requirements and approval procedures for Drugs & Cosmetics Medical Devices, Biologicals & Herbals, and Food & Nutraceuticals CDSCO (Central Drug Standard Control Organization) and State Licensing Authority: Organization, Responsibilities • Rules, regulations, guidelines and standards for regulatory filing of Drugs & Cosmetics, Medical Devices, Biologicals & Herbals, and Food & Nutraceuticals • Format and contents of Regulatory dossier filing Clinical trial/ investigations	12 Hrs
3	Indian Pharmacopoeial Standards, BIS standards and ISO and other relevant standards	12 Hrs
4	Bioavailability and Bioequivalence data (BA &BE), BCS Classification of Drugs, Regulatory Requirements for Bioequivalence study Stability requirements: ICH and WHO Guidelines for Drug testing in animals/Preclinical Studies Animal testing: Rationale for conducting studies, CPCSEA Guidelines Ethical guidelines for human participants ICMR-DBT Guidelines for Stem Cell Research	12 Hrs
5	Intellectual Property Rights: Patent, Trademark, Copyright, Industrial Designs and Geographical Indications, Indian Patent Scenario. IPR vs Regulatory Affairs	12 Hrs

REFERENCES

1. Manual of Patent Practice & Procedure, 3rd Edition, by The Patent Office of India
2. Patent Failure How Judges, Bureaucrats, and Lawyers put innovators at risk by James Bessen and Michael J. Meurer
3. Principles and Practice of Clinical Trial Medicine by Richard Chin and Bruce Y. Lee
4. Ethical Guidelines for Biomedical Research on Human Participants by Indian Council of Medical Research New delhi 2006.
5. CPCSEA Guidelines for Laboratory Animal Facility by Committee for the purpose of control and supervision on experiments on animals (CPCSEA)

6. ICH E6 Guideline — Good Clinical Practice‖ by ICH Harmonised Tripartite
7. Guidance for Industry on Submission of Clinical Trial Application for Evaluating Safety and Efficacy by CDSCO (Central Drug Standard Control Organisation)
8. Guidance for Industry on Requirement of Chemical & Pharmaceutical Information including Stability Study Data before approval of clinical trials / BE studies by CDSCO
9. Guidelines for Import and Manufacture of Medical Devices by CDSCO
10. Guidelines from official website of CDSCO

REGULATORY AFFAIRS PRACTICAL - I
(MRA 105P)

1. Case studies (4 Nos.) of each of Good Pharmaceutical Practices.
2. Documentation for in process and finished products Quality control tests for Solid, liquid, Semisolid and Sterile preparations.
3. Preparation of SOPs, Analytical reports (Stability and validation)
4. Protocol preparation for documentation of various types of records (BMR, MFR, DR)
5. Labeling comparison between brand & generics.
6. Preparation of clinical trial protocol for registering trial in India
7. Registration for conducting BA/ BE studies in India
8. Import of drugs for research and developmental activities
9. Preparation of regulatory dossier as per Indian CTD format and submission in SUGAM
10. Registering for different Intellectual Property Rights in India
11. GMP Audit Requirements as per CDSCO
12. Preparation and documentation for Indian Patent application.
13. Preparation of checklist for registration of IND as per ICH CTD format.
14. Preparation of checklist for registration of NDA as per ICH CTD format.
15. Preparation of checklist for registration of ANDA as per ICH CTD format.
16. Case studies on response with scientific rationale to USFDA Warning Letter
17. Preparation of submission checklist of IMPD for EU submission.
18. Comparison study of marketing authorization procedures in EU.
19. Comparative study of DMF system in US, EU and Japan
20. Preparation of regulatory submission using eCTD software
21. Preparation of Clinical Trial Application (CTA) for US submission
22. Preparation of Clinical Trial Application (CTA) for EU submission
23. Comparison of Clinical Trial Application requirements of US, EU and Japan of a dosage form.
24. Regulatory requirements checklist for conducting clinical trials in India.
25. Regulatory requirements checklist for conducting clinical trials in Europe.
26. Regulatory requirements checklist for conducting clinical trials in USA

SEMESTER II

REGULATORY ASPECTS OF DRUGS & COSMETICS

(MRA 201T)

Scope

This course is designed to impart the fundamental knowledge on the drug development process, regulatory requirements for approval of new drugs, drug products and cosmetics in regulated and semi-regulated countriesIt prepares the students to learn in detail on the regulatory requirements, documentation requirements, and registration procedures for marketing the drug products and cosmetics in regulated and semi-regulated countries.

Objectives

Upon completion of the course, the student shall be able to know

- process of drug discovery and development and generic product development
- regulatory approval process and registration procedures for API and drug products in US, EU
- Cosmetics regulations in regulated and semi-regulated countries
- A comparative study of India with other global regulated markets

Theory 60 Hrs

1. USA & CANADA: Organization structure and functions of FDA. Federal register and Code of Federal Regulations (CFR), History and evolution of United States Federal, Food, Drug and Cosmetic Act (FFDCA), Hatch Waxman act and Orange book, Purple book, Drug Master Files (DMF) system in US, Regulatory Approval Process for Investigational New Drug (IND), New Drug Application (NDA), Abbreviated New Drug Application (ANDA), Supplemental New Drug Application (SNDA); Regulatory requirements for Orphan drugs and Combination Products, Changes to an approved NDA / ANDA. Regulatory considerations for manufacturing, packaging and labeling of pharmaceuticals in USA. Legislation and regulations for import, manufacture, distribution and sale of cosmetics in USA and Canada. 12 Hrs

2 European Union & Australia: Organization and structure of EMA & EDQM, General guidelines, Active Substance Master Files (ASMF) system in EU, Content and approval process of IMPD, Marketing Authorization procedures in EU (Centralized procedure, 12 Hrs

	Decentralized procedure, Mutual recognition procedure and National Procedure). Regulatory considerations for manufacturing, packaging and labeling of pharmaceuticals in EU, Eudralex directives for human medicines, Variations & extensions, Compliance of European Pharmacopoeia (CEP)/ Certificate of Suitability (CoS), Marketing Authorization (MA) transfers, Qualified Person (QP) in EU. Legislation and regulations for import, manufacture, distribution and sale of cosmetics in European Union & Australia.	
3	Japan: Organization of the PMDA, Pharmaceutical Laws and regulations, types of registration applications, DMF system in Japan, drug regulatory approval process, Regulatory considerations for manufacturing, packaging and labeling of pharmaceuticals in Japan, Post marketing surveillance in Japan. Legislation and regulations for import, manufacture, distribution and sale of cosmetics in Japan	12 Hrs
4	Emerging Market: Introduction, Countries covered, Study of the world map,study of various committees across the globe (ASEAN, APEC, EAC, GCC, PANDRH, SADC) WHO: WHO, GMP, Regulatory Requirements for registration of drugs and post approval requirements in WHO through prequalification programme, Certificate of Pharmaceutical Product (CoPP) - General and Country Specific (South Africa, Egypt, Algeria and Morocco, Nigeria, Kenya and Botswana)	12 Hrs
5	Brazil, ASEAN, CIS and GCC Countries: ASIAN Countries: Introduction to ACTD, Regulatory Requirements for registration of drugs and post approval requirements in China and South Korea & Association of Southeast Asian Nations (ASEAN) Region i.e. Vietnam, Malaysia, Philippines, Singapore and Thailand. CIS (Commonwealth Independent States): Regulatory pre-requisites related to Marketing authorization requirements for drugs and post approval requirements in CIS countries i.e. Russia, Kazakhstan and Ukraine GCC (Gulf Cooperation Council) for Arab states: Regulatory pre-requisites related to Marketing authorization requirements for drugs and post approval requirements in Saudi Arabia and UAE Legislation and regulations for import, manufacture, distribution and sale of cosmetics in Brazil, ASEAN, CIS and GCC Countries.	12 Hrs

REFERENCES :

1. Generic Drug Product Development, Solid Oral Dosage forms, Leon Shargel and Isader Kaufer, Marcel Dekker series, Vol.143
2. The Pharmaceutical Regulatory Process, Edited by Ira R. Berry Marcel Dekker Series, Vol.144
3. The Pharmaceutical Regulatory Process, Second Edition Edited by Ira R. Berry and Robert P. Martin, Drugs and the Pharmaceutical Sciences, Vol.185 Informa Health care Publishers.
4. New Drug Approval Process: Accelerating Global Registrations By Richard A Guarino, MD, 5th edition, Drugs and the Pharmaceutical Sciences, Vol.190.
5. Guidebook for drug regulatory submissions / Sandy Weinberg. By John Wiley & Sons. Inc.
6. Drugs: From Discovery to Approval, Second Edition By Rick Ng
7. New Drug Development: A Regulatory Overview, Eighth Edition By Mark Mathieu
8. Pharmaceutical Risk Management By Jeffrey E. Fetterman, Wayne L. Pines and Gary H. Slatko
9. Preparation and Maintenance of the IND Application in eCTD Format By William K. Sietsema
10. Country Specific Guidelines from official websites.
11. http://www.who.int/medicines/areas/quality_safety/regulation_legislation/ListMRAWebsites.pdf
12. Roadmap to an ASEAN economic community Edited by Denis Hew. ISEAS Publications, Singapore 2005, ISBN981-230-347-2
13. ASEAN, Rodolfo C. Severino, ISEAS Publications, Singapore 2005, ISBN 978-981-230-750-7
14. Building a Future with Brics: The Next Decade for Offshoring, Mark Kobayashi-Hillary, Springer
15. Outsourcing to India: The Offshore Advantage, Mark Kobayashi-Hillary, Springer Trade performance and Regional Integration of the CIS Countries, Lev Freinkman,
16. The world Bank, Washington, DC, ISBN: 0-8212-5896-0
17. Global Pharmaceutical Policy: Ensuring Medicines for Tomorrow's World ByFrederick M. Abbott, Graham Dukes, Maurice Nelson Graham Dukes 139
18. The Gulf Cooperation Council: A Rising Power and Lessons for ASEAN by Linda Low and Lorraine Carlos Salazar (Nov 22, 2010)
19. Doing Business in the Asean Countries, Balbir Bhasin, Business Expert Press ISBN:13:978-1-60649-108-9
20. Realizing the ASEAN Economic Community: A Comprehensive Assessment, Michael G Plummer (Editor), Chia Siow Yue (Editor), Instute of South east asian studies, Singapore

REGULATORY ASPECTS OF HERBAL AND BIOLOGICALS
(MRA 202T)

Scope

This course is designed to impart fundamental knowledge on Regulatory Requirements, Licensing and Registration, Regulation on Labelling of Biologics in India, USA and Europe

It prepares the students to learn in detail on Regulatory Requirements for biologics, Vaccines and Blood Products

Objectives

Upon the completion of the course the student shall be able to :

- Know the regulatory Requirements for Biologics and Vaccines
- Understand the regulation for newly developed biologics and biosimilars
- Know the pre-clinical and clinical development considerations of biologics
- Understand the Regulatory Requirements of Blood and/or Its Components Including Blood Products and label requirements

Theory 60 Hrs

1. India : Introduction, Applicable Regulations and Guidelines , Principles for Development of Similar Biologics, Data Requirements for Preclinical Studies, Data Requirements for Clinical Trial Application, Data Requirements for Market Authorization Application, Post-Market Data for Similar Biologics, Pharmacovigilance. GMP and GDP. — 12 Hrs

2 USA: Introduction to Biologics; biologics, biological and biosimilars, different biological products, difference between generic drug and biosimilars, laws, regulations and guidance on biologics/ biosimilars, development and approval of biologics and biosimilars (IND, PMA, BLA, NDA, 510(k), pre-clinical and clinical development considerations, advertising, labelling and packing of biologics — 12 Hrs

3 European Union: Introduction to Biologics; directives, scientific guidelines and guidance related to biologics in EU, comparability/ biosimilarity assessment, Plasma master file, TSE/ BSE evaluation, development and regulatory approval of biologics (Investigational medicinal products and biosimilars), pre-clinical — 12 Hrs

	and clinical development considerations; stability, safety, advertising, labelling and packing of biologics in EU	
4	Vaccine regulations in India, US and European Union: Clinical evaluation, Marketing authorisation, Registration or licensing, Quality assessment, Pharmacovigilance, Additional requirements Blood and Blood Products Regulations in India, US and European Union: Regulatory Requirements of Blood and/or Its Components Including Blood Products, Label Requirements, ISBT (International Society of Blood Transfusion) and IHN (International Haemovigilence Network)	12 Hrs
5	Herbal Products: Quality, safety and legislation for herbal products in India, USA and European Union.	12 Hrs

REFERENCES

1. FDA Regulatory Affairs: A Guide for Prescription Drugs, Medical Devices, and Biologics, Douglas J. Pisano , David S. Mantus ; Informa ,2008
2. Biological Drug Products: Development and Strategies; Wei Wang , Manmohan Singh ; wiley ,2013
3. Development of Vaccines: From Discovery to Clinical Testing; Manmohan Singh , Indresh K. Srivastava ;Wiley, 2011
4. www.who.int/biologicals/en
5. www.fda.gov/BiologicsBloodVaccines/GuidanceComplianceRegulatoryInformation/
6. www.ihn-org.com
7. www.isbtweb.org
8. Guidelines on Similar Biologics: Regulatory Requirements for Marketing Authorization in India
9. www.cdsco.nic.in
10. www.ema.europa.eu › scientific guidelines › Biologicals
11. www.fda.gov/biologicsbloodVaccines/GuidanceCompliance Regulatory Information (Biologics)

REGULATORY ASPECTS OF MEDICAL DEVICES
(MRA 203T)

Scope

This course is designed to impart the fundamental knowledge on the medical devices and in vitro diagnostics, basis of classification and product life cycle of medical devices, regulatory requirements for approval of medical devices in regulated countries like US, EU and Asian countries along with WHO regulations. It prepares the students to learn in detail on the harmonization initiatives, quality and ethical considerations, regulatory and documentation requirements for marketing medical devices and IVDs in regulated countries.

Objectives

Upon completion of the course, the student shall be able to know

- basics of medical devices and IVDs, process of development, ethical and quality considerations
- harmonization initiatives for approval and marketing of medical devices and IVDs
- regulatory approval process for medical devices and IVDs in India, US, Canada, EU, Japan and ASEAN
- clinical evaluation and investigation of medical devices and IVDs

Theory — 60 Hrs

1. Medical Devices: Introduction, Definition, Risk based classification and Essential Principles of Medical Devices and IVDs. Differentiating medical devices IVDs and Combination Products from that of pharmaceuticals, History of Medical Device Regulation, Product Lifecycle of Medical Devices and Classification of Medical Devices. — 12 Hrs

   IMDRF/GHTF: Introduction, Organizational Structure, Purpose and Functions, Regulatory Guidelines, Working Groups, Summary Technical Document (STED), Global Medical Device Nomenclature (GMDN).

2. Ethics: Clinical Investigation of Medical Devices, Clinical Investigation Plan for Medical Devices, Good Clinical Practice for Clinical Investigation of medical devices (ISO 14155:2011) — 12 Hrs

   Quality: Quality System Regulations of Medical Devices: ISO 13485, Quality Risk Management of Medical Devices: ISO 14971, Validation and Verification of Medical device, Adverse Event Reporting of Medical device

3	USA: Introduction, Classification, Regulatory approval process for Medical Devices (510k) Premarket Notification, Pre-Market Approval (PMA), Investigational Device Exemption (IDE) and In vitro Diagnostics, Quality System Requirements 21 CFR Part 820, Labeling requirements 21 CFR Part 801, Post marketing surveillance of MD and Unique Device Identification (UDI). Basics of In vitro diagnostics, classification and approval process.	12 Hrs
4	European Union: Introduction, Classification, Regulatory approval process for Medical Devices (Medical Device Directive, Active Implantable Medical Device Directive) and In vitro Diagnostics (In Vitro Diagnostics Directive), CE certification process. Basics of In vitro diagnostics, classification and approval process.	12 Hrs
5	ASEAN, China & Japan: Medical Devices and IVDs, Regulatory registration procedures, Quality System requirements and clinical evaluation and investigation. IMDRF study groups and guidance documents.	12 Hrs

REFERENCES

1. FDA regulatory affairs: a guide for prescription drugs, medical devices, and biologics by Douglas J. Pisano, David Mantus.
2. Medical Device Development: A Regulatory Overview by Jonathan S. Kahan
3. Medical Product Regulatory Affairs: Pharmaceuticals, Diagnostics, Medical Devices by John J. Tobin and Gary Walsh
4. Compliance Handbook for Pharmaceuticals, Medical Devices and Biologics by Carmen Medina
5. Country Specific Guidelines from official websites.

REGULATORY ASPECTS OF FOOD & NUTRACEUTICALS
(MRA 204T)

Scope

This course is designed to impart the fundamental knowledge on Regulatory Requirements, Registration and Labeling Regulations of Nutraceuticals in India, USA and Europe.

It prepares the students to learn in detail on Regulatory Aspects for nutraceuticals and food supplements.

Objectives

Upon completion of the course, the student shall be able to

- Know the regulatory Requirements for nutraceuticals
- Understand the regulation for registration and labeling of nutraceuticals and food supplements in India, USA and Europe.

Theory		60 Hrs
1.	Nutraceuticals: Introduction, History of Food and Nutraceutical Regulations, Meaning of Nutraceuticals, Dietary Supplements, Functional Foods, Medical Foods, Scope and Opportunities in Nutraceutical Market.	12 Hrs
2	Global Aspects: WHO guidelines on nutrition. NSF International: Its Role in the Dietary Supplements and Nutraceuticals Industries, NSF Certification, NSF Standards for Food And Dietary Supplements. Good Manufacturing Practices for Nutraceuticals.	12 Hrs
3	India : Food Safety and Standards Act, Food Safety and Standards Authority of India: Organization and Functions, Regulations for import, manufacture and sale of nutraceutical products in India, Recommended Dietary Allowances (RDA) in India.	12 Hrs
4	USA: US FDA Food Safety Modernization Act, Dietary Supplement Health and Education Act. U.S. regulations for manufacture and sale of nutraceuticals and dietary supplements, Labelling Requirements and Label Claims for Dietary Supplements, Recommended Dietary Allowances (RDA) in the U.S	12 Hrs

5	European Union: European Food Safety Authority (EFSA): Organization and Functions. EU Directives and regulations for manufacture and sale of nutraceuticals and dietary supplements. Nutrition labelling. European Regulation on Novel Foods and Novel Food Ingredients. Recommended Dietary Allowances (RDA) in Europe.	12 Hrs

REFERENCES

1. Regulation of Functional Foods and Nutraceuticals: A Global Perspective by Clare M. Hasler (Wiley Online Library)
2. Nutraceutical and Functional Food Regulations in the United States and Around the World by Debasis Bagchi (Academic Press, Elsevier)
3. http://www.who.int/publications/guidelines/nutrition/en/
4. http://www.europarl.europa.eu/RegData/etudes/STUD/2015/536324/IPOL_STU(2015)536324_EN.pdf
5. Handbook of Nutraceuticals by Yashwant Pathak (CRC Press)
6. Food Regulation: Law, Science, Policy and Practice by Neal D. Fortin (Wiley)
7. Country Specific Guidelines from official websites.

REGULATORY AFFAIRS PRACTICAL - II
(MRA 205P)

1. Case studies on
2. Change Management/ Change control. Deviations
3. Corrective & Preventive Actions (CAPA)
4. Documentation of raw materials analysis as per official monographs
5. Preparation of audit checklist for various agencies
6. Preparation of submission to FDA using eCTD software
7. Preparation of submission to EMA using eCTD software
8. Preparation of submission to MHRA using eCTD software
9. Preparation of Biologics License Applications (BLA)
10. Preparation of documents required for Vaccine Product Approval
11. Comparison of clinical trial application requirements of US, EU and India of Biologics
12. Preparation of Checklist for Registration of Blood and Blood Products
13. Registration requirement comparison study in 5 emerging markets (WHO) and preparing check list for market authorization
14. Registration requirement comparison study in emerging markets (BRICS) and preparing check list for market authorization
15. Registration requirement comparison study in emerging markets (China and South Korea) and preparing check list for market authorization
16. Registration requirement comparison study in emerging markets (ASEAN) and preparing check list for market authorization
17. Registration requirement comparison study in emerging markets (GCC) and preparing check list for market authorization
18. Checklists for 510k and PMA for US market
19. Checklist for CE marking for various classes of devices for EU
20. STED Application for Class III Devices
21. Audit Checklist for Medical Device Facility
22. Clinical Investigation Plan for Medical Devices

PHARMACEUTICALBIOTECHNOLOGY(MPB)

MODERN PHARMACEUTICAL ANALYTICAL TECHNIQUES (MPB 101T)

Scope

This subject deals with various advanced analytical instrumental techniques for identification, characterization and quantification of drugs. Instruments dealt are NMR, Mass spectrometer, IR, HPLC, GC etc.

Objectives

After completion of course student is able to know,

- The analysis of various drugs in single and combination dosage forms
- Theoretical and practical skills of the instruments

THEORY 60 Hrs

1. a. UV-Visible spectroscopy: Introduction, Theory, Laws, Instrumentation associated with UV-Visible spectroscopy, Choice of solvents and solvent effect and Applications of UV-Visible spectroscopy. 12 Hrs

   IR spectroscopy: Theory, Modes of Molecular vibrations, Sample handling, Instrumentation of Dispersive and Fourier - Transform IR Spectrometer, Factors affecting vibrational frequencies and Applications of IR spectroscopy

   b. Spectroflourimetry: Theory of Fluorescence, Factors affecting fluorescence, Quenchers, Instrumentation and Applications of fluorescence spectrophotometer.

   c. Flame emission spectroscopy and Atomic absorption spectroscopy: Principle, Instrumentation, Interferences and Applications.

2 NMR spectroscopy: Quantum numbers and their role in NMR, Principle, Instrumentation, Solvent requirement in NMR, Relaxation process, NMR signals in various compounds, Chemical shift, Factors influencing chemical shift, Spin-Spin coupling, Coupling constant, Nuclear magnetic double resonance, Brief outline of principles of FT-NMR and 13C NMR. Applications of NMR spectroscopy. 12 Hrs

3	Mass Spectroscopy: Principle, Theory, Instrumentation of Mass Spectroscopy, Different types of ionization like electron impact, chemical, field, FAB and MALDI, APCI, ESI, APPI Analyzers of Quadrupole and Time of Flight, Mass fragmentation and its rules, Meta stable ions, Isotopic peaks and Applications of Mass spectroscopy	12 Hrs
4	Chromatography: Principle, apparatus, instrumentation, chromatographic parameters, factors affecting resolution and applications of the following: a) Paper chromatography b) Thin Layer chromatography c) Ion exchange chromatography d) Column chromatography e) Gas chromatography f) High Performance Liquid chromatography g) Affinity chromatography	12 Hrs
5	a. Electrophoresis: Principle, Instrumentation, Working conditions, factors affecting separation and applications of the following: a) Paper electrophoresis b) Gel electrophoresis c) Capillary electrophoresis d) Zone electrophoresis e) Moving boundary electrophoresis f) Iso electric focusing b. X ray Crystallography: Production of X rays, Different X ray methods, Bragg's law, Rotating crystal technique, X ray powder diffration technique, Types of crystals and applications of X-ray diffraction.	12 Hrs

REFERENCES

1. Spectrometric Identification of Organic compounds - Robert M Silverstein, Sixth edition, John Wiley & Sons.
2. Principles of Instrumental Analysis - Doglas A Skoog, F. James Holler, Timothy A. Nieman, 5th edition, Eastern press, Bangalore.
3. Instrumental methods of analysis – Willards, 7th edition, CBS publishers.
4. Practical Pharmaceutical Chemistry – Beckett and Stenlake, Vol II, 4th edition, CBS Publishers, New Delhi.
5. Organic Spectroscopy - William Kemp, 3rd edition, ELBS.
6. Quantitative Analysis of Drugs in Pharmaceutical formulation - P D Sethi, 3rd Edition, CBS Publishers, New Delhi.
7. Pharmaceutical Analysis- Modern methods – Part B - J W Munson, Volume 11, Marcel Dekker Series

MICROBIAL AND CELLULAR BIOLOGY
(MPB 102T)

Scope

This subject is designed to provide the advanced knowledge to the biotechnology students in invaluable areas of advanced microbiology which plays a crucial role in determining its future use and applications in medicine, drug discovery and in pharmaceutical industry.

Objective

At the completion of this course it is expected that the students will get an understanding about the following aspects;

- Importance of Microorganisms in Industry
- Central dogma of molecular biology
- Structure and function of cell and cell communication
- Cell culture technology and its applications in pharmaceutical industries.
- Microbial pathogenesis and correlating it to rational use of antimicrobial agents.

THEORY 60Hrs

1. Microbiology 12 Hrs

Introduction – Prokaryotes and Eukaryotes. Bacteria, fungi, actionomycetes and virus - structure, chemistry and morphology, cultural, physiological and reproductive features. Methods of isolation, cultivation and maintenance of pure cultures. Industrially important microorganisms - examples and applications

2 Molecular Biology: Structure of nucleus and chromosome, Nucleic acids and composition, structure and types of DNA and RNA. Central dogma of molecular biology: Replication, Transcription and translation. 12 Hrs

Gene regulation

Gene copy number, transcriptional control and translational control.

RNA processing

Modification and Maturation, RNA splicing, RNA editing, RNA amplification. Mutagenesis and repair mechanisms, types of mutants, application of mutagenesis in stain improvement, gene mapping of plasmids- types purification and application. Phage genetics, geneticorganization, phage mutation and lysogeny.

3	Cell structure and function Cell organelles, cytoskeleton & cell movements, basic aspectsof cell regulation, bioenergetics and fuelling reactions of aerobics and anaerobics,secondary metabolism & its applications. Cell communication, cell cycle and apoptosis, mechanism of cell division. Celljunctions/adhesion and extra cellular matrix, germ cells and fertilization, histology – thelife and death of cells in tissues. Cell Cycle and Cytoskeleton Cell Division and its Regulation, G-Protein CoupledReceptors, Kinases, Nuclear receptors, Cytoskeleton & cell movements, IntermediateFilaments. Apoptosis and Oncogenes Programmed Cell Death, Tumor cells, carcinogens & repair. Differentiation and Developmental Biology Fertilization, Events of Fertilization, In vitro Fertilization, Embryonic Germ Cells, Stem Cells and its Application.	12 Hrs
4	Principles of microbial nutrition Physical and chemical environment for microbial growth, Stability and degeneration of microbial cultures. Growth of animal cells in culture General procedure for cell culture, Nutrient composition, Primary, established and transformed cell cultures, applications of cell cultures in pharmaceutical industry and research. Growth of viruses in cell culture propagation and enumeration. In-vitro screening techniques- cytotoxicity, anti-tumor, anti-viral assays.	12 Hrs
5	Microbial pathology Identifying the features of pathogenic bacteria, fungi and viruses. Mechanism of microbial pathogenicity, etiology and pathology of common microbial diseases and currently recommended therapies for common bacterial, fungal & viral infections. Mechanism of action of antimicrobial agents and possible sites of chemotherapy.	12 Hrs

REFERENCES

1. W.B. Hugo and A.D. Russel: Pharmaceutical Microbiology, Blackwell Scientific publications, Oxford London.
2. Prescott and Dunn, Industrial Microbiology, CBS Publishers & Distributors, Delhi.
3. Pelczar, Chan Kreig, Microbiology, Tata McGraw Hill edn.
4. David Freifelder, Molecular Biology, 2nd edition, Narosa Publishing House.
5. R. Ian Freshney, Culture of animal cells – A manual of Basic techniques, 6th edition, Wileys publication house.
6. David Baltimore,Molecular cell biology, W H Freeman & Co publishers.
7. Cell biology vol-I,II,III by Julio E.Cells
8. Bergeys manual of systematic bacteriology, Williams and Wilkins- A Waverly company.

BIOPROCESS ENGINEERING AND TECHNOLOGY
(MPB 103T)

Scope

This paper has been designed to provide the knowledge to the biotechnology students in invaluable areas of bioprocess technology to develop skills to modify, design and operate different types of fermenters, to understand and implement various fermentation procedures, to train students in scale up fermentation operations.

Objective

At the completion of this subject it is expected that students will be able to,

- Understand basics and design of fermentation technology
- Scale up and scale down processing of fermentation technology
- Bioprocessing of the industrially important microbial metabolites in industries and R & D organizations.
- Regulation governing the manufacturing of biological products
- Understand and conduct fermentation process kinetics.

	THEORY	60 Hrs
1.	Introduction to fermentation technology Basic principles of fermentation Study of the design and operation of bioreactor Ancillary parts and function, impeller design and agitation, power requirements on measurements and control of dissolved oxygen, carbon dioxide, temperature, pH and foam. Types of bioreactor CSTR, tower, airlift, bubble column, packed glass bead, hollow fiber, configuration and application Computer control of fermentation process System configuration and application	12 Hrs
2	Mass transfer Theory, diffusional resistance to oxygen requirements of microorganisms, measurements of mass transfer co- efficient and factor affecting them, effects of aeration and agitation on mass transfer, supply of air, air compressing, cleaning and sterilization of air and plenum ventilation, air sampling and testing standards for air purity.	12 Hrs

Rheology

Rheological properties of fermentation system and their importance in bioprocessing.

3 Scale up of fermentation process 12 Hrs

Principles, theoretical considerations, techniques used, media for fermentation, HTST sterilization, advantage and disadvantage, liquid sterilization.

Cultivation and immobilized culture system

Cultivation system - batch culture, continuous culture, synchronous cultures, fed batch culture. Graphical plot representing the above systems.

Introduction to immobilization

Techniques, immobilization of whole cell, immobilized culture system to prepare fine chemicals. Immobilization of enzymes and their applications in the industry. Reactors for immobilized systems and perspective of enzyme engineering.

4 Scale down of fermentation process 12 Hrs

Theory, equipment design and operation, methods of filtration, solvent extraction, chromatographic separation, crystallization turbidity analysis and cell yield determination, metabolic response assay, enzymatic assay, bioautographic techniques and disruption of cells for product recovery.

Isolation and screening

Primary and secondary, maintenance of stockculture, strain improvement for increased yield.

5 Bioprocessing of the industrially important microbial metabolites 12 Hrs

a) Organic solvents – Alcohol and Glycerol
b) Organic acids - Citric acids, Lactic acids,
c) Amino acids - Glutamic acids, Lysine, Cyclic AMP and GMP
d) Antibiotics - Penicillin, Streptomycin, Griseofulvin,
e) Vitamins - B12, Riboflavin and Vitamin C

Biosynthetic pathways for some secondary metabolites, microbial transformation of steroids and alkaloids

Regulation governing the manufacturing of biological products .

REFERENCES

1. Peter Stanbury, Allan Whitaker, Stephen Hall, Principles of Fermentation technology, Elsevier stores.
2. L.E. Casida, Industrial Microbiology, John Wiley & sons Inc.
3. F.M. Asubel, Current protocols in molecular biology, volume I and II, John Wiley Publishers.
4. Biotol Board, Bioreactor design and product yield, Butterworth and Helhemann Publishers.
5. H. Patel, Industrial microbiology, Macmillan India Limited.

ADVANCED PHARMACEUTICAL BIOTECHNOLOGY
(MPB 104T)

Scope

This paper has been designed to provide the knowledge to the students to develop skills of advanced techniques of isolation and purification of enzymes, to enrich students with current status of development of vaccines and economic importance of biotechnology products.

Objective

At the completion of this subject it is expected that students will be able to

- Understand about the latest technology development in biotechnology technique, tools and their uses in drug and vaccine development.
- Identify appropriate sources of enzymes.
- Understand and perform genetic engineering techniques in gene manipulation, r-DNA technology and gene amplification.
- Understand the overview of pharmacogenomics.
- Learn the regulatory approval process and key regulatory agencies for new drugs, biologics, devices, and drug-device combinations.

THEORY 60 Hrs

1. Enzyme Technology 12 Hrs

Classification, general properties of enzymes, dynamics of enzymatic activity,sources of enzymes, extraction and purification, pharmaceutical,therapeutic and clinical application. Production of amyloglucosidase, glucose isomerase,amylase and trypsin.

2 Genetic Engineering 12 Hrs

Techniques of gene manipulation, cloning strategies,procedures, cloning vectors expression vectors, recombinant selection andscreening, expression in E.coli and yeast.

Site directed mutagenesis, polymerase chain reaction, and analysis of DNAsequences.

Gene library and cDNA

Applications of the above technique in the production of,

- Regulatory proteins - Interferon, Interleukins
- Blood products - Erythropoietin
- Vaccines - Hepatitis-B
- Hormones - Insulin

3	Therapeutic peptides Study on controlled and site specified delivery of therapeutic peptides and proteins through various routes of administration. Transgenic animals Production of useful proteins in transgenic animals and gene therapy. Human Genome The human genome project-a brief study, Human chromosome – Structure and classification, chromosomal abnormalities – Syndromes	12 Hrs
4	Signal transduction Introduction, cell signaling pathways, Ion channels, Sensors and effectors, ON and OFF mechanisms, Spatial and temporal aspects of signaling, cellular process, development, cell cycle and proliferation, neuronal signaling, cell stress, inflammatory responses and cell death, signaling defects and diseases. Oncogenes Introduction, definition, various oncogenes and their proteins.	12 Hrs
5	Microbial Biotransformation Biotransformation for the synthesis of chiral drugs and steroids. Microbial Biodegradation Biodegradation of xenobiotics, chemical and industrial wastes, Production of single-cell protein, Applications of microbes in environmental monitoring. Biosensors Definition, characteristics of ideal biosensors, types of biosensors, biological recognition elements, transducers, application of biosensors.	12 Hrs

REFERENCES

1. Biotechnology-The biological principles: MD Trevan, S Boffey, KH Goulding and P.F. Stanbury.
2. Immobilization of cells and enzymes: HosevearKennadycabral& Bicker staff
3. Principles of Gene Manipulating: RW Old and S.B.Primrose.
4. Molecular Cell Biology: Harvey Lodish, David Baltimore, Arnold Berk, S LawenceZipursky, Paul Matsudaira, James Darnell.
5. Modern Biotechnology: S.B Primrose

6. Gene transfer and expression protocols-methods in Molecular Biology, vol. VII, Edit E.T. Murray
7. Current protocols in Molecular Biology, Vo1.I & II:F.M. Asubel, John wiley Publishers
8. Current protocols in cellular biology, Vo1.1 & II John wiley publishers.
9. Principles of human genetics; by Curt Stern, published by W.H. Freeman.

PHARMACEUTICAL BIOTECHNOLOGY PRACTICAL - I
(MPB 105P)

1. Analysis of Pharmacopoeial compounds and their formulations by UV Vis spectrophotometer
2. Simultaneous estimation of multi component containing formulations by UV spectrophotometry
3. Experiments based on HPLC
4. Experiments based on Gas Chromatography
5. Estimation of riboflavin/quinine sulphate by fluorimetry
6. Estimation of sodium/potassium by flame photometry
7. Isolation and Purification of microorganism from the soil
8. Microbial contamination of Water and biochemical parameters.
9. Determination of Minimum Inhibitory concentration by gradient plate technique and serial dilution method.
10. UV- survival curve and Dark repair
11. Sterility test for pharmaceutical preparations
12. Sub culturing of cells and cytotoxicity assays.
13. Construction of growth curve and determination of specific growth rate and doubling time
14. Fermentation process of alcohol and wine production
15. Fermentation of vitamins and antibiotics
16. Whole cell immobilization engineering
17. Thermal death kinetics of bacteria
18. Replica plating
19. Bio-autography.
20. Isolation and estimation of DNA
21. Isolation and estimation of RNA
22. Isolation of plasmids
23. Agarose gel electrophoresis.
24. Transformation techniques
25. SDS - polyacrylamide gel electrophoresis for proteins
26. Polymerase chain reaction technique.

PROTEINS AND PROTEIN FORMULATIONS
(MPB 201T)

Scope

This course is designed to impart knowledge and skills necessary for knowing fundamental aspects of proteins and their formulations is a part of drug research and development process. Basic theoretical discussions of the principles of more integrated and coherent use of information for protein formulation and design are provided to help the students to clarify the various biological concepts of protein.

Objective

At the completion of this course it is expected that students will be able to understand,

- Various methods of purification of proteins
- Peptides in drug development
- Protein identification and characterization
- Protein based formulations
- Sequencing proteins

THEORY 60 Hrs

1. Protein engineering — 12 Hrs

   Concepts for protein engineering. Isolation and purification of proteins, Stability and activity based approaches of protein engineering, Chemical and Physical Considerations in Protein and Peptide Stability, Different methods for protein engineering, gene shuffling, and direct evolution.

2 Peptidomimetics — 12 Hrs

   Introduction, classification; Conformationally restricted peptides, design, pseudopeptides, peptidomimetics and transition state analogs; Biologically active template; Amino acid replacements; Peptidomimetics and rational drug design; CADD techniques in peptidomimetics; Development of non peptide peptidomimetics.

3 Proteomics — 12 Hrs

   Protein identification and characterization: Methods/strategies, protein identification, de novo protein characterization, Isotope labelling, N- and C-terminal tags.

	2-Dimensional gel electrophoresis Methods including immobilized pH gradients (IPGs), resolution, reproducibility and image analysis, future developments	
4	Protein formulation Different strategies used in the formulation of DNA and proteins, Analytical and biophysical parameters of proteins and DNA in pre-formulation, Liposomes, Neon-spears, Neon-particulate system, PEGylation, Biological Activity, Biophysical Characterization Techniques, Forced degradation studies of protein.	12 Hrs
5	Methods of protein sequencing Various methods of protein sequencing, characterisation, Edman degradation, Tryptic and/or Chymotryptic Peptide Mapping.	12 Hrs

REFERENCES

1. H. Lodhishet. Al. Molecular Cell Biology, W. H. Freeman and Company
2. Protein Purification – Hand Book, Amersham pharmacia biotech
3. EngelbertBuxbaum, Fundamentals of Protein Structure and Function, Springer Science
4. Sheldon J. Park, Jennifer R. Cochran, Protein Engineering and Design, CRC press.
5. Robert K. Skopes. Protein purification, principle and practice, springer link.
6. David Whitford, Proteins-Structure and Function, John Wiley & Sons Ltd.
7. James Swarbrick, Protein Formulation and Delivery Informa Healthcare USA,Inc.
8. Rodney Pearlman, Y. John Wang Formulation, Characterization, and Stability of Protein Drugs, Kluwer Academic Publishers.

IMMUNOTECHNOLOGY
(MPB 202T)

Scope

This course is designed to impart knowledge on production and engineering of antibodies, the application of antigens, the design of (recombinant) vaccines, strategies for immune intervention, etc. The Immunotechnology - based techniques will be used for therapeutics and diagnostics, industries in the production, quality control and quality assurance, and in R&D.

Objective

After this course, the students will be able to:-

- Understand the techniques like immunodiagnostic tests,
- Characterization of lymphocytes, purification of antigens and antibody, etc.
- Access health problems with immunological background;
- Develop approaches for the immune intervention of diseases

THEORY 60 Hrs

1. Fundamental aspects of immunology 12 Hrs

Introduction, cells and organs of the immune system, cellular basis of Immune response, primary and secondary lymphoid organs, antigen antibody and their structure.

Types of immune responses, anatomy of immune response.

Overview of innate and adaptive Immunity.

Humoral Immunity

B - Lymphocytes and their activation. Structure and function of immunoglobulins, idiotypes and anti idiotypic antibodies.

Cell mediated Immunity

Thymus derived lymphocytes (T cells) - their ontogeny and types, MHC complex, antigen presenting cells (APC), mechanisms of T cell activation, macrophages, dendritic cells, langerhans cells, mechanism of phagocytosis

2 Immune Regulation and Tolerance 12 Hrs

Complement activation and types and their biological functions, cytokines and their role in immune response.

Hypersensitivity

Hypersensitivity Types I-IV, Hypersensitivity reactions and treatment

Autoimmune diseases

3 Vaccine technology 12 Hrs

Vaccine and their types, conventional vaccines, novel methods for vaccine production, antiidiotype vaccine, DNA vaccine, genetically engineered vaccine, iscoms, synthetic peptides, and immunodiagnostics.

Stem cell technology

Stem cell technology and applications to immunology

4 Hybridoma Technology 12 Hrs

Hybridoma techniques – fusion methods for myeloma cells and B-Lymphocytes, selection and screening techniques. Production and purification of monoclonal antibodies and their applications in Pharmaceutical industry.

5 Immunological Disorder 12 Hrs

Autoimmune disorders and types, pathogenic mechanisms, treatment, experimental models of auto immune diseases, primary and secondary immunodeficiency disorders.

Immunodiagnosis

Antigen antibody interaction – Precipitation reaction, Agglutination reactions, Principles and applications of ELISA, Radio Immuno Assay, Western blot analysis, immune-electrophoresis, immuno fluorescence, chemiluminescence assay, complement fixation reaction.

REFERENCES

1. J. Kubey, Immunology – an Introduction.
2. S.C. Rastogi, Immunodiagonstics, New Age International.
3. Ashim Chakravarthy, Immunology and Immunotechnology, Oxford University Press.
4. E. Benjamini, Molecular Immunology.

BIOINFORMATICS AND COMPUTATIONAL BIOTECHNOLOGY
(MPB 203T)

Scope

This paper has been designed to provide the advanced knowledge to the biotechnology students in invaluable areas of advanced bioinformatics which plays a crucial role in determining its future use and applications in medicine, drug discovery and in pharmaceutical industry.

Objectives

Upon completion of this course it is expected that the students will be able to understand,

- Use of computers in developing a new drugs
- Biological concepts for bioinformatics
- Proteins and their diversity
- Various gene finding methods
- Searching the biological databases
- Target searching
- Various methods of drug designing

THEORY — 60 Hrs

1. Introduction to Bioinformatics — 12 Hrs

   Definition and History of Bioinformatics, Internet and Bioinformatics, Introduction to Data Mining, Applications of Data Mining to Bioinformatics,

   Biological Database

   Protein and nucleic acid databases. Structural data bases. Collecting and storing the sequence and Applications of Bioinformatics.

2 Sequence analysis — 12 Hrs

   Sequence alignment, pair wise alignment techniques, multiple sequence analysis, multiple sequence alignment; Flexible sequence similarity searching with the FAST3 program package, the use of CLUSTAL W and CLUSTAL X for the multiple sequence alignment. Tools used for sequence analysis.

3 Protein informatics — 12 Hrs

   Introduction; Force field methods; Energy, buried and exposed residues, side chains and neighbours; Fixed regions, hydrogen bonds, mapping properties onto surfaces; Fitting monomers, R &

S fit of conformers, assigning secondary structures; Sequence alignment-methods, evaluation, scoring; Protein completion, backbone construction and side chain addition; Small peptide methodology, software accessibility, building peptides; Protein displays; Substructure manipulations, annealing.

Protein structure prediction

Protein folding and model generation; Secondary structure prediction, analyzing secondary structures; Protein loop searching, loop generating methods, loop analysis; Homology modeling, concepts of homology modeling, potential applications, description, methodology, homologous sequence identification; Align structures, align model sequence; Construction of variable and conserved regions, threading techniques, Topology fingerprint approach for prediction, evaluation of alternate models; Structure prediction on a mystery sequence, structure aided sequence techniques of structure prediction, structural profiles, alignment algorithms, mutation tables, prediction, validation, sequence based methods of structure prediction, prediction using inverse folding, fold prediction; Significance analysis, scoring techniques, sequence- sequence scoring.

Docking

Docking problems, methods for protein- ligand docking, validation studies and applications; Screening small molecule databases, docking of combinatorial libraries, input data, analyzing docking results.

4 Diversity of Genomes 12 Hrs

Prokaryotic and Eukaryotic Gene Families. Genome Analysis: Introduction, Gene prediction methods, Gene mapping and applications- Genetic and Physical Mapping, Integrated map, Sequence assembly and gene expression.

Completed Genomes

Bacterium, Nematode, Plant and Human

Evolution of Genomes

Lateral or Horizontal Transfer among Genomes, Transcriptome and Proteome-General Account

Phylogenetic analysis

Evolutionary Change in Nucleotide Sequences, Rates and Patterns of Nucleotide Substitution, Models for Nucleotide Substitution, Construction of Phylogenetic Tree, Genome Annotation technique.

5	Target searching and Drug Designing Target and lead, timeline for drug development, target discovery, target modulators, In-silico gene expression, microarray, and lead discovery, libraries of ligands, active site analysis, and prediction of drug quality.	12 Hrs

REFERENCES

1. David W. Mount, Bioinformatics Sequence and Genome Analysis, CBS Publishers and Distributors
2. S. C. Rastogiet. al. Bioinformatics- Concepts Skill and Applications, CBS Publishers and Distributors
3. T. E. Creighton, Protein Structure and Molecular Properties, W. H.Freeman and Company
4. Andreas D. Baxevanis, B. F. Francis Ouellette, Bioinformatics; A Practical Guide to the Analysis of Genes and Proteins, John Wiley & Sons, Inc.
5. Arthur M. Lesk, Introduction to Bioinformatics, Oxford University Press.
6. Shui Qing Ye. Bioinformatics: A Practical Approach, Chapman & Hall/CRC.
7. David Posada, Bioinformatics for DNA Sequence Analysis, Humana press.
8. Lesk, A.M. Introduction to Bioinformatics. Oxford University Press.
9. Letovsky, S.I. Bioinformatics. Kluwer Academic Publishers.
10. Baldi, P. and Brunak, S. Bioinformatics. The MIT Press.

BIOLOGICAL EVALUATION OF DRUG THERAPY
(MPB 204T)

Scope

This paper has been designed to provide the knowledge to the biotechnology students to understand the importance of biological and evaluation of drug therapy of biological medicines.

Objective

At the completion of this subject it is expected that students will be able to,

- Understand about the general concept of standardization of biological.
- Understand the importance of transgenic animals and knockout animals.
- Understand the biological medicines in development of various diseases.
- Learn the biological evaluation of drugs in vitro and in vivo

THEORY 60 Hrs

1. Biological Standardization 12 Hrs

General principles, Scope and limitation of bio-assay, bioassay of some official drugs.

Preclinical drug evaluation

Preclinical drug evaluation of its biological activity, potency and toxicity-Toxicity test in animals including acute, sub-acute and chronic toxicity, ED50 and LD50 determination, special toxicity test like teratogenecity and mutagenecity.

Guidelines for toxicity studies

Various guidelines for toxicity studies. Animal experiments assessing safety of packaging materials.

2 Pyrogens 12 Hrs

Pyrogens: Sources, Chemistry and properties of bacterial pyrogens and endotoxins, Official pyrogen tests.

Microbiological assay

Assay of antibiotics and vitamins.

Biological evaluation of drugs

Screening and evaluation (including principles of screening, development of models for diseases: In vivo models / In vitro models / cell line study).

3 Biologic Medicines in Development for various diseases - By Therapeutic Category — 12 Hrs

- Genetic Disorders
- Eye related Disorders
- Digestive Disorders
- Diabetes/Related Conditions
- Cardiovascular Disease
- Cancer/Related Conditions
- Blood Disorders
- Autoimmune Disorders
- Infectious Diseases
- Neurologic Disorders
- Skin Diseases
- Organe Transplantation

Biologic Medicines in Development for various diseases – by Product Category

- Antisense
- Vaccines
- Recombinant Hormones/Proteins
- Monoclonal Antibodies (mAb)
- Interferons
- Growth Factors
- Gene Therapy
- RNA Interference

4 Regulatory aspects : drugs, biologics and medical devices — 12 Hrs

An introduction to the regulations and documents necessary for approval of a medical product.

Regulatory consideration

Regulatory consideration for pre-clinical testing and clinical testing of drugs, biologics and medical devices.

New Drug Applications for Global Pharmaceutical Product Approvals

5 Bioavailability — 12 Hrs

Objectives and consideration in bio-availability studies of Biopharmaceuticals, Concept of equivalents, Measurements of bio-availability.

Determination of the rate of absorption, Bioequivalence and its importance, Regulatory aspects of bio-availability and bioequivalence studies for conventional dosage forms and controlled drug delivery systems of Biopharmaceuticals.

Pharmacokinetics

Pharmacokinetics:- Basic consideration, Pharmacokinetic models, Application of Pharmacokinetics in new drug development of Biopharmaceuticals and designing of dosage forms and Novel drug delivery systems of Biopharmaceuticals.

REFERENCES

1. Perkins F.T., Hennessen W. Standardization and Control of Biologicals Produced by Recombinant DNA Technology, International Association of Biological Standardization
2. J.H. Burn., Biological Standardization, Oxford University Press
3. Drug Discovery and Evaluation in Pharmacology assay: Vogel
4. Chow, Shein, Ching, Design and analysis of animal studies in pharmaceutical development,
5. Nodine and Siegler, Animal and Clinical pharmacologic Techniques in Drug Evaluation.
6. Screening methods in pharmacology (vol I & II), R.A. Turner.

PHARMACEUTICAL BIOTECHNOLOGY PRACTICAL - II
(MPB 205P)

1. Protein identification
2. Protein characterization
3. Protein biochemistry
4. Recombinant DNA Technology
5. Protein expression
6. Protein formulations
7. Database searching
8. Sequence analysis methods
9. Protein structure prediction
10. Gene annotation methods
11. Phylogenetic analysis
12. Protein, DNA binding studies
13. Preparation of DNA for PCR applications – Isolation, Purity and Quantification
14. Introduction to PCR – working of PCR, Programming.
15. Introduction to RT-PCR – working, programming.
16. Primer design using softwares.
17. Gene DNA amplification by random / specific primers.
18. Southern Hybridization
19. Western Blotting
20. Gene transformation

PHARMACYPRACTICE(MPP)

CLINICAL PHARMACY PRACTICE (MPP 101T)

Scope

This course is designed to impart the basic knowledge and skills that are required to practice pharmacy including the provision of pharmaceutical care services to both healthcare professionals and patients in clinical settings.

Objectives

Upon completion of this course it is expected that students shall be able to :

- Understand the elements of pharmaceutical care and provide comprehensive patient care services
- Interpret the laboratory results to aid the clinical diagnosis of various disorders
- Provide integrated, critically analyzed medicine and poison information to enable healthcare professionals in the efficient patient management

THEORY 60 Hrs

1. Introduction to Clinical Pharmacy: Definition, evolution and scope of clinical pharmacy, International and national scenario of clinical pharmacy practice, Pharmaceutical care — 12 Hrs

   Clinical Pharmacy Services: Ward round participation, Drug therapy review (Drug therapy monitoring including medication order review, chart endorsement, clinical review and pharmacist interventions)

2 Clinical Pharmacy Services: Patient medication history interview, Basic concept of medicine and poison information services, Basic concept of pharmacovigilance, Hemovigilance, Materiovigilance and AEFI, Patient medication counselling, Drug utilisation evaluation, Documentation of clinical pharmacy services, Quality assurance of clinical pharmacy services. — 12 Hrs

3 Patient Data Analysis: — 12 Hrs

Patient Data & Practice Skills: Patient's case history - its structure and significances in drug therapy management, Common medical abbreviations and terminologies used in clinical practice, Communication skills: verbal and non-verbal communications, its applications in patient care services.

	Lab Data Interpretation: Hematological tests, Renal function tests, Liver function tests	
4	Lab Data Interpretation: Tests associated with cardiac disorders, Pulmonary function tests, Thyroid function tests, Fluid and electrolyte balance, Microbiological culture sensitivity tests	12 Hrs
5	Medicines & Poison Information Services Medicine Information Service: Definition and need for medicine information service, Medicine information resources, Systematic approach in answering medicine information queries, Preparation of verbal and written response, Establishing a drug information centre. Poison Information Service: Definition, need, organization and functions of poison information centre.	12 Hrs

REFERENCES

1. A Textbook of Clinical Pharmacy Practice – Essential concepts and skills – Parthasarathi G, Karin Nyfort-Hansen and Milap Nahata
2. Practice Standards and Definitions - The Society of Hospital Pharmacists of Australia
3. Basic skills in interpreting laboratory data - Scott LT, American Society of Health System Pharmacists Inc
4. Relevant review articles from recent medical and pharmaceutical literature.

PHARMACOTHERAPEUTICS-I
(MPP 102T)

Scope

This course aims to enable the students to understand the different treatment approaches in managing various disease conditions. Also, it imparts knowledge and skills in optimizing drug therapy of a patient by individualizing the treatment plan through evidence-based medicines.

Objectives

Upon completion of this course it is expected that students shall be able to:

- Describe and explain the rationale for drug therapy
- Summarize the therapeutic approach for management of various disease conditions including reference to the latest available evidence
- Discuss the clinical controversies in drug therapy and evidence based medicine
- Prepare individualized therapeutic plans based on diagnosis
- Identify the patient specific parameters relevant in initiating drug therapy, and monitoring therapy (including alternatives, time- course of clinical and laboratory indices of therapeutic response and adverse effect/s)

THEORY 60 Hrs

Etiopathogenesis and pharmacotherapy of diseases associated with following systems

1.	Cardiovascular system: Hypertension, Congestive cardiac failure, Acute coronary syndrome, Arrhythmias, Hyperlipidemias.	12 Hrs
2	Respiratory system: Asthma, Chronic obstructive airways disease, Drug induced pulmonary diseases Endocrine system: Diabetes, Thyroid diseases	12 Hrs
3	Gastrointestinal system: Peptic ulcer diseases, Reflux esophagitis, Inflammatory bowel diseases, Jaundice & hepatitis	12 Hrs
4	Gastrointestinal system: Cirrhosis, Diarrhea and Constipation, Drug-induced liver disease	12 Hrs
	Hematological diseases: Anemia, Deep vein thrombosis, Drug induced hematological disorders	

5	Bone and joint disorders: Rheumatoid arthritis, Osteoarthritis, Gout, Osteoporosis	12 Hrs
	Dermatological Diseases: Psoriasis, Eczema and scabies, impetigo, drug induced skin disorders	
	Ophthalmology: Conjunctivitis, Glaucoma	

REFERENCES

1. Roger and Walker. Clinical Pharmacy and Therapeutics - Churchill Livingstone publication
2. Joseph T. Dipiro et al. Pharmacotherapy: A Pathophysiologic Approach- Appleton & Lange
3. Robins SL. Pathologic basis of disease -W.B. Saunders publication
4. Eric T. Herfindal. Clinical Pharmacy and Therapeutics- Williams and Wilkins Publication
5. Lloyd Young and Koda-Kimble MA Applied Therapeutics: The clinical Use of Drugs- Lippincott Williams and Wilkins
6. Chisholm- Burns Wells Schwinghammer Malone and Joseph P Dipiro. Pharmacotherapy Principles and practice-– McGraw Hill Publication
7. Carol Mattson Porth. Principles of Pathophysiology- Lippincott Williams and Wilkins
8. Harrison's. Principles of Internal Medicine - McGraw Hill
9. Relevant review articles from recent medical and pharmaceutical literature

HOSPITAL & COMMUNITY PHARMACY
(MPP 103T)

Scope

This course is designed to impart basic knowledge and skills that are required to practice pharmacy in both hospital and community settings.

Objectives

Upon completion of this course it is expected that students shall be able to:

- Understand the organizational structure of hospital pharmacy
- Understand drug policy and drug committees
- Know about procurement & drug distribution practices
- Know the admixtures of radiopharmaceuticals
- Understand the community pharmacy management
- Know about value added services in community pharmacies

THEORY 60 Hrs

1.	Introduction to Hospitals – Definition, classification, organizational structure Hospital Pharmacy: Definition, Relationship of hospital pharmacy department with other departments, Organizational structure, legal requirements, work load statistics, Infrastructural requirements, Hospital Pharmacy Budget and Hospital Pharmacy management Hospital Drug Policy: Pharmacy & Therapeutics Committee, Infection Control committee, Research & Ethics Committee, Management of Medicines as per NABH	12 Hrs
2	Hospital Formulary Guidelines and its development, Developing Therapeutic guidelines, Drug procurement process, and methods of Inventory control, Methods of Drug distribution, Intravenous admixtures, Hospital Waste Management	12 Hrs
3	Education and training: Training of technical staff, training and continuing education for pharmacists, Pharmacy students, Medical staff and students, Nursing staff and students, Formal and informal meetings and lectures, Drug and therapeutics newsletter. Community Pharmacy Practice: Definition, roles & responsibilities of community pharmacists, and their relationship with other health care providers.	12 Hrs

Community Pharmacy management: Legal requirements to start community pharmacy, site selection, lay out & design, drug display, super drug store model, accounts and audits, Good dispensing practices, Different softwares & databases used in community pharmacies. Entrepreneurship in community pharmacy.

4	Prescription – Legal requirements & interpretation, prescription related problems Responding to symptoms of minor ailments: Head ache, pyrexia, menstrual pains, food and drug allergy, OTC medication: Rational use of over the counter medications Medication counseling and use of patient information leaflets Medication adherence – Definition, factors influencing adherence behavior, strategies to improve medication adherence Patient referrals to the doctors ADR monitoring in community pharmacies	12 Hrs
5	Health Promotion – Definition and health promotion activities, family planning, Health screening services, first aid, prevention of communicable and non-communicable diseases, smoking cessation, Child & mother care National Health Programs- Role of Community Pharmacist in Malaria and TB control programs Home Medicines review program – Definition, objectives, Guidelines, method and outcomes Research in community pharmacy Practice	12 Hrs

REFERENCES

1. Hospital Pharmacy - Hassan WE. Lea and Febiger publication.
2. Textbook of hospital pharmacy - Allwood MC and Blackwell.
3. Avery's Drug Treatment, Adis International Limited.
4. Community Pharmacy Practice – Ramesh Adepu, BSP Publishers, Hyderabad
5. Remington Pharmaceutical Sciences.
6. Relevant review articles from recent medical and pharmaceutical literature

CLINICAL RESEARCH
(MPP 104T)

Scope

This course aims to provide the students an opportunity to learn drug development process especially the phases of clinical trials and also the ethical issues involved in the conduct of clinical research. Also, it aims to imparts knowledge and develop skills on conceptualizing, designing, conducting and managing clinical trials.

Objectives

Upon completion of this course it is expected that students shall be able to:

- Know the new drug development process.
- Understand the regulatory and ethical requirements.
- Appreciate and conduct the clinical trials activities
- Know safety monitoring and reporting in clinical trials
- Manage the trial coordination process

THEORY 60 Hrs

1. Drug development process: Introduction, various approaches to drug discovery, Investigational new drug application submission Ethics in Biomedical Research: Ethical Issues in Biomedical Research – Principles of ethics in biomedical research, Ethical committee [institutional review board] - its constitution and functions, Challenges in implementation of ethical guidelines, ICH GCP guidelines and ICMR guidelines in conduct of Clinical trials, Drug Safety Reporting. 12 Hrs

2 Types and Designs used in Clinical Research: Planning and execution of clinical trials, Various Phases of clinical trials, Bioavailability and Bioequivalence studies, Randomization techniques (Simple randomization, restricted randomization, blocking method and stratification), Types of research designs based on Controlling Method (Experimental, Quasi experimental, and Observational methods) Time Sequences (Prospective and Retrospective), Sampling methods (Cohort study, case Control study and cross sectional study), Health outcome measures (Clinical & Physiological, Humanistic and economic) 12 Hrs

Clinical Trial Study team: Roles and responsibilities of: Investigator, Study Coordinator, Sponsor, Monitor, Contract Research Organization.

3	Clinical trial Documents: Guidelines to the preparation of following documents: Protocols, Investigator's Brochure, Informed Consent Form, Case report forms, Contracts and agreements, Dairy Cards Clinical Trial Start up activities: Site Feasibility Studies, Site/Investigator selection, Pre-study visit, Investigator meeting, Clinical trial agreement execution, Ethics committee document preparation and submission	12 Hrs
4	Investigational Product: Procurement and Storage of investigation product Filing procedures: Essential documents for clinical trial, Trial Master File preparation and maintenance, Investigator Site File, Pharmacy File, Site initiation visit, Conduct, Report and Follow up Clinical Trial Monitoring and Close out: Preparation and conduct of monitoring visit: Review of source documents, CRF, ICF, IP storage, accountability and reconciliation, Study Procedure, EC communications, Safety reporting, Monitoring visit reporting and follow-up Close-Out visit: Study related documents collection, Archival requirement, Investigational Product reconciliation and destruction, Close-Out visit report.	12 Hrs
5	Quality Assurance and Quality Control in Clinical Trials: Types of audits, Audit criteria, Audit process, Responsibilities of stakeholders in audit process, Audit follow-up and documentation, Audit resolution and Preparing for FDA inspections, Fraud and misconduct management Data Management Infrastructure and System Requirement for Data Management: Electronic data capture systems, Selection and implementation of new systems, System validation and test procedures, Coding dictionaries, Data migration and archival Clinical Trial Data Management: Standard Operating Procedures, Data management plan, CRF & Data base design considerations, Study set-up, Data entry, CRF tracking and corrections, Data cleaning, Managing laboratory and ADR data, Data transfer and database lock, Quality Control and Quality Assurance in CDM, Data mining and warehousing.	12 Hrs

REFERENCES

1. Principles and practice of pharmaceutical medicine, Second edition. Authors:Lionel. D. Edward, Aadrew.J.Flether Anthony W Fos , Peter D Sloaier Publisher:Wiley;
2. Handbook of clinical research. Julia Lloyd and Ann Raven Ed. Churchill Livingstone
3. Principles of Clinical Research edited by Giovanna di Ignazio, Di Giovanna and Haynes.
4. Central Drugs Standard Control Organization. Good Clinical Practices-Guidelines for Clinical Trials on Pharmaceutical Products in India. New Delhi: Ministry of Health.
5. International Conference on Harmonisation of Technical requirements for registration of Pharmaceuticals for human use. ICH Harmonised Tripartite Guideline. Guideline for Good Clinical Practice.E6; May 1996.
6. Ethical Guidelines for Biomedical Research on Human Subjects. Indian Council of Medical Research, New Delhi.
7. Textbook of Clinical Trials edited by David Machin, Simon Day and Sylvan Green, John Wiley and Sons.
8. Clinical Data Management edited by R K Rondels, S A Varley, C F Webbs. Second Edition, Jan 2000, Wiley Publications.
9. Goodman & Gilman: JG Hardman, LE Limbard, McGraw Hill Publications.
10. Relevant review articles from recent medical and pharmaceutical literature.

PHARMACY PRACTICE PRACTICAL – I
(MPP 105P)

Pharmacy Practice practical component includes experiments covering important topics of the courses Clinical Pharmacy Practice, Pharmacotherapeutics-I, Hospital & Community Pharmacy and Clinical Research.

List of Experiments (24)

1. Treatment Chart Review (one)
2. Medication History Interview (one)
3. Patient Medication Counseling (two)
4. Drug Information Query (two)
5. Poison Information Query (one)
6. Lab Data Interpretation (two)
7. Presentation of clinical cases of various disease conditions adopting Pharmaceutical Care Plan Model (eight)
8. ABC Analysis of a given list of medications (one)
9. Preparation of content of a medicine, with proper justification, for the inclusion in the hospital formulary (one)
10. Formulation and dispensing of a given IV admixtures (one)
11. Preparation of a patient information leaflet (two)
12. Preparation of Study Protocol (one)
13. Preparation of Informed Consent Form (one)

PRINCIPLES OF QUALITY USE OF MEDICINES
(MPP 201T)

Scope:

This course is designed to impart basic knowledge and skills that are required to practice quality use of medicines (QUM) in different healthcare settings and also to promote quality use of medicines, in clinical practice, through evidence-based medicine approach.

Objectives:

Upon completion of this course it is expected that students shall be able to:

- Understand the principles of quality use of medicines
- Know the benefits and risks associated with use of medicines
- Understand regulatory aspects of quality use of medicines
- Identify and resolve medication related problems
- Promote quality use of medicines
- Practice evidence-based medicines

	THEORY	60 Hrs
1.	Introduction to Quality use of medicines (QUM): Definition and Principles of QUM, Key partners and responsibilities of the partners, Building blocks in QMC, Evaluation process in QMC, Communication in QUM, Cost effective prescribing.	12 Hrs
2	Concepts in QUM Evidence based medicine: Definition, concept of evidence based medicine, Approach and practice of evidence based medicine in clinical settings Essential drugs: Definition, need, concept of essential drug, National essential drug policy and list Rational drug use: Definition, concept and need for rational drug use, Rational drug prescribing, Role of pharmacist in rational drug use.	12 Hrs
3	QUM in various settings: Hospital settings, Ambulatory care/Residential care, Role of health care professionals in promoting the QUM, Strategies to promote the QUM, Impact of QUM on E-health, integrative medicine and multidisciplinary care. QUM in special population: Pediatric prescribing, Geriatric prescribing, Prescribing in pregnancy and lactation, Prescribing in immune compromised and organ failure patients.	12 Hrs

4	Regulatory aspects of QUM in India: Regulation including scheduling, Regulation of complementary medicines, Regulation of OTC medicines, Professional responsibility of pharmacist, Role of industry in QUM in medicine development.	12 Hrs
5	Medication errors: Definition, categorization and causes of medication errors, Detection and prevention of medication errors, Role of pharmacist in monitoring and management of medication errors Pharmacovigilance: Definition, aims and need for pharmacovigilance, Types, predisposing factors and mechanism of adverse drug reactions (ADRs), Detection, reporting and monitoring of ADRs, Causality assessment of ADRs, Management of ADRs, Role of pharmacist in pharmacovigilance.	12 Hrs

REFERENCES:

1. A Textbook of Clinical Pharmacy Practice – Essential concepts and skills – Parthasarathi G, Karin Nyfort-Hansen and Milap Nahata
2. Andrews EB, Moore N. Mann's Pharmacovigilance
3. Dipiro JT, Talbert RL, Yee GC. Pharmacotherapy: A Pathophysiologic Approach
4. Straus SE, Richardson WS, Glasziou P, Haynes RB. Evidence-Based Medicine: How to practice and teach it
5. Cohen MR. Medication Errors
6. Online:
   - http://medicinesaustralia.com.au/files/2012/05/MA_QUM_External_Reduced.pdf
   - http://curriculum.racgp.org.au/statements/quality-use-of-medicines/
   - http://www.rug.nl/research/portal/files/14051541/Chapter_2.pdf
7. Relevant review articles from recent medical and pharmaceutical literature.

PHARMACOTHERAPEUTICS II
(MPP 202T)

Scope

This course aims to enable the students to understand the different treatment approaches in managing various disease conditions. Also, it imparts knowledge and skills in optimizing drug therapy of a patient by individualizing the treatment plan through evidence-based medicines.

Objectives

Upon completion of this course it is expected that students shall be able to:

- Describe and explain the rationale for drug therapy
- Summarize the therapeutic approach for management of various disease conditions including reference to the latest available evidence
- Discuss the clinical controversies in drug therapy and evidence based medicine
- Prepare individualized therapeutic plans based on diagnosis
- Identify the patient specific parameters relevant in initiating drug therapy, and monitoring therapy (including alternatives, time- course of clinical and laboratory indices of therapeutic response and adverse effect/s)

THEORY		60 Hrs
1.	Nervous system: Epilepsy, Parkinson's disease, Stroke, Headache, Alzheimer's disease, Neuralgias and Pain pathways and Pain management.	12 Hrs
2	Psychiatric disorders: Schizophrenia, Depression, Anxiety disorders, Sleep disorders, Drug induced psychiatric disorders Renal system: Acute renal failure, Chronic renal failure, Renal dialysis, Drug induced renal disease	12 Hrs
3	Infectious diseases: General guidelines for the rational use of antibiotics and surgical prophylaxis, Urinary tract infections, Respiratory tract infections, Gastroenteritis, Tuberculosis, Malaria, Bacterial endocarditis, Septicemia.	12 Hrs
4	Infectious diseases: Meningitis, HIV and opportunistic infections, Rheumatic fever, Dengue fever, H1N1, Helmenthiasis, Fungal infections Gynecological disorders: Dysmenorrhea, Hormone replacement therapy.	12 Hrs

5	Oncology: General principles of cancer chemotherapy, pharmacotherapy of breast cancer, lung cancer, head & neck cancer, hematological malignancies, Management of nausea and vomiting, Palliative care	12 Hrs

REFERENCES

1. Roger and Walker. Clinical Pharmacy and Therapeutics - Churchill Livingstone publication.
2. Joseph T. Dipiro et al. Pharmacotherapy: A Pathophysiologic Approach- Appleton & Lange
3. Robins SL. Pathologic basis of disease -W.B. Saunders publication
4. Eric T. Herfindal. Clinical Pharmacy and Therapeutics- Williams and Wilkins Publication
5. Lloyd Young and Koda-Kimble MA Applied Therapeutics: The clinical Use of Drugs- Lippincott Williams and Wilkins
6. Chisholm- Burns Wells Schwinghammer Malone and Joseph P Dipiro. Pharmacotherapy Principles and practice-– McGraw Hill Publication
7. Carol Mattson Porth. Principles of Pathophysiology- Lippincott Williams and Wilkins
8. Harrison's. Principles of Internal Medicine - McGraw Hill
9. Relevant review articles from recent medical and pharmaceutical literature

CLINICAL PHARMACOKINETICS AND THERAPEUTIC DRUG MONITORING
(MPP 203T)

Scope

This course is designed to enable students to understand the basics principles and applications of pharmacokinetics in designing the individualized dosage regimen, to interpret the plasma drug concentration profile in altered pharmacokinetics, drug interactions and in therapeutic drug monitoring processes to optimize the drug dosage regimen. Also, it enables students to understand the basic concepts of pharmacogenetics, pharmacometrics for modeling and simulation of pharmacokinetic data.

Objectives

Upon completion of this course it is expected that students shall be able to:

- Design the drug dosage regimen for individual patients
- Interpret and correlate the plasma drug concentrations with patients' therapeutic outcomes
- Recommend dosage adjustment for patients with renal/ hepatic impairment
- Recommend dosage adjustment for paediatrics and geriatrics
- Manage pharmacokinetic drug interactions
- Apply pharmacokinetic parameters in clinical settings
- Interpret the impact of genetic polymorphisms of individuals on pharmacokinetics and or pharmacodynamics of drugs
- Do pharmacokinetic modeling for the given data using the principles of pharmacometrics

THEORY 60 Hrs

1. Introduction to Clinical pharmacokinetics: Compartmental and Non compartmental models, Renal and non-renal clearance, Organ extraction and models of hepatic clearance, Estimation and determinants of bioavailability, Multiple dosing, Calculation of loading and maintenance doses
   Designing of dosage regimens: Determination of dose and dosing intervals, Conversion from intravenous to oral dosing, Nomograms and Tabulations in designing dosage regimen. 12 Hrs

2	Pharmacokinetics of Drug Interaction: Pharmacokinetic drug interactions, Inhibition and Induction of Drug metabolism, Inhibition of Biliary Excretion Pharmacogenetics: Genetic polymorphism in Drug metabolism: Cytochrome P-450 Isoenzymes, Genetic Polymorphism in Drug Transport and Drug Targets, Pharmacogenetics and Pharmacokinetic / Pharmacodynamic considerations Introduction to Pharmacometrics: Introduction to Bayesian Theory, Adaptive method or Dosing with feedback, Analysis of Population pharmacokinetic Data.	12 Hrs
3	Non Linier Mixed Effects Modelling: The Structural or Base Model, Modeling Random Effects, Modeling Covariate Relationships, Mixture Model, Estimation Methods, Model Building Techniques, Covariate Screening Methods, Testing the model assumptions, Precision of the parameter estimates and confidence intervals, Model misspecification and violation of the model assumptions, Model Validation, Simulation of dosing regimens and dosing recommendations, Pharmacometrics software.	12 Hrs
4	Altered Pharmacokinetics: Drug dosing in the elderly, Drug dosing in the paediatrics, Drug dosing in the obese patients, Drug dosing in the pregnancy and lactation, Drug dosing in the renal failure and extracorporeal removal of drugs, Drug dosing in the in hepatic failure.	12 Hrs
5	Therapeutic Drug monitoring: Introduction, Individualization of drug dosage regimen (Variability – Genetic, age, weight, disease and Interacting drugs), Indications for TDM, Protocol for TDM, Pharmacokinetic/Pharmacodynamic Correlation in drug therapy, TDM of drugs used in the following conditions: Cardiovascular disease: Digoxin, Lidocaine, Amiodarone; Seizure disorders: Phenytoin, Carbamazepine, Sodium Valproate; Psychiatric conditions: Lithium, Fluoxetine, Amitriptyline; Organ transplantations: Cyclosporine; Cytotoxic Agents: Methotrexate, 5-FU, Cisplatin; Antibiotics: Vancomycin, Gentamicin, Meropenem.	12 Hrs

REFERENCES

1. Leon Shargel, Susanna Wu-Pong, Andrew Yu. Applied Biopharmaceutics & Pharmacokinetics. New York: Mc Graw Hill.
2. Peter L. Bonate. Pharmacokinetic - Pharmacodynamic Modeling and Simulation. Springer Publications.
3. Michael E. Burton, Leslie M. Shaw, Jerome J. Schentag, William E.Evans. Applied Pharmacokinetics & Pharmacodynamics: Principles of Therapeutic Drug Monitoring. lippincott Williams & Wilkins.
4. Steven How-Yan Wong, Irving Sunshine. Handbook of Analytical Therapeutic Drug Monitoring and Toxicology. CRC Press, USA.
5. Soraya Dhillon, Andrzej Kostrzewski. Clinical pharmacokinetics. 1st edition. London: Pharmaceutical Press.
6. Joseph T.Dipiro, William J.Spruill, William E.Wade, Robert A.Blouin and Jane M.Pruemer .Concepts in Clinical Pharmacokinetics. American Society of Health-System Pharmacists, USA.
7. Malcolm Rowland, Thomas N. Tozer .Clinical Pharmacokinetics and pharmacodynamics: concepts and applications. lippincott Williams & Wilkins, USA.
8. Evans, Schentag, Jusko. Applied pharmacokinetics. American Society of Health system Pharmacists, USA.
9. Michael E. Winter. Basic Clinical Pharmacokinetics. lippincott Williams & Wilkins, USA.
10. Milo Gibaldi. Biopharmaceutics and Clinical Pharmacokinetics. Pharma Book Syndicate, USA.
11. Dhillon and Kostrzewski. Clinical pharmacokinetics. Pharmaceutical Press, London.
12. John E .Murphy. Clinical Pharmacokinetics. 5th edition. US: American Society of Health- System Pharmacist, USA.
13. Relevant review articles from recent medical and pharmaceutical literature

PHARMACOEPIDEMIOLOGY & PHARMACOECONOMICS
(MPP 204T)

Scope

This course enables students to understand various pharmacoepidemiological methods and their clinical applications. Also, it aims to impart knowledge on basic concepts, assumptions, terminology, and methods associated with Pharmacoeconomics and health related outcomes, and when should be appropriate Pharmacoeconomic model should be applied for a health care regimen.

Objectives

Upon completion of this course it is expected that students shall be able to:

- Understand the various epidemiological methods and their applications
- Understand the fundamental principles of Pharmacoeconomics.
- Identify and determine relevant cost and consequences associated with pharmacy products and services.
- Perform the key Pharmacoeconomics analysis methods
- Understand the Pharmacoeconomic decision analysis methods and its applications.
- Describe current Pharmacoeconomic methods and issues.
- Understand the applications of Pharmacoeconomics to various pharmacy settings.

THEORY 60 Hrs

1. Introduction to Pharmacoepidemiology: Definition, Scope, Need, Aims & Applications; Outcome measurement: Outcome measures, Drug use measures: Monetary units, Number of prescriptions, units of drug dispensed, defined daily doses, prescribed daily doses, Diagnosis and Therapy surveys, Prevalence, Incidence rate, Monetary units, number of prescriptions, unit of drugs dispensed, defined daily doses and prescribed daily doses, medications adherence measurements. Concept of risk: Measurement of risk, Attributable risk and relative risk, Time- risk relationship and odds ratio — 12 Hrs

2 Pharmacoepidemiological Methods: Qualitative models: Drug Utilization Review; Quantitative models: case reports, case series, Cross sectional studies, Cohort and case control studies, Calculation of Odds' ratio, Meta analysis models, Drug effects study in populations: Spontaneous reporting, Prescription event — 12 Hrs

monitoring, Post marketing surveillance, Record linkage systems, Applications of Pharmacoepidemiology

3	Introduction to Pharmacoeconomics: Definition, history of Pharmacoeconomics, Need of Pharmacoeconomic studies in Indian healthcare system. Cost categorization and resources for cost estimation: Direct costs. Indirect costs. Intangible costs. Outcomes and Measurements of Pharmacoeconomics: Types of outcomes: Clinical outcome, Economic outcomes, Humanistic outcomes; Quality Adjusted Life Years, Disability Adjusted Life Years Incremental Cost Effective Ratio, Average Cost Effective Ratio. Person Time, Willingness To Pay, Time Trade Off and Discounting.	12 Hrs
4	Pharmacoeconomic evaluations: Definition, Steps involved, Applications, Advantages and disadvantages of the following Pharmacoeconomic models: Cost Minimization Analysis (CMA), Cost Benefit Analysis (CBA), Cost Effective Analysis (CEA), Cost Utility Analysis (CUA), Cost of Illness (COI), Cost Consequences Analysis (COA).	12 Hrs
5	Definition, Steps involved, Applications, Advantages and disadvantages of the following: Health related quality of life (HRQOL): Definition, Need for measurement of HRQOL, Common HRQOL measures. Definition, Steps involved, Applications of the following: Decision Analysis and Decision tree, Sensitivity analysis, Markov Modeling, Software used in pharmacoeconomic analysis, Applications of Pharmacoeconomics.	12 Hrs

REFERENCES

1. Rascati K L. Essentials of Pharmacoeconomics, Woulters Kluwer Lippincott Williams & Wilkins, Philadelphia.
2. Thomas E Getzen. Health economics. Fundamentals and Flow of Funds. John Wiley & Sons, USA.
3. Andrew Briggs, Karl Claxton, Mark Sculpher. Decision Modelling for Health Economic Evaluation, Oxford University Press, London.
4. Michael Drummond, Mark Sculpher, George Torrence, Bernie O'Brien and Greg Stoddart. Methods for the Economic Evaluation of Health Care Programmes Oxford University Press, London.

5. George E Mackinnon III. Understanding health outcomes and pharmacoeconomics.
6. Graker, Dennis. Pharmacoeconomics and outcomes.
7. Walley, Pharmacoeconomics.
8. Pharmacoeconomic – ed. by Nowakowska – University of Medical Sciences, Poznan.
9. Relevant review articles from recent medical and pharmaceutical literature

PHARMACY PRACTICE PRACTICAL - II
(MPP 205P)

Pharmacy Practice practical component includes experiments covering important topics of the courses Principles of Quality Use of Medicines, Pharmacotherapeutics-II, Clinical Pharmacokinetics & Therapeutic Drug Monitoring and Pharmacoepidemiology and Pharmacoeconomics.

List of Experiments (24)

1. Causality assessment of adverse drug reactions (three)
2. Detection and management of medication errors (three)
3. Rational use of medicines in special population (three)
4. Presentation of clinical cases of various disease conditions adopting Pharmaceutical Care Plan Model (eight)
5. Calculation of Bioavailability and Bioequivalence from the given data (two)
6. Interpretation of Therapeutic Drug Monitoring reports of a given patient (three)
7. Calculation of various Pharmacoeconomic outcome analysis for the given data (two)

PHARMACOLOGY (MPL)

MODERN PHARMACEUTICAL ANALYTICAL TECHNIQUES (MPL 101T)

Scope

This subject deals with various advanced analytical instrumental techniques for identification, characterization and quantification of drugs. Instruments dealt are NMR, Mass spectrometer, IR, HPLC, GC etc.

Objectives

After completion of course student is able to know about,

- Chemicals and Excipients
- The analysis of various drugs in single and combination dosage forms
- Theoretical and practical skills of the instruments

THEORY 60 Hrs

1. UV-Visible spectroscopy: Introduction, Theory, Laws, Instrumentation associated with UV-Visible spectroscopy, Choice of solvents and solvent effect and Applications of UV-Visible spectroscopy, Difference/ Derivative spectroscopy. 10 Hrs

   IR spectroscopy: Theory, Modes of Molecular vibrations, Sample handling, Instrumentation of Dispersive and Fourier - Transform IR Spectrometer, Factors affecting vibrational frequencies and Applications of IR spectroscopy, Data Interpretation.

   Spectroflourimetry: Theory of Fluorescence, Factors affecting fluorescence (Characterestics of drugs that can be analysed by flourimetry), Quenchers, Instrumentation and Applications of fluorescence spectrophotometer.

   Flame emission spectroscopy and Atomic absorption spectroscopy: Principle, Instrumentation, Interferences and Applications.

2 NMR spectroscopy: Quantum numbers and their role in NMR, Principle, Instrumentation, Solvent requirement in NMR, Relaxation process, NMR signals in various compounds, Chemical shift, Factors influencing chemical shift, Spin-Spin coupling, Coupling constant, Nuclear magnetic double resonance, Brief outline of principles of FT-NMR and 13C NMR. Applications of NMR spectroscopy. 10 Hrs

3	Mass Spectroscopy: Principle, Theory, Instrumentation of Mass Spectroscopy, Different types of ionization like electron impact, chemical, field, FAB and MALDI, APCI, ESI, APPI Analyzers of Quadrupole and Time of Flight, Mass fragmentation and its rules, Meta stable ions, Isotopic peaks and Applications of Mass spectroscopy.	10 Hrs
4	Chromatography: Principle, apparatus, instrumentation, chromatographic parameters, factors affecting resolution, isolation of drug from excipients, data interpretation and applications of the following: j) Thin Layer chromatography k) High Performance Thin Layer Chromatography l) Ion exchange chromatography m) Column chromatography n) Gas chromatography o) High Performance Liquid chromatography p) Ultra High Performance Liquid chromatography q) Affinity chromatography r) Gel Chromatography	10 Hrs
5	Electrophoresis: Principle, Instrumentation, Working conditions, factors affecting separation and applications of the following: a) Paper electrophoresis b) Gel electrophoresis c) Capillary electrophoresis d) Zone electrophoresis e) Moving boundary electrophoresis f) Iso electric focusing X ray Crystallography: Production of X rays, Different X ray methods, Bragg's law, Rotating crystal technique, X ray powder technique, Types of crystals and applications of X-ray diffraction.	10 Hrs
6	Potentiometry: Principle, working, Ion selective Electrodes and Application of potentiometry. Thermal Techniques: Principle, thermal transitions and Instrumentation (Heat flux and power-compensation and designs), Modulated DSC, Hyper DSC, experimental parameters (sample preparation, experimental conditions, calibration, heating and cooling rates, resolution, source of errors) and their influence, advantage and disadvantages, pharmaceutical applications. Differential Thermal Analysis (DTA): Principle, instrumentation and advantage and disadvantages, pharmaceutical applications, derivative differential thermal analysis (DDTA). TGA: Principle, instrumentation, factors affecting results, advantage and disadvantages, pharmaceutical applications.	10 Hrs

REFERENCES

1. Spectrometric Identification of Organic compounds - Robert M Silverstein, Sixth edition, John Wiley & Sons, 2004.
2. Principles of Instrumental Analysis - Doglas A Skoog, F. James Holler, Timothy A. Nieman, 5th edition, Eastern press, Bangalore, 1998.
3. Instrumental methods of analysis – Willards, 7th edition, CBS publishers.
4. Practical Pharmaceutical Chemistry – Beckett and Stenlake, Vol II, 4th edition, CBS Publishers, New Delhi, 1997.
5. Organic Spectroscopy - William Kemp, 3rd edition, ELBS, 1991.
6. Quantitative Analysis of Drugs in Pharmaceutical formulation - P D Sethi, 3rd Edition, CBS Publishers, New Delhi, 1997.
7. Pharmaceutical Analysis - Modern Methods – Part B - J W Munson, Vol 11, Marcel. Dekker Series
8. Spectroscopy of Organic Compounds, 2nd edn., P.S/Kalsi, Wiley estern Ltd., Delhi.
9. Textbook of Pharmaceutical Analysis, KA.Connors, 3rd Edition, John Wiley & Sons, 1982.

ADVANCED PHARMACOLOGY - I
(MPL 102T)

Scope

The subject is designed to strengthen the basic knowledge in the field of pharmacology and to impart recent advances in the drugs used for the treatment of various diseases. In addition, this subject helps the students to understand the concepts of drug action and mechanisms involved

Objectives

Upon completion of the course the student shall be able to :

- Discuss the pathophysiology and pharmacotherapy of certain diseases
- Explain the mechanism of drug actions at cellular and molecular level
- Understand the adverse effects, contraindications and clinical uses of drugs used in treatment of diseases

THEORY 60 Hrs

1. General Pharmacology 12 Hrs

a. Pharmacokinetics: The dynamics of drug absorption, distribution, biotransformation and elimination. Concepts of linear and non-linear compartment models. Significance of Protein binding.

b. Pharmacodynamics: Mechanism of drug action and the relationship between drug concentration and effect. Receptors, structural and functional families of receptors, quantitation of drug receptors interaction and elicited effects.

2 Neurotransmission 12 Hrs

a. General aspects and steps involved in neurotransmission.

b. Neurohumoral transmission in autonomic nervous system (Detailed study about neurotransmitters- Adrenaline and Acetyl choline).

c. Neurohumoral transmission in central nervous system (Detailed study about neurotransmitters- histamine, serotonin, dopamine, GABA, glutamate and glycine].

d. Non adrenergic non cholinergic transmission (NANC). Co-transmission

Systemic Pharmacology

A detailed study on pathophysiology of diseases, mechanism of action, pharmacology and toxicology of existing as well as novel drugs used in the following systems

Autonomic Pharmacology

Parasympathomimetics and lytics, sympathomimetics and lytics, agents affecting

neuromuscular junction

3	Central nervous system Pharmacology General and local anesthetics Sedatives and hypnotics, drugs used to treat anxiety. Depression, psychosis, mania, epilepsy, neurodegenerative diseases. Narcotic and non-narcotic analgesics.	12 Hrs
4	Cardiovascular Pharmacology Diuretics, antihypertensives, antiischemics, anti- arrhythmics, drugs for heart failure and hyperlipidemia. Hematinics, coagulants , anticoagulants, fibrinolytics and anti-platelet drugs	12 Hrs
5	Autocoid Pharmacology The physiological and pathological role of Histamine, Serotonin, Kinins Prostaglandins Opioid autocoids. Pharmacology of antihistamines, 5HT antagonists.	12 Hrs

REFEERENCES

1. The Pharmacological Basis of Therapeutics, Goodman and Gillman's
2. Principles of Pharmacology. The Pathophysiologic basis of drug Therapy by David E Golan, Armen H, Tashjian Jr, Ehrin J,Armstrong, April W, Armstrong, Wolters, Kluwer-Lippincott Williams & Wilkins Publishers.
3. Basic and Clinical Pharmacology by B.G Katzung
4. Hand book of Clinical Pharmacokinetics by Gibaldi and Prescott.
5. Applied biopharmaceutics and Pharmacokinetics by Leon Shargel and Andrew B.C.Yu.
6. Graham Smith. Oxford textbook of Clinical Pharmacology.
7. Avery Drug Treatment
8. Dipiro Pharmacology, Pathophysiological approach.
9. Green Pathophysiology for Pharmacists.

10. Robbins & Cortan Pathologic Basis of Disease, 9th Ed. (Robbins Pathology)
11. A Complete Textbook of Medical Pharmacology by Dr. S.K Srivastava published by APC Avichal Publishing Company
12. KD.Tripathi. Essentials of Medical Pharmacology.
13. Modern Pharmacology with Clinical Applications, Craig Charles R. & Stitzel Robert E., Lippincott Publishers.
14. Clinical Pharmacokinetics & Pharmacodynamics : Concepts and Applications - Malcolm Rowland and Thomas N.Tozer, Wolters Kluwer, Lippincott Williams & Wilkins Publishers.
15. Applied biopharmaceutics and Pharmacokinetics, Pharmacodynamics and Drug metabolism for industrial scientists.
16. Modern Pharmacology, Craig CR. & Stitzel RE, Little Brown & Company.

PHARMACOLOGICAL AND TOXICOLOGICAL SCREENING METHODS - I
(MPL 103T)

Scope

This subject is designed to impart the knowledge on preclinical evaluation of drugs and recent experimental techniques in the drug discovery and development. The subject content helps the student to understand the maintenance of laboratory animals as per the guidelines, basic knowledge of various in-vitro and in-vivo preclinical evaluation processes

Objectives

Upon completion of the course the student shall be able to,

- Appraise the regulations and ethical requirement for the usage of experimental animals.
- Describe the various animals used in the drug discovery process and good laboratory practices in maintenance and handling of experimental animals
- Describe the various newer screening methods involved in the drug discovery process
- Appreciate and correlate the preclinical data to humans

THEORY 60 Hrs

1. Laboratory Animals 12 Hrs

Common laboratory animals: Description, handling and applications of different species and strains of animals.

Transgenic animals: Production, maintenance and applications
Anaesthesia and euthanasia of experimental animals.
Maintenance and breeding of laboratory animals.
CPCSEA guidelines to conduct experiments on animals

Good laboratory practice.
Bioassay-Principle, scope and limitations and methods

2 Preclinical screening of new substances for the pharmacological activity using in vivo, in vitro, and other possible animal alternative models. 12 Hrs

General principles of preclinical screening. CNS Pharmacology: behavioral and muscle co ordination, CNS stimulants and

depressants, anxiolytics, anti-psychotics, anti epileptics and nootropics. Drugs for neurodegenerative diseases like Parkinsonism, Alzheimers and multiple sclerosis. Drugs acting on Autonomic Nervous System.

3	Preclinical screening of new substances for the pharmacological activity using in vivo, in vitro, and other possible animal alternative models. Respiratory Pharmacology: anti-asthmatics, drugs for COPD and anti allergics. Reproductive Pharmacology: Aphrodisiacs and antifertility agents Analgesics, antiinflammatory and antipyretic agents. Gastrointestinal drugs: anti ulcer, anti -emetic, anti-diarrheal and laxatives.	12 Hrs
4	Preclinical screening of new substances for the pharmacological activity using in vivo, in vitro, and other possible animal alternative models. Cardiovascular Pharmacology: antihypertensives, antiarrythmics, antianginal, antiatherosclerotic agents and diuretics. Drugs for metabolic disorders like anti-diabetic, antidyslipidemic agents. Anti cancer agents. Hepatoprotective screening methods.	12 Hrs
5	Preclinical screening of new substances for the pharmacological activity using in vivo, in vitro, and other possible animal alternative models. Iimmunomodulators, Immunosuppressants and immunostimulants General principles of immunoassay: theoretical basis and optimization of immunoassay, heterogeneous and homogenous immunoassay systems. Immunoassay methods evaluation; protocol outline, objectives and preparation. Immunoassay for digoxin and insulin Limitations of animal experimentation and alternate animal experiments. Extrapolation of in vitro data to preclinical and preclinical to humans	12 Hrs

REFERENCES

1. Biological standardization by J.H. Burn D.J. Finney and I.G. Goodwin
2. Screening methods in Pharmacology by Robert Turner. A
3. Evaluation of drugs activities by Laurence and Bachrach
4. Methods in Pharmacology by Arnold Schwartz.
5. Fundamentals of experimental Pharmacology by M.N.Ghosh
6. Pharmacological experiment on intact preparations by Churchill Livingstone
7. Drug discovery and Evaluation by Vogel H.G.
8. Experimental Pharmacology by R.K.Goyal.
9. Preclinical evaluation of new drugs by S.K. Guta
10. Handbook of Experimental Pharmacology, SK.Kulkarni
11. Practical Pharmacology and Clinical Pharmacy, SK.Kulkarni, 3rd Edition.
12. David R.Gross. Animal Models in Cardiovascular Research, 2nd Edition, Kluwer Academic Publishers, London, UK.
13. Screening Methods in Pharmacology, Robert A.Turner.
14. Rodents for Pharmacological Experiments, Dr.Tapan Kumar chatterjee.
15. Practical Manual of Experimental and Clinical Pharmacology by Bikash Medhi (Author), Ajay Prakash (Author)

CELLULAR AND MOLECULAR PHARMACOLOGY
(MPL 104T)

Scope:

The subject imparts a fundamental knowledge on the structure and functions of cellular components and help to understand the interaction of these components with drugs. This information will further help the student to apply the knowledge in drug discovery process.

Objectives:

Upon completion of the course, the student shall be able to,

- Explain the receptor signal transduction processes.
- Explain the molecular pathways affected by drugs.
- Appreciate the applicability of molecular pharmacology and biomarkers in drug discovery process.
- Demonstrate molecular biology techniques as applicable for pharmacology

THEORY		60 Hrs
1.	Cell biology Structure and functions of cell and its organelles Genome organization. Gene expression and its regulation, importance of siRNA and micro RNA, gene mapping and gene sequencing Cell cycles and its regulation. Cell death- events, regulators, intrinsic and extrinsic pathways of apoptosis. Necrosis and autophagy.	12 Hrs
2	Cell signaling Intercellular and intracellular signaling pathways. Classification of receptor family and molecular structure ligand gated ion channels; G-protein coupled receptors, tyrosine kinase receptors and nuclear receptors. Secondary messengers: cyclic AMP, cyclic GMP, calcium ion, inositol 1,4,5-trisphosphate, (IP3), NO, and diacylglycerol. Detailed study of following intracellular signaling pathways: cyclic AMP signaling pathway, mitogen-activated protein kinase (MAPK) signaling, Janus kinase (JAK)/signal transducer and activator of transcription (STAT) signaling pathway.	12 Hrs

3	Principles and applications of genomic and proteomic tools DNA electrophoresis, PCR (reverse transcription and real time), Gene sequencing, micro array technique, SDS page, ELISA and western blotting, Recombinant DNA technology and gene therapy Basic principles of recombinant DNA technology-Restriction enzymes, various types of vectors. Applications of recombinant DNA technology. Gene therapy- Various types of gene transfer techniques, clinical applications and recent advances in gene therapy.	12 Hrs
4	Pharmacogenomics Gene mapping and cloning of disease gene. Genetic variation and its role in health/ pharmacology Polymorphisms affecting drug metabolism Genetic variation in drug transporters Genetic variation in G protein coupled receptors Applications of proteomics science: Genomics, proteomics, metabolomics, functionomics, nutrigenomics Immunotherapeutics Types of immunotherapeutics, humanisation antibody therapy, Immunotherapeutics in clinical practice	12 Hrs
5	a. Cell culture techniques Basic equipments used in cell culture lab. Cell culture media, various types of cell culture, general procedure for cell cultures; isolation of cells, subculture, cryopreservation, characterization of cells and their application. Principles and applications of cell viability assays, glucose uptake assay, Calcium influx assays Principles and applications of flow cytometry b. Biosimilars	12 Hrs

REFERENCES:

1. The Cell, A Molecular Approach. Geoffrey M Cooper.
2. Pharmacogenomics: The Search for Individualized Therapies. Edited by J. Licinio and M -L. Wong
3. Handbook of Cell Signaling (Second Edition) Edited by Ralph A. et.al
4. Molecular Pharmacology: From DNA to Drug Discovery. John Dickenson et.al
5. Basic Cell Culture protocols by Cheril D.Helgason and Cindy L.Miller
6. Basic Cell Culture (Practical Approach) by J. M. Davis (Editor)
7. Animal Cell Culture: A Practical Approach by John R. Masters (Editor)
8. Current porotocols in molecular biology vol I to VI edited by Frederick M.Ausuvel et la.

PHARMACOLOGICAL PRACTICAL - I
(MPL 105P)

1. Analysis of pharmacopoeial compounds and their formulations by UV Vis spectrophotometer
2. Simultaneous estimation of multi component containing formulations by UV spectrophotometry
3. Experiments based on HPLC
4. Experiments based on Gas Chromatography
5. Estimation of riboflavin/quinine sulphate by fluorimetry
6. Estimation of sodium/potassium by flame photometry

Handling of laboratory animals.

1. Various routes of drug administration.
2. Techniques of blood sampling, anesthesia and euthanasia of experimental animals.
3. Functional observation battery tests (modified Irwin test)
4. Evaluation of CNS stimulant, depressant, anxiogenics and anxiolytic, anticonvulsant activity.
5. Evaluation of analgesic, anti-inflammatory, local anesthetic, mydriatic and miotic activity.
6. Evaluation of diuretic activity.
7. Evaluation of antiulcer activity by pylorus ligation method.
8. Oral glucose tolerance test.
9. Isolation and identification of DNA from various sources (Bacteria, Cauliflower, onion, Goat liver).
10. Isolation of RNA from yeast
11. Estimation of proteins by Braford/Lowry's in biological samples.
12. Estimation of RNA/DNA by UV Spectroscopy
13. Gene amplification by PCR.
14. Protein quantification Western Blotting.
15. Enzyme based in-vitro assays (MPO, AChEs, α amylase, α glucosidase).
16. Cell viability assays (MTT/Trypan blue/SRB).
17. DNA fragmentation assay by agarose gel electrophoresis.
18. DNA damage study by Comet assay.
19. Apoptosis determination by fluorescent imaging studies.
20. Pharmacokinetic studies and data analysis of drugs given by different routes of administration using softwares
21. Enzyme inhibition and induction activity
22. Extraction of drug from various biological samples and estimation of drugs in biological fluids using different analytical techniques (UV)
23. Extraction of drug from various biological samples and estimation of drugs in biological fluids using different analytical techniques (HPLC)

REFERENCES

1. CPCSEA, OECD, ICH, USFDA, Schedule Y, EPA guidelines,
2. Fundamentals of experimental Pharmacology by M.N.Ghosh
3. Handbook of Experimental Pharmacology by S.K. Kulkarni.
4. Drug discovery and Evaluation by Vogel H.G.
5. Spectrometric Identification of Organic compounds - Robert M Silverstein,
6. Principles of Instrumental Analysis - Doglas A Skoog, F. James Holler, Timothy A. Nieman,
7. Vogel's Text book of quantitative chemical analysis - Jeffery, Basset, Mendham, Denney,
8. Basic Cell Culture protocols by Cheril D. Helgason and Cindy L.Mille
9. Basic Cell Culture (Practical Approach) by J. M. Davis (Editor)
10. Animal Cell Culture: A Practical Approach by John R. Masters (Editor)
11. Practical Manual of Experimental and Clinical Pharmacology by Bikash Medhi(Author), Ajay Prakash (Author) Jaypee brothers' medical publishers Pvt. Ltd

ADVANCED PHARMACOLOGY - II
(MPL 201T)

Scope

The subject is designed to strengthen the basic knowledge in the field of pharmacology and to impart recent advances in the drugs used for the treatment of various diseases. In addition, the subject helps the student to understand the concepts of drug action and mechanism involved

Objectives

Upon completion of the course the student shall be able to:

- Explain the mechanism of drug actions at cellular and molecular level
- Discuss the Pathophysiology and pharmacotherapy of certain diseases
- Understand the adverse effects, contraindications and clinical uses of drugs used in treatment of diseases

	THEORY	60 Hrs
1.	Endocrine Pharmacology Molecular and cellular mechanism of action of hormones such as growth hormone, prolactin, thyroid, insulin and sex hormones Anti-thyroid drugs, Oral hypoglycemic agents, Oral contraceptives, Corticosteroids. Drugs affecting calcium regulation	12 Hrs
2	Chemotherapy Cellular and molecular mechanism of actions and resistance of antimicrobial agents such as ß-lactams, aminoglycosides, quinolones, Macrolide antibiotics. Antifungal, antiviral, and anti-TB drugs.	12 Hrs
3	Chemotherapy Drugs used in Protozoal Infections Drugs used in the treatment of Helminthiasis Chemotherapy of cancer Immunopharmacology Cellular and biochemical mediators of inflammation and immune response. Allergic or hypersensitivity reactions. Pharmacotherapy of asthma and COPD. Immunosuppressants and Immunostimulants	12 Hrs

4	GIT Pharmacology Antiulcer drugs, Prokinetics, antiemetics, anti-diarrheals and drugs for constipation and irritable bowel syndrome. Chronopharmacology Biological and circadian rhythms, applications of chronotherapy in various diseases like cardiovascular disease, diabetes, asthma and peptic ulcer	12 Hrs
5	Free radicals Pharmacology Generation of free radicals, role of free radicals in etiopathology of various diseases such as diabetes, neurodegenerative diseases and cancer. Protective activity of certain important antioxidant Recent Advances in Treatment: Alzheimer's disease, Parkinson's disease, Cancer, Diabetes mellitus	12 Hrs

REFERENCES

1. The Pharmacological basis of therapeutics- Goodman and Gill man's
2. Principles of Pharmacology. The Pathophysiologic basis of drug therapy by David E Golan et al.
3. Basic and Clinical Pharmacology by B.G -Katzung
4. Pharmacology by H.P. Rang and M.M. Dale.
5. Hand book of Clinical Pharmacokinetics by Gibaldi and Prescott.
6. Text book of Therapeutics, drug and disease management by E T. Herfindal and Gourley.
7. Applied biopharmaceutics and Pharmacokinetics by Leon Shargel and Andrew B.C.Yu.
8. Handbook of Essential Pharmacokinetics, Pharmacodynamics and Drug Metabolism for Industrial Scientists
9. Robbins & Cortan Pathologic Basis of Disease, 9th Ed. (Robbins Pathology)
10. A Complete Textbook of Medical Pharmacology by Dr. S.K Srivastava published by APC Avichal Publishing Company.
11. KD.Tripathi. Essentials of Medical Pharmacology
12. Principles of Pharmacology. The Pathophysiologic basis of drug Therapy by David E Golan, Armen H, Tashjian Jr, Ehrin J,Armstrong, April W, Armstrong, Wolters, Kluwer-Lippincott Williams & Wilkins Publishers

PHARMACOLOGICAL AND TOXICOLOGICAL SCREENING METHODS-II
(MPL 202T)

Scope:

This subject imparts knowledge on the preclinical safety and toxicological evaluation of drug & new chemical entity. This knowledge will make the student competent in regulatory toxicological evaluation.

Objectives:

Upon completion of the course, the student shall be able to,

- Explain the various types of toxicity studies.
- Appreciate the importance of ethical and regulatory requirements for toxicity studies.
- Demonstrate the practical skills required to conduct the preclinical toxicity studies.

THEORY 60 Hrs

1.	Basic definition and types of toxicology (general, mechanistic, regulatory and descriptive) Regulatory guidelines for conducting toxicity studies OECD, ICH, EPA and Schedule Y OECD principles of Good laboratory practice (GLP) History, concept and its importance in drug development	12 Hrs
2	Acute, sub-acute and chronic- oral, dermal and inhalational studies as per OECD guidelines. Acute eye irritation, skin sensitization, dermal irritation & dermal toxicity studies. Test item characterization- importance and methods in regulatory toxicology studies	12 Hrs
3	Reproductive toxicology studies, Male reproductive toxicity studies, female reproductive studies (segment I and segment III), teratogenecity studies (segment II) Genotoxicity studies (Ames Test, in vitro and in vivo Micronucleus and Chromosomal aberrations studies) In vivo carcinogenicity studies	12 Hrs
4	IND enabling studies (IND studies)- Definition of IND, importance of IND, industry perspective, list of studies needed for IND submission.	12 Hrs

Safety pharmacology studies- origin, concepts and importance of safety pharmacology.
Tier1- CVS, CNS and respiratory safety pharmacology, HERG assay. Tier2- GI, renal and other studies

5	Toxicokinetics- Toxicokinetic evaluation in preclinical studies, saturation kinetics Importance and applications of toxicokinetic studies. Alternative methods to animal toxicity testing.	12 Hrs

REFERENCES

1. Hand book on GLP, Quality practices for regulated non-clinical research and development (http://www.who.int/tdr/publications/documents/glp-handbook.pdf).
2. Schedule Y Guideline: drugs and cosmetics (second amendment) rules, 2005, ministry of health and family welfare (department of health) New Delhi
3. Drugs from discovery to approval by Rick NG.
4. Animal Models in Toxicology, 3rd Edition, Lower and Bryan
5. OECD test guidelines.
6. Principles of toxicology by Karen E. Stine, Thomas M. Brown.
7. Guidance for Industry M3(R2) Nonclinical Safety Studies for the Conduct of Human Clinical Trials and Marketing Authorization for Pharmaceuticals (http://www.fda.gov/downloads/drugs/guidancecomplianceregulatoryinformation/guidances/ucm073246.pdf)

PRINCIPLES OF DRUG DISCOVERY
(MPL 203T)

Scope:

The subject imparts basic knowledge of drug discovery process. This information will make the student competent in drug discovery process

Objectives:

Upon completion of the course, the student shall be able to,

- Explain the various stages of drug discovery.
- Appreciate the importance of the role of genomics, proteomics and bioinformatics in drug discovery
- Explain various targets for drug discovery.
- Explain various lead seeking method and lead optimization
- Appreciate the importance of the role of computer aided drug design in drug discovery

THEORY		60 Hrs
1.	An overview of modern drug discovery process: Target identification, target validation, lead identification and lead Optimization. Economics of drug discovery. Target Discovery and validation-Role of Genomics, Proteomics and Bioinformatics. Role of Nucleic acid microarrays, Protein microarrays, Antisense technologies, siRNAs, antisense oligonucleotides, Zinc finger proteins. Role of transgenic animals in target validation.	12 Hrs
2	Lead Identification- combinatorial chemistry & high throughput screening, in silico lead discovery techniques, Assay development for hit identification. Protein structure Levels of protein structure, Domains, motifs, and folds in protein structure. Computational prediction of protein structure: Threading and homology modeling methods. Application of NMR and X-ray crystallography in protein structure prediction	12 Hrs
3	Rational Drug Design Traditional vs rational drug design, Methods followed in traditional drug design, High throughput screening, Concepts of Rational Drug Design, Rational Drug Design Methods: Structure and Pharmacophore based approaches	12 Hrs

	Virtual Screening techniques: Drug likeness screening, Concept of pharmacophore mapping and pharmacophore based Screening,	
4	Molecular docking: Rigid docking, flexible docking, manual docking; Docking based screening. De novo drug design. Quantitative analysis of Structure Activity Relationship History and development of QSAR, SAR versus QSAR, Physicochemical parameters, Hansch analysis, Fee Wilson analysis and relationship between them.	12 Hrs
5	QSAR Statistical methods – regression analysis, partial least square analysis (PLS) and other multivariate statistical methods. 3D-QSAR approaches like COMFA and COMSIA Prodrug design-Basic concept, Prodrugs to improve patient acceptability, Drug solubility, Drug absorption and distribution, site specific drug delivery and sustained drug action. Rationale of prodrug design and practical consideration of prodrug design	12 Hrs

REFERENCES

1. MouldySioud. Target Discovery and Validation Reviews and Protocols: Volume 2 Emerging Molecular Targetsand Treatment Options. 2007 Humana Press Inc.
2. Darryl León. Scott MarkelIn. Silico Technologies in Drug Target Identification and Validation. 2006 by Taylor and Francis Group, LLC.
3. Johanna K. DiStefano. Disease Gene Identification. Methods and Protocols. Springer New York Dordrecht Heidelberg London.
4. Hugo Kubiny. QSAR: Hansch Analysis and Related Approaches. Methods and Principles in Medicinal Chemistry. Publisher Wiley-VCH
5. Klaus Gubernator, Hans-Joachim Böhm. Structure-Based Ligand Design. Methods and Principles in Medicinal Chemistry. Publisher Wiley-VCH
6. Abby L . Parrill. M . Rami Reddy. Rational Drug Design. Novel Methodology and Practical Applications. ACS Symposium Series; American Chemical Society: Washington, DC, 1999.
7. J. Rick Turner. New drug development design, methodology and, analysis. John Wiley & Sons, Inc., New Jersey.

CLINICAL RESEARCH AND PHARMACOVIGILANCE
(MPL 204T)

Scope:

This subject will provide a value addition and current requirement for the students in clinical research and pharmacovigilance. It will teach the students on conceptualizing, designing, conducting, managing and reporting of clinical trials. This subject also focuses on global scenario of Pharmacovigilance in different methods that can be used to generate safety data. It will teach the students in developing drug safety data in Pre-clinical, Clinical phases of Drug development and post market surveillance.

Objectives:

Upon completion of the course, the student shall be able to,

- Explain the regulatory requirements for conducting clinical trial
- Demonstrate the types of clinical trial designs
- Explain the responsibilities of key players involved in clinical trials
- Execute safety monitoring, reporting and close-out activities
- Explain the principles of Pharmacovigilance
- Detect new adverse drug reactions and their assessment
- Perform the adverse drug reaction reporting systems and communication in Pharmacovigilance

THEORY — 60 Hrs

1. Regulatory Perspectives of Clinical Trials: — 12 Hrs
   Origin and Principles of International Conference on Harmonization - Good Clinical Practice (ICH-GCP) guidelines
   Ethical Committee: Institutional Review Board, Ethical Guidelines for Biomedical Research and Human Participant- Schedule Y, ICMR
   Informed Consent Process: Structure and content of an Informed Consent Process Ethical principles governing informed consent process
2. Clinical Trials: Types and Design — 12 Hrs
   Experimental Study- RCT and Non RCT,
   Observation Study: Cohort, Case Control, Cross sectional
   Clinical Trial Study Team
   Roles and responsibilities of Clinical Trial Personnel: Investigator, Study Coordinator, Sponsor, Contract Research Organization and its management

3	Clinical Trial Documentation- Guidelines to the preparation of documents, Preparation of protocol, Investigator Brochure, Case Report Forms, Clinical Study Report Clinical Trial Monitoring- Safety Monitoring in CT Adverse Drug Reactions: Definition and types. Detection and reporting methods. Severity and seriousness assessment.Predictability and preventability assessment, Management of adverse drug reactions; Terminologies of ADR.	12 Hrs
4	Basic aspects, terminologies and establishment of pharmacovigilance History and progress of pharmacovigilance, Significance of safety monitoring, Pharmacovigilance in India and international aspects, WHO international drug monitoring programme, WHO and Regulatory terminologies of ADR, evaluation of medication safety, Establishing pharmacovigilance centres in Hospitals, Industry and National programmes related to pharmacovigilance. Roles and responsibilities in Pharmacovigilance	12 Hrs
5	Methods, ADR reporting and tools used in Pharmacovigilance International classification of diseases, International Non-proprietary names for drugs, Passive and Active surveillance, Comparative observational studies, Targeted clinical investigations and Vaccine safety surveillance. Spontaneous reporting system and Reporting to regulatory authorities, Guidelines for ADRs reporting. Argus, Aris G Pharmacovigilance, VigiFlow, Statistical methods for evaluating medication safety data.	12 Hrs
6	Pharmacoepidemiology, pharmacoeconomics, safety pharmacology	12 Hrs

REFERENCES

1. Central Drugs Standard Control Organization- Good Clinical Practices, Guidelines for Clinical Trials on Pharmaceutical Products in India. New Delhi: Ministry of Health;2001.
2. International Conference on Harmonization of Technical requirements for registration of Pharmaceuticals for human use. ICH Harmonized Tripartite Guideline. Guideline for Good Clinical Practice.E6; May 1996.

3. Ethical Guidelines for Biomedical Research on Human Subjects 2000. Indian Council of Medical Research, New Delhi.
4. Textbook of Clinical Trials edited by David Machin, Simon Day and Sylvan Green, March 2005, John Wiley and Sons.
5. Clinical Data Management edited by R K Rondels, S A Varley, C F Webbs. Second Edition, Jan 2000, Wiley Publications.
6. Handbook of clinical Research. Julia Lloyd and Ann Raven Ed. Churchill Livingstone.
7. Principles of Clinical Research edited by Giovanna di Ignazio, Di Giovanna and Haynes.

PHARMACOLOGICAL PRACTICAL - II
(MPL 205P)

1. To record the DRC of agonist using suitable isolated tissues preparation.
2. To study the effects of antagonist/potentiating agents on DRC of agonist using suitable isolated tissue preparation.
3. To determine to the strength of unknown sample by matching bioassay by using suitable tissue preparation.
4. To determine to the strength of unknown sample by interpolation bioassay by using suitable tissue preparation
5. To determine to the strength of unknown sample by bracketing bioassay by using suitable tissue preparation
6. To determine to the strength of unknown sample by multiple point bioassay by using suitable tissue preparation.
7. Estimation of PA_2 values of various antagonists using suitable isolated tissue preparations.
8. To study the effects of various drugs on isolated heart preparations
9. Recording of rat BP, heart rate and ECG.
10. Recording of rat ECG
11. Drug absorption studies by averted rat ileum preparation.
12. Acute oral toxicity studies as per OECD guidelines.
13. Acute dermal toxicity studies as per OECD guidelines.
14. Repeated dose toxicity studies- Serum biochemical, haematological, urine analysis, functional observation tests and histological studies.
15. Drug mutagenicity study using mice bone-marrow chromosomal aberration test.
16. Protocol design for clinical trial.(3 Nos.)
17. Design of ADR monitoring protocol.
18. In-silico docking studies. (2 Nos.)
19. In-silico pharmacophore based screening.
20. In-silico QSAR studies.
21. ADR reporting

REFERENCES

1. Fundamentals of experimental Pharmacology-by M.N.Ghosh
2. Hand book of Experimental Pharmacology-S.K.Kulakarni
3. Text book of in-vitro practical Pharmacology by Ian Kitchen
4. Bioassay Techniques for Drug Development by Atta-ur-Rahman, Iqbal choudhary and William Thomsen
5. Applied biopharmaceutics and Pharmacokinetics by Leon Shargel and Andrew B.C.Yu.
6. Handbook of Essential Pharmacokinetics, Pharmacodynamics and Drug Metabolism for Industrial Scientists.

PHARMACOGNOSY (MPG)

MODERN PHARMACEUTICAL ANALYTICAL TECHNIQUES (MPG 101T)

Scope

This subject deals with various advanced analytical instrumental techniques for identification, characterization and quantification of drugs. Instruments dealt are NMR, Mass spectrometer, IR, HPLC, GC etc.

Objectives

After completion of course student is able to know,

- The analysis of various drugs in single and combination dosage forms
- Theoretical and practical skills of the instruments

THEORY 60 Hrs

1. UV-Visible spectroscopy: Introduction, Theory, Laws, Instrumentation associated with UV-Visible spectroscopy, Choice of solvents and solvent effect and Applications of UV-Visible spectroscopy. 12 Hrs

   IR spectroscopy: Theory, Modes of Molecular vibrations, Sample handling, Instrumentation of Dispersive and Fourier - Transform IR Spectrometer, Factors affecting vibrational frequencies and Applications of IR spectroscopy

   Spectroflourimetry: Theory of Fluorescence, Factors affecting fluorescence, Quenchers, Instrumentation and Applications of fluorescence spectrophotometer.

   Flame emission spectroscopy and Atomic absorption spectroscopy: Principle, Instrumentation, Interferences and Applications.

2 NMR spectroscopy: Quantum numbers and their role in NMR, Principle, Instrumentation, Solvent requirement in NMR, Relaxation process, NMR signals in various compounds, Chemical shift, Factors influencing chemical shift, Spin-Spin coupling, Coupling constant, Nuclear magnetic double resonance, Brief outline of principles of FT-NMR and 13C NMR. Applications of NMR spectroscopy.1 12 Hrs

3	Mass Spectroscopy: Principle, Theory, Instrumentation of Mass Spectroscopy, Different types of ionization like electron impact, chemical, field, FAB and MALDI, APCI, ESI, APPI Analyzers of Quadrupole and Time of Flight, Mass fragmentation and its rules, Meta stable ions, Isotopic peaks and Applications of Mass spectroscopy.	10 Hrs
4	Chromatography: Principle, apparatus, instrumentation, chromatographic parameters, factors affecting resolution, isolation of drug from excipients, data interpretation and applications of the following: a) Thin Layer chromatography b) High Performance Thin Layer Chromatography c) Ion exchange chromatography d) Column chromatography e) Gas chromatography f) High Performance Liquid chromatography g) Ultra High Performance Liquid chromatography h) Affinity chromatography i) Gel Chromatography	10 Hrs
5	Electrophoresis: Principle, Instrumentation, Working conditions, factors affecting separation and applications of the following: a) Paper electrophoresis b) Gel electrophoresis c) Capillary electrophoresis d) Zone electrophoresis e) Moving boundary electrophoresis f) Iso electric focusing X ray Crystallography: Production of X rays, Different X ray methods, Bragg's law, Rotating crystal technique, X ray powder technique, Types of crystals and applications of X-ray diffraction.	10 Hrs
6	Potentiometry: Principle, working, Ion selective Electrodes and Application of potentiometry. Thermal Techniques: Principle, thermal transitions and Instrumentation (Heat flux and power-compensation and designs), Modulated DSC, Hyper DSC, experimental parameters (sample preparation, experimental conditions, calibration, heating and	10 Hrs

cooling rates, resolution, source of errors) and their influence, advantage and disadvantages, pharmaceutical applications. Differential Thermal Analysis (DTA): Principle, instrumentation and advantage and disadvantages, pharmaceutical applications, derivative differential thermal analysis (DDTA). TGA: Principle, instrumentation, factors affecting results, advantage and disadvantages, pharmaceutical applications.

REFERENCES

1. Spectrometric Identification of Organic compounds - Robert M Silverstein, Sixth edition, John Wiley & Sons, 2004.
2. Principles of Instrumental Analysis - Doglas A Skoog, F. James Holler, Timothy A. Nieman, 5th edition, Eastern press, Bangalore, 1998.
3. Instrumental methods of analysis – Willards, 7th edition, CBS publishers.
4. Practical Pharmaceutical Chemistry – Beckett and Stenlake, Vol II, 4th edition, CBS Publishers, New Delhi, 1997.
5. Organic Spectroscopy - William Kemp, 3rd edition, ELBS, 1991.
6. Quantitative Analysis of Drugs in Pharmaceutical formulation - P D Sethi, 3rd Edition, CBS Publishers, New Delhi, 1997.
7. Pharmaceutical Analysis - Modern Methods – Part B - J W Munson, Vol 11, Marcel. Dekker Series
8. Spectroscopy of Organic Compounds, 2nd edn., P.S/Kalsi, Wiley estern Ltd., Delhi.

ADVANCED PHARMACOGNOSY - I
(MPG 102T)

SCOPE

To learn and understand the advances in the field of cultivation and isolation of drugs of natural origin, various phytopharmaceuticals, nutraceuticals and their medicinal use and health benefits.

OBJECTIVES

Upon completion of the course, the student shall be able to know the,

- advances in the cultivation and production of drugs
- various phyto-pharmaceuticals and their source, its utilization and medicinal value.
- various nutraceuticals/herbs and their health benefits
- Drugs of marine origin
- Pharmacovigilance of drugs of natural origin

THEORY 60 Hrs

1. Plant drug cultivation: General introduction to the importance of Pharmacognosy in herbal drug industry, Indian Council of Agricultural Research, Current Good Agricultural Practices, Current Good Cultivation Practices, Current Good Collection Practices, Conservation of medicinal plants- Ex-situ and In-situ conservation of medicinal plants. 12 Hrs

2 Marine natural products: General methods of isolation and purification, Study of Marine toxins, Recent advances in research in marine drugs, Problems faced in research on marine drugs such as taxonomical identification, chemical screening and their solution. 12 Hrs

3 Nutraceuticals: Current trends and future scope, Inorganic mineral supplements, Vitamin supplements, Digestive enzymes, Dietary fibres, Cereals and grains, Health drinks of natural origin, Antioxidants, Polyunsaturated fatty acids, Herbs as functional foods, Formulation and standardization of neutraceuticals, Regulatory aspects, FSSAI guidelines, Sources, name of marker compounds and their chemical nature, medicinal uses and health benefits of following 12 Hrs

i) Spirulina ii) Soya bean iii) Ginseng iv) Garlic v) Broccoli vi) Green and Herbal Tea vii) Flax seeds viii) Black cohosh ix) Turmeric.

4 Phytopharmaceuticals: Occurrence, isolation and characteristic features (Chemical nature, uses in pharmacy, medicinal and health benefits) of following. 12 Hrs

a) Carotenoids – i) α and β - Carotene ii) Xanthophyll (Lutein)
b) Limonoids – i) d-Limonene ii) α – Terpineol
c) Saponins – i) Shatavarins
d) Flavonoids – i) Resveratrol ii) Rutin iii) Hesperidin iv) Naringin v) Quercetin
e) Phenolic acids- Ellagic acid
f) Vitamins
g) Tocotrienols and Tocopherols
h) Andrographolide, Glycolipids, Gugulipids, Withanolides, Vascine, Taxol
i) Miscellaneous

5 Pharmacovigilance of drugs of natural origin: WHO and AYUSH guidelines for safety monitoring of natural medicine, Spontaneous reporting schemes for biodrug adverse reactions, bio drug-drug and bio drug-food interactions with suitable examples. 12 Hrs

REFERENCES (Latest Editions of)

1. Pharmacognosy - G. E. Trease and W.C. Evans. Saunders Edinburgh, New York.
2. Pharmacognosy-Tyler, Brady, Robbers
3. Modem Methods of Plant Analysis- Peach & M.V. Tracey, Vol. I&II
4. Text Book of Pharmacognosy by T.E. Wallis
5. Marine Natural Products-Vol.I to IV.
6. Natural products: A lab guide by Raphael Ikan , Academic Press 1991.
7. Glimpses of Indian Ethano Pharmacology, P. Pushpangadam. Ulf Nyman. V.George Tropical Botanic Garden & Research Institute, 1995.
8. Medicinal natural products (a biosynthetic approach), Paul M. Dewick, John Wiley & Sons Ltd., England, 1998.
9. Chemistry of Marine Natural Products- Paul J. Schewer 1973.
10. Herbal Drug Industry by RD. Choudhary, Eastern Publisher, New Delhi, 1996.
11. Cultivation of Medicinal Plants by C.K. Atal & B.M. Kapoor.
12. Cultivation and Utilization of Aromatic Plants, C.K. Atal & B.M. Kapoor
13. Cultivation of medicinal and aromatic crops, AA Farooqui and B.S. Sreeramu. University Press, 2001.

14. Natural Products from Plants, 1st edition, by Peter B. Kaufman, CRC Press, New York, 1998
15. Recent Advances in Phytochemistry- Vol. 1&4: Scikel Runeckles- Appleton Century crofts.
16. Text book of Pharmacognosy, C.K.Kokate, Purohit, Ghokhale, Nirali Prakasshan, 1996.
17. Pharmacognosy and Pharmacobiotechnology, Ashutoshkar, New Age Publications, New Delhi.

PHYTOCHEMISTRY
(MPG 103T)

SCOPE

Students shall be equipped with the knowledge of natural product drug discovery and will be able to isolate, identify and extract and the phyto-constituents

OBJECTIVES

Upon completion of the course, the student shall be able to know the,

- different classes of phytoconstituents, their biosynthetic pathways, their properties, extraction and general process of natural product drug discovery
- phytochemical fingerprinting and structure elucidation of phytoconstituents.

THEORY 60 Hrs

1. Biosynthetic pathways and Radio tracing techniques: Constituents & their Biosynthesis, Isolation, Characterization and purification with a special reference to their importance in herbal industries of following phyto-pharmaceuticals containing drugs: 12 Hrs
   a) Alkaloids: Ephedrine, Quinine, Strychynine, Piperine, Berberine, Taxol, Vinca alkoloids.
   b) Glycosides: Digitoxin, Glycyrrhizin, Sennosides, Bacosides, Quercitin.
   c) Steroids: Hecogenin, guggulosterone and withanolides
   d) Coumarin: Umbelliferone.
   e) Terpenoids: Cucurbitacins

2 Drug discovery and development: History of herbs as source of drugs and drug discovery, the lead structure selection process, structure development, product discovery process and drug registration, Selection and optimization of lead compounds with suitable examples from the following source : artemesin, andrographolides. Clinical studies emphasising on phases of clinical trials, protocol design for lead molecules. 12 Hrs

3 Extraction and Phytochemical studies: Recent advances in extractions with emphasis on selection of method and choice of solvent for extraction, successive and exhaustive extraction and other methods of extraction commonly used like microwave 12 Hrs

assisted extraction, Methods of fractionation. Separation of phytoconstituents by latest CCCET, SCFE techniques including preparative HPLC and Flash column chromatography.

4	Phytochemical finger printing: HPTLC and LCMS/GCMS applications in the characterization of herbal extracts. Structure elucidation of phytoconstituents.	12 Hrs
5	Structure elucidation of the following compounds by spectroscopic techniques like UV, IR, MS, NMR (1H, 13C) a. Carvone, Citral, Menthol b. Luteolin, Kaempferol c. Nicotine, Caffeine iv) Glycyrrhizin.	12 Hrs

REFERENCES (Latest Editions of)

1. Organic chemistry by I.L. Finar Vol.II
2. Pharmacognosy by Trease and Evans, ELBS.
3. Pharmacognosy by Tylor and Brady.
4. Text book of Pharmacognosy by Wallis.
5. Clark's isolation and Identification of drugs by A.C. Mottal.
6. Plant Drug Analysis by Wagner & Bladt.
7. Wilson and Gisvolds text book of Organic Medicinnal and Pharmaceutical Chemistry by Deorge. R.F.
8. The Chemistry of Natural Products, Edited by R.H. Thomson, Springer International Edn. 1994.
9. Natural Products Chemistry Practical Manual by Anees A Siddiqui and SeemiSiddiqui
10. Organic Chemistry of Natural Products, Vol. 1&2. Gurdeep R Chatwal.
11. Chemistry of Natural Products- Vol. 1 onwards IWPAC.
12. Modem Methods of Plant Analysis- Peach & M.V. Tracey, Vol. I&II
13. Medicinal Natural products – a biosynthetic approach, Dewick PM, John Wiley & Sons, Toronto, 1998.
14. Chemistry of Natural Products, Bhat SV, Nagasampagi BA, Meenakshi S, Narosa Publishing House, New Delhi.
15. Pharmacognosy & Phytochemistry of Medicinal Plants, 2nd edition, Bruneton J, Interceptt Ltd., New York, 1999.

INDUSTRIAL PHARMACOGNOSTICAL TECHNOLOGY
(MPG 104T)

SCOPE

To understand the Industrial and commercial potential of drugs of natural origin, integrate traditional Indian systems of medicine with modern medicine and also to know regulatory and quality policy for the trade of herbals and drugs of natural origin.

OBJECTIVES

By the end of the course the student shall be able to know,

- the requirements for setting up the herbal/natural drug industry.
- the guidelines for quality of herbal/natural medicines and regulatory issues.
- the patenting/IPR of herbals/natural drugs and trade of raw and finished materials.

THEORY 60 Hrs

1. Herbal drug industry: Infrastructure of herbal drug industry involved in production of standardized extracts and various dosage forms. Current challenges in upgrading and modernization of herbal formulations. Entrepreneurship Development, Project selection, project report, technical knowledge, Capital venture, plant design, layout and construction. Pilot plant scale -up techniques, case studies of herbal extracts. Formulation and production management of herbals. 12 Hrs

2 Regulatory requirements for setting herbal drug industry: Global marketing management. Indian and international patent law as applicable herbal drugs and natural products. Export - Import (EXIM) policy, TRIPS. 12 Hrs

Quality assurance in herbal/natural drug products.
Concepts of TQM, GMP, GLP, ISO-9000.

3 Monographs of herbal drugs: General parameters of monographs of herbal drugs and comparative study in IP, USP, Ayurvedic Pharmacopoeia, Siddha and Unani Pharmacopoeia, American herbal pharmacopoeia, British herbal pharmacopoeia, WHO guidelines in quality assessment of herbal drugs.

4 Testing of natural products and drugs: Herbal medicines - clinical laboratory testing. Stability testing of natural products, protocols. 12 Hrs

5 Patents: Indian and international patent laws, proposed amendments as applicable to herbal/natural products and process. Geographical indication, Copyright, Patentable subject maters, novelty, non obviousness, utility, enablement and best mode, procedure for Indian patent filing, patent processing, grant of patents, rights of patents, cases of patents, opposition and revocation of patents, patent search and literature, Controllers of patents. 12 Hrs

REFERENCES (Latest Editions of)

1. Herbal drug industry by R.D. Choudhary (1996), Eastern Publisher, New Delhi.
2. GMP for Botanicals - Regulatory and Quality issues on Phytomedicine by Pulok K Mukharjee (2003), Ist Edition, Business horizons Robert Verpoorte, New Delhi.
3. Quality control of herbal drugs by Pulok K Mukarjee (2002), Business Horizons Pharmaceutical Publisher, New Delhi.
4. PDR for Herbal Medicines (2000), Medicinal Economic Company, New Jersey.
5. Indian Herbal Pharmacopoeia (2002), IDMA, Mumbai.
6. Text book of Pharmacognosy by C.K. Kokate, Purohit, Gokhlae (1996), Nirali Prakashan, New Delhi.
7. Text book of Pharmacognosy and Phytochemistry by Vinod D. Rangarl (2002), Part I & II, Career Publication, Nasik, India.
8. Plant drug analysis by H.Wagner and S.Bladt, Springer, Berlin.
9. Standardization of Botanicals. Testing and extraction methods of medicinal herbs by V. Rajpal (2004), Vol.I, Eastern Publisher, New Delhi.
10. Phytochemical Dictionary. Handbook of Bioactive Compounds from Plants by J.B.Harborne, (1999), IInd Edition, Taylor and Francis Ltd, UK.
11. Herbal Medicine. Expanded Commission E Monographs by M.Blumenthal, (2004), IST Edition,
12. Drug Formulation Manual by D.P.S.Kohli and D.H.Shah (1998), Eastern Publisher, New Delhi.

PHARMACOGNOSY PRACTICAL - I
(MPG l05P)

1. Analysis of Pharmacopoeial compounds of natural origin and their formulations by UV Vis spectrophotometer
2. Analysis of recorded spectra of simple phytoconstituents
3. Experiments based on Gas Chromatography
4. Estimation of sodium/potassium by flame photometry
5. Development of fingerprint of selected medicinal plant extracts commonly used in herbal drug industry viz. Ashwagandha, Tulsi, Bael, Amla, Ginger, Aloe, Vidang, Senna, Lawsonia by TLC/HPTLC method.
6. Methods of extraction
7. Phytochemical screening
8. Demonstration of HPLC- estimation of glycerrhizin
9. Monograph analysis of clove oil
10. Monograph analysis of castor oil.
11. Identification of bioactive constituents from plant extracts
12. Formulation of different dosage forms and their standardisation.

MEDICINAL PLANT BIOTECHNOLOGY
(MPG 201T)

SCOPE

To explore the knowledge of Biotechnology and its application in the improvement of quality of medicinal plants

OBJECTIVES

Upon completion of the course, the student shall be able to,

- Know the process like genetic engineering in medicinal plants for higher yield of Phytopharmaceuticals.
- Use the biotechnological techniques for obtaining and improving the quality of natural products/medicinal plants

THEORY 60 Hrs

1. Introduction to Plant biotechnology: Historical perspectives, prospects for development of plant biotechnology as a source of medicinal agents. Applications in pharmacy and allied fields. Genetic and molecular biology as applied to pharmacognosy, study of DNA, RNA and protein replication, genetic code, regulation of gene expression, structure and complicity of genome, cell signaling, DNA recombinant technology. 12 Hrs

2 Different tissue culture techniques: Organogenesis and embryogenesis, synthetic seed and monoclonal variation, Protoplast fusion, Hairy root multiple shoot cultures and their applications. Micro propagation of medicinal and aromatic plants. Sterilization methods involved in tissue culture, gene transfer in plants and their applications. 15 Hrs

3 Immobilisation techniques & Secondary Metabolite Production: Immobilization techniques of plant cell and its application on secondary metabolite Production. Cloning of plant cell: Different methods of cloning and its applications. Advantages and disadvantages of plant cell cloning. Secondary metabolism in tissue cultures with emphasis on production of medicinal agents. Precursors and elicitors on production of secondary metabolites. 15 Hrs

4 Biotransformation and Transgenesis: Biotransformation, bioreactors for pilot and large scale cultures of plant cells and retention of biosynthetic potential in cell culture. Transgenic 13 Hrs

plants, methods used in gene identification, localization and sequencing of genes. Application of PCR in plant genome analysis.

5	Fermentation technology: Application of Fermentation technology, Production of ergot alkaloids, single cell proteins, enzymes of pharmaceutical interest.	05 Hrs

REFERENCES (Latest Editions of)

1. Plant tissue culture, Bhagwani, vol 5, Elsevier Publishers.
2. Plant cell and Tissue Culture (Lab. Manual), JRMM. Yeoman.
3. Elements in biotechnology by PK. Gupta, Rastogi Publications, New Delhi.
4. An introduction to plant tissue culture by MK. Razdan, Science Publishers.
5. Experiments in plant tissue culture by John HD and Lorin WR., Cambridge University Press.
6. Pharmaceutical biotechnology by SP. Vyas and VK. Dixit, CBS Publishers.
7. Plant cell and tissue culture by Jeffrey W. Pollard and John M Walker, Humana press.
8. Plant tissue culture by Dixon, Oxford Press, Washington DC, 1985
9. Plant tissue culture by Street.
10. Pharmacognosy by G. E. Trease and WC. Evans, Elsevier.
11. Biotechnology by Purohit and Mathur, Agro-Bio, 3rd revised edition.
12. Biotechnological applications to tissue culture by Shargool, Peter D, Shargoal, CKC Press.
13. Pharmacognosy by Varo E. Tyler, Lynn R. Brady and James E. Robberrt, That Tjen, NGO.
14. Plant Biotechnology, Ciddi Veerasham.

ADVANCED PHARMACOGNOSY - II
(MPG 202T)

SCOPE

To know and understand the Adulteration and Deterioration that occurs in herbal/natural drugs and methods of detection of the same. Study of herbal remedies and their validations, including methods of screening

OBJECTIVES

Upon completion of the course, the student shall be able to know the,

- validation of herbal remedies
- methods of detection of adulteration and evaluation techniques for the herbal drugs
- methods of screening of herbals for various biological properties

THEORY 60 Hrs

1.	Herbal remedies – Toxicity and Regulations: Herbals vs Conventional drugs, Efficacy of Herbal medicine products, Validation of herbal therapies, Pharmacodynamic and Pharmacokinetic issues.	12 Hrs
2	Adulteration and Deterioration: Introduction, Types of Adulteration/ Substitution of Herbal drugs, Causes and Measures of Adulteration, Sampling Procedures, Determination of Foreign Matter, DNA Finger printing techniques in identification of drugs of natural origin, detection of heavy metals, pesticide residues, phytotoxin, microbial contamination in herbs and their formulations.	12 Hrs
3	Ethnobotany and Ethnopharmacology: Ethnobotany in herbal drug evaluation, Impact of Ethnobotany in traditional medicine, New development in herbals, Bio-prospecting tools for drug discovery, Role of Ethnopharmacology in drug evaluation, Reverse Pharmacology.	12 Hrs
4	Analytical Profiles of herbal drugs: Andrographis paniculata, Boswellia serata, Coleus forskholii, Curcuma longa, Embelica officinalis, Psoralea corylifolia.	12 Hrs
5	Biological screening of herbal drugs: Introduction and Need for Phyto-Pharmacological Screening, New Strategies for evaluating	12 Hrs

Natural Products, In vitro evaluation techniques for Antioxidants, Antimicrobial and Anticancer drugs. In vivo evaluation techniques for Anti-inflammatory, Antiulcer, Anticancer, Wound healing, Antidiabetic, Hepatoprotective, Cardio protective, Diuretics and Antifertility, Toxicity studies as per OECD guidelines.

REFERENCES (Latest Editions of)

1. Glimpses of Indian Ethano Pharmacology by P. Pushpangadam. Ulf Nyman. V.George Tropical Botanic Garden & Research Institute.
2. Natural products: A lab guide by Raphael Ikan, Academic Press.
3. Pharmacognosy - G. E. Trease and W.C. Evans. WB. Saunders Edinburgh, New York.
4. Pharmacognosy-Tyler, Brady, Robbers, Lee & Fetiger.
5. Modem Methods of Plant Analysis- Peach & M.V. Tracey, Vol. I & II, Springer Publishers.
6. Herbal Drug Industry by RD. Choudhary, Eastern Publishers, New Delhi.
7. Text book of Pharmacognosy by C.K.Kokate, Purohit, Ghokhale, Nirali Prakashan.
8. Text Book of Pharmacognosy by T.E. Wallis, J & A Churchill Ltd., London.
9. Quality control of herbal drugs by Pulok K Mukherjee, Business Horizons Pharmaceutical Publishers, New Delhi.
10. Indian Herbal Pharmacopoeia, IDMA, Mumbai.
11. Text book of Pharmacognosy and Phytochemistry by Vinod D. RangarI, Part I & II, Career Publication, Nasik, India.
12. Plant drug analysis by H.Wagner and S.Bladt, 2nd edition, Springer, Berlin.
13. Standardization of Botanicals. Testing and extraction methods of medicinal herbs by V. Rajpal (2004), Vol.I, Eastern PublisherS, New Delhi.
14. Herbal Medicine. Expanded Commission E Monographs, M.Blumenthal.

INDIAN SYSTEMS OF MEDICINE
(MPG 203T)

SCOPE

To make the students understand thoroughly the principles, preparations of medicines of various Indian systems of medicine like Ayurveda, Siddha, Homeopathy and Unani. Also focusing on clinical research of traditional medicines, quality assurance and challenges in monitoring the safety of herbal medicines.

OBJECTIVES

After completion of the course, student is able to

- To understand the basic principles of various Indian systems of medicine
- To know the clinical research of traditional medicines, Current Good Manufacturing Practice of Indian systems of medicine and their formulations.

THEORY 60 Hrs

1. Fundamental concepts of Ayurveda, Siddha, Unani and Homoeopathy systems of medicine — 12 Hrs

   Different dosage forms of the ISM.

   Ayurveda: Ayurvedic Pharmacopoeia, Analysis of formulations and bio crude drugs with references to: Identity, purity and quality.

   Siddha: Gunapadam (Siddha Pharmacology), raw drugs/Dhatu/Jeevam in Siddha system of medicine, Purification process (Suddhi).

2 Naturopathy, Yoga and Aromatherapy practices — 12 Hrs

   a) Naturopathy - Introduction, basic principles and treatment modalities.

   b) Yoga - Introduction and Streams of Yoga. Asanas, Pranayama, Meditations and Relaxation techniques.

   c) Aromatherapy – Introduction, aroma oils for common problems, carrier oils.

3 Formulation development of various systems of medicine — 12 Hrs

   Salient features of the techniques of preparation of some of the important class of Formulations as per Ayurveda, Siddha, Homeopathy and Unani Pharmacopoeia and texts. Standardization,

   Shelf life and Stability studies of ISM formulations.

4	Schedule T – Good Manufacturing Practice of Indian systems of medicine Components of GMP (Schedule – T) and its objectives, Infrastructural requirements, working space, storage area, machinery and equipments, standard operating procedures, health and hygiene, documentation and records. Quality assurance in ISM formulation industry - GAP, GMP and GLP. Preparation of documents for new drug application and export registration. Challenges in monitoring the safety of herbal medicines: Regulation, quality assurance and control, National/Regional Pharmacopoeias.	12 Hrs
5	TKDL, Geographical indication Bill, Government bills in AYUSH, ISM, CCRAS, CCRS, CCRH, CCRU	12 Hrs

REFERENCES (Latest Editions of)

1. Ayurvedic Pharmacopoeia, The Controller of Publications, Civil Lines, Govt. of India, New Delhi.
2. Hand Book on Ayurvedic Medicines, H. Panda, National Institute of Industrial Research, New Delhi.
3. Ayurvedic System of Medicine, Kaviraj Nagendranath Sengupata, Sri Satguru Publications, New Delhi.
4. Ayurvedic Pharmacopoeia. Formulary of Ayurvedic Medicines, IMCOPS, Chennai.
5. Homeopathic Pharmacopoeia. Formulary of Homeopathic Medicines, IMCOPS, Chennai.
6. Homeopathic Pharmacy : An introduction & Hand book, Steven B. Kayne, Churchill Livingstone, New York.
7. Indian Herbal Pharmacopoeia, IDMA, Mumbai.
8. British Herbal Pharmacopoeia, bRITISH Herbal Medicine Association, UK.
9. GMP for Botanicals - Regulatory and Quality issues on Phytomedicine, Pulok K Mukharjee, Business Horizons, New Delhi.
10. Indian System of Medicine and Homeopathy in India, Planning and Evaluation Cell, Govt. of India, New Delhi.
11. Essential of Food and Nutrition, Swaminathan, Bappco, Bangalore.
12. Clinical Dietitics and Nutrition, F.P. Antia, Oxford University Press, Delhi.
13. Yoga - The Science of Holistic Living by V.K.Yoga, Vivekananda Yoga Prakashna Publishing, Bangalore.

HERBAL COSMETICS
(MPG 204T)

SCOPE

This subject deals with the study of preparation and standardization of herbal/natural cosmetics. This subject gives emphasis to various national and international standards prescribed regarding herbal cosmeceuticals.

OBJECTIVES

After completion of the course, student shall be able to,

- understand the basic principles of various herbal/natural cosmetic preparations
- current Good Manufacturing Practices of herbal/natural cosmetics as per the regulatory authorities

THEORY 60 Hrs

1.	Introduction: Herbal/natural cosmetics, Classification & Economic aspects. Regulatory Provisions relation to manufacture of cosmetics: - License, GMP, offences & Penalties, Import & Export of Herbal/natural cosmetics, Industries involved in the production of Herbal/natural cosmetics.	12 Hrs
2	Commonly used herbal cosmetics, raw materials, preservatives, surfactants, humectants, oils, colors, and some functional herbs, preformulation studies, compatibility studies, possible interactions between chemicals and herbs, design of herbal cosmetic formulation.	12 Hrs
3	Herbal Cosmetics : Physiology and chemistry of skin and pigmentation, hairs, scalp, lips and nail, Cleansing cream, Lotions, Face powders, Face packs, Lipsticks, Bath products, soaps and baby product, Preparation and standardisation of the following : Tonic, Bleaches, Dentifrices and Mouth washes & Tooth Pastes, Cosmetics for Nails.	12 Hrs
4	Cosmeceuticals of herbal and natural origin: Hair growth formulations, Shampoos, Conditioners, Colorants & hair oils, Fairness formulations, vanishing & foundation creams, anti-sun burn preparations, moisturizing creams, deodorants.	12 Hrs

5	Analysis of Cosmetics, Toxicity screening and test methods: Quality control and toxicity studies as per Drug and Cosmetics Act.	12 Hrs

REFERENCES (Latest Editions of)

1. Panda H. Herbal Cosmetics (Hand book), Asia Pacific Business Press Inc, New Delhi.
2. Thomson EG. Modern Cosmetics, Universal Publishing Corporation, Mumbai.
3. P.P.Sharma. Cosmetics - Formulation, Manufacturing & Quality Control, Vandana Publications, New Delhi.
4. Supriya K B. Handbook of Aromatic Plants, Pointer Publishers, Jaipur.
5. Skaria P. Aromatic Plants (Horticulture Science Series), New India Publishing Agency, New Delhi.
6. Kathi Keville and Mindy Green. Aromatheraphy (A Complete Guide to the Healing Art), Sri Satguru Publications, New Delhi.
7. Chattopadhyay PK. Herbal Cosmetics & Ayurvedic Medicines (EOU), National Institute of Industrial Research, Delhi.
8. Balsam MS & Edward Sagarin. Cosmetics Science and Technology, Wiley Interscience, New York.

HERBAL COSMETICS PRACTICALS
(MPG 205P)

1. Isolation of nucleic acid from cauliflower heads
2. Isolation of RNA from yeast
3. Quantitative estimation of DNA
4. Immobilization technique
5. Establishment of callus culture
6. Establishment of suspension culture
7. Estimation of aldehyde contents of volatile oils
8. Estimation of total phenolic content in herbal raw materials
9. Estimation of total alkaloid content in herbal raw materials
10. Estimation of total flavonoid content in herbal raw materials
11. Preparation and standardization of various simple dosage forms from Ayurvedic, Siddha, Homoeopathy and Unani formulary
12. Preparation of certain Aromatherapy formulations
13. Preparation of herbal cosmetic formulation such as lip balm, lipstick, facial cream, herbal hair and nail care products
14. Evaluation of herbal tablets and capsules
15. Preparation of sunscreen, UV protection cream, skin care formulations.
16. Formulation & standardization of herbal cough syrup.

Semester III

MRM 301T - Research Methodology & Biostatistics

UNIT – I

General Research Methodology: Research, objective, requirements, practical difficulties, review of literature, study design, types of studies, strategies to eliminate errors/bias, controls, randomization, crossover design, placebo, blinding techniques.

UNIT – II

Biostatistics: Definition, application, sample size, importance of sample size, factors influencing sample size, dropouts, statistical tests of significance, type of significance tests, parametric tests(students "t" test, ANOVA, Correlation coefficient, regression), non-parametric tests (wilcoxan rank tests, analysis of variance, correlation, chi square test), null hypothesis, P values, degree of freedom, interpretation of P values.

UNIT – III

Medical Research: History, values in medical ethics, autonomy, beneficence, non-maleficence, double effect, conflicts between autonomy and beneficence/non-maleficence, euthanasia, informed consent, confidentiality, criticisms of orthodox medical ethics, importance of communication, control resolution, guidelines, ethics committees, cultural concerns, truth telling, online business practices, conflicts of interest, referral, vendor relationships, treatment of family members, sexual relationships, fatality.

UNIT – IV

CPCSEA guidelines for laboratory animal facility: Goals, veterinary care, quarantine, surveillance, diagnosis, treatment and control of disease, personal hygiene, location of animal facilities to laboratories, anesthesia, euthanasia, physical facilities, environment, animal husbandry, record keeping, SOPs, personnel and training, transport of lab animals.

UNIT – V

Declaration of Helsinki: History, introduction, basic principles for all medical research, and additional principles for medical research combined with medical care.

PHARMACY COUNCIL OF INDIA
Combined Council's Building, Kotla Road,
Aiwan-E-Ghalib Marg, New Delhi-110 002.
Website : www.pci.nic.

Office of the Principal
Institute of Pharmacy & Technology, Salipur, Cuttack-754202, Odisha

Mentor-Mentee Notice

No. IPT/ 74 /2022, Date:06.05.2022

It is hereby advised to all the Mentors of this institution to maintain the Mentor-Mentee system as per the following protocol. For reference of the faculty members the protocol has been displayed in our college website under Mentor-Mentee system.

MENTOR-MENTEE SYSTEM

Mentoring is an effective and popular way of providing guidance and support to the students and thereby shaping their future. Effective mentoring also helps to accomplish program vision & mission of an institute. It develops a sense of discipline, responsibility and accountability within the student community. The prime objective of the mentor-mentee process at IPT, Salipur is to ensure students' overall development with regard to academics, professional integrity and helps in developing employable skills among the technical students of this institution.

Details of Mentor-Mentee Process

- Eligible faculty members are assigned a group of 20 to 25 mentees whom they serve as mentors throughout the period of their course.
- The first-year students are assigned mentors through the Mentor-Mentee system.
- The mentors are provided with a standard booklet containing all personal and academic details of their respective mentees, which they need to update throughout academic curriculum of the assigned students.
- The mentors remain in regular touch with the guardian of the mentees and update them regarding the progress and any deficiencies found within them.
- Proper confidentiality shall be maintained by the mentors with regard to the personal grievances of their respective mentees and motivate and guide them to navigate themselves from odd situations.
- The mentors shall be consulted/informed in case of disciplinary issues on code of conduct with their respective mentees.

Role of a Mentor

- To take the lead in supporting a mentee through an ongoing, one-to-one relationship.
- To build a relationship of trust by caring and planning for welfare of the mentee.
- To serve as a positive role model.
- To strive for mutual respect.
- Always be a patient listener to the mentees and be considerate and flexible towards the issues of mentees.
- Should always encourage and support the mentees for constructive activities.
- Try to develop a sense of mutual respect for each other among the mentees.

Responsibilities of a Mentor

- Meet the mentee student twice in a month.
- Track the academic performance of the mentee and counsel, guide and motivate in all academic and professional matters.
- Advise the mentee regarding choice of electives, add on courses, external certifications, project, summer training/internships and other co-curricular matters.
- Advise for career options and its planning and development.
- Maintain a confidential progressive record of the mentee.
- Intimate HOD and suggest if any coordinated action is called for.
- Contact parents/guardians if situation demands e.g. irregularities, negative behavioral changes and interpersonal relations, detrimental activities etc.
- Maintain contact with the students even after their graduation.

Responsibilities of a Mentee

- Respect the mentor.
- Regularly attend the meetings with the mentor and seek advice.
- Provide the details of his/her performance, curricular and extracurricular activities to the mentor.

HOD 6/5/22
Coordinator

Principal 6/5/22
PRINCIPAL
Institute of Pharmacy & Technology
Salipur, Dist-Cuttack-754202, Orissa

Copy to: Student notice board/Staff circular/Mentor mentee file/Notice file/Guard file

Office of the Principal
Institute of Pharmacy & Technology, Salipur, Cuttack-754202, Odisha

Mentor-Mentee Notice

No. IPT/ 34 /2023, Date: 13.02.2023

The following D. Pharm, B. Pharm and M. Pharm students of academic year 2022-23 are under your Mentorship, carryout the Mentor Mentee meeting once in a month or as often possible and discuss vividly about the curricular and extracurricular activities of each mentee, so that the mentees will be competent from all aspects.

Sl.No.	Mentors Name	Course & year	Mentees Regn. No./Roll No.	Signature
01	Dr. S. Panja	D. Pharm 1st year	001 to 020	
02	Dr. S.K. Sahu	D. Pharm 1st year	021 to 040	
03	Mr. B.K. Nayak	D. Pharm 1st year	041 to 060	
04	Dr. S.K. Behera	D. Pharm 2nd year	001 to 020	
05	Dr. B.N. Mishra	D. Pharm 2nd year	021 to 040	
06	Mr. C. Panda	D. Pharm 2nd year	041 to 060	C. Panda
07	Dr. M. Banerjee	B.Pharm 1st year	22BPH001 to 22BPH020, 22BPH101	
08	Mr. A.C. Sahoo	B.Pharm 1st year	22BPH021 to 22BPH040, 22BPH102	
09	Dr. C.S. Barik	B.Pharm 1st year	22BPH041 to 22BPH060, 22BPH103	
10	Dr. P.K. Sahoo	B.Pharm 1st year	22BPH061 to 22BPH080, 22BPH104	
11	Dr. S. Dash	B.Pharm 1st year	22BPH081 to 22BPH100, 22BPH105	
12	Dr. B.R. Mohanty	B.Pharm 2nd year	2103257001 to 2103257021, 22BLE001 to 22BLE003	
13	Dr. B.S. Nayak	B.Pharm 2nd year	2103257022 to 2103257042 22BLE004 to 22BLE006	
14	Dr. B.S. Mishra	B.Pharm 2nd year	2103257043 to 2103257063 22BLE007 to 22BLE009	
15	Dr. S. Panda	B.Pharm 2nd year	1803257062, 2103257064 to 2103257073, 2103257075 to 2103257084 22BLE010 to 22BLE012	
16	Dr. S.S. Kar	B.Pharm 2nd year	2103257085 to 2103257105 22BLE013 to 22BLE014	
17	Dr. M.K. Sahoo	B.Pharm 3rd year	1803257018, 2003257001 to 2003257021, 2123257001 & 2123257002	
18	Dr. R.K. Giri	B.Pharm 3rd year	2003257022 to 2003257042, 2123257003 & 2123257004	13/02/23
19	Dr. A.K. Senapati	B.Pharm 3rd year	2003257043 to 2003257063, 2123257005 & 2123257006	13/02/23
35	Dr. H.K. Sandeep Kumar	B.Pharm 3rd year	2003257064 to 2003257084, 2123257007 & 2123257008	
36	Mrs. B. Behera	B.Pharm 3rd year	2003257085 to 2003257105, 2123257009 to 2123257011	13/2/23
37	Dr. S.K. Kanungo	B.Pharm Final year	1903257001 to 1903257021, 2023257001 to 202325703	13/2/23
38	Dr. P.K.S. Mahapatra	B.Pharm Final year	1903257022-1903257042, 2023257004 & 202325705	
39	Dr. S.K. Patro	B.Pharm Final year	1903257043-1903257063,	13/2/23

Sl.No.	Mentors Name	Course & year	Mentees Regn. No./Roll No.	Signature
			2023257006 & 202325707	
30	Dr. A.K. Prusty	B.Pharm Final year	1903257064-1903257084 2023257008 & 202325709	
31	Mr. D. Hati	B.Pharm Final year	1903257085-1903257104 2023257010 to 2023257013	
1 32	Dr. S.K. Patro	M.Pharm 1st year (Pharm. Analysis)	22MPH001 to 22MPH012	
2 33	Dr. S.K. Kanungo	M.Pharm 1st year (Pharma. Chemistry)	22MPH013 to 22MPH024	13/3/23
3 34	Dr. B.R. Mohanty	M.Pharm 1st year (Pharmaceutics)	22MPH025 to 22MPH039	
4 35	Dr. S.K. Patro	M.Pharm 2nd year (Pharm. Analysis)	2108257001 to 2108257015	
5 36	Dr. S.K. Kanungo	M.Pharm 2nd year (Pharma. Chemistry)	2108257016 to 2108257029	13/3/23
6 37	Dr. B.R. Mohanty	M.Pharm 2nd year (Pharmaceuties)	2108257030 to 2108257044	

13/3/2023
Coordinator

13/3/23
Principal
Principal
Institute of Pharmacy & Technology
Salipur, Dist-Cuttack-754202, Odisha

Copy to: Student notice board/Staff circular/Mentor mentee file/Notice file/Guard file.

Office of the Principal
Institute of Pharmacy & Technology, Salipur, Cuttack-754202, Odisha
Mentor-Mentee Notice

No. IPT/ 478 /2023, **Date:**25.04.2023

In continuation of our earlier notice No. IPT/34/2023, dated 13.01.2023, the following D. Pharm., B. Pharm and M. Pharm students of the academic year 2022-23 are under your Mentorship, carrying the Mentor Mentee meeting once in a month or as often possible and discuss vividly about the curricular and extracurricular activities of each mentee, so that the mentees will be competent from all aspects.

Sl.No.	Mentors Name	Course & year	Mentees Regn. No./Roll No.	Signature
01	Dr. S.K. Behera	D. Pharm 1st year	22DP11001 to 22DP11020	
02	Dr. B.N. Mishra	D. Pharm 1st year	22DP11021 to 22DP11040	
03	Mr. C. Panda	D. Pharm 1st year	22DP11041 to 22DP11060	
04	Dr. S. Parija	D. Pharm 2nd year	21DP11001 to 21DP11020	
05	Dr. S.K. Sahu	D. Pharm 2nd year	21DP11021 to 21DP11040	
06	Mr. B.K. Nayak	D. Pharm 2nd year	21DP11041 to 21DP11060	
07	Dr. M. Banerjee	B.Pharm 1st year	2203257001 to 2203257021	
08	Dr. A.C. Sahoo	B.Pharm 1st year	2203257022 to 2203257042	
09	Dr. C.S. Barik	B.Pharm 1st year	2203257043 to 2203257063	
10	Dr. P.K. Sahoo	B.Pharm 1st year	2203257064 to 2203257084	
11	Dr. S. Dash	B.Pharm 1st year	2203257085 to 2203257105	
12	Dr. B.R. Mohanty	B.Pharm 2nd year	2103257001 to 2103257021, 2223257001 to 2223257003	
13	Dr. B.S. Nayak	B.Pharm 2nd year	2103257022 to 2103257042 2223257004 to 2223257006	
14	Dr. B.S. Mishra	B.Pharm 2nd year	2103257043 to 2103257063 2223257007 to 2223257009	
15	Dr. S. Panda	B.Pharm 2nd year	2103257062, 2103257064 to 2103257073, 2103257075 to 2103257084 2223257010 to 2223257012	
16	Dr. S.S. Kar	B.Pharm 2nd year	2103257085 to 2103257105 2223257013 to 2223257014	
17	Dr. M.K. Sahoo	B.Pharm 3rd year	2003257018, 2003257001 to 2003257021 2123257001 & 2123257002	
18	Dr. R.K. Giri	B.Pharm 3rd year	2003257022 to 2003257042, 2123257003 & 2123257004	
19	Dr. A.K. Senapati	B.Pharm 3rd year	2003257043 to 2003257063, 2123257005 & 2123257006	
25	Dr. H.K. Sundeep Kumar	B.Pharm 3rd year	2003257064 to 2003257084, 2123257007 & 2123257008	
26	Mrs. B. Behera	B.Pharm 3rd year	2003257085 to 2003257105, 2123257009 to 2123257011 & 2023257011	
27	Dr. S.K. Kanungo	B.Pharm Final year	1903257001 to 1903257021, 2023257001 to 2023257003	

26/4/23

Principal
Institute of Pharmacy & Technology
Salipur, Dist-Cuttack-754202, Odisha

25/04

25/04/2023

Sl.No.	Mentors Name	Course & year	Mentees Regn. No./Roll No.	Signature
28	Dr. P.K.S. Mahapatra	B.Pharm Final year	1903257042 to 1903257042, 2023257004 & 2023257005	
29	Dr. S.K. Patro	B.Pharm Final year	1903257063 to 1903257063, 2023257068 & 2023257071	
30	Dr. A.K. Prusty	B.Pharm Final year	1903257084 to 1903257084 2023257098 & 2023257099	
31	Mr. D. Hati	B.Pharm Final year	1903257094 to 1903257094 2023257010 to 2023257013	
32	Dr. S.K. Patro	M.Pharm 1st year (Pharm. Analysis)	2208257001 to 2208257012	
33	Dr. S.K. Kanungo	M.Pharm 1st year (Pharma. Chemistry)	2208257013 to 2208257024	
34	Dr. B.R. Mohanty	M.Pharm 1st year (Pharmaceutics)	2208257025 to 2208257039	
35	Dr. S.K. Patro	M.Pharm 2nd year (Pharm. Analysis)	2108257001 to 2108257015	
36	Dr. S.K. Kanungo	M.Pharm 2nd year (Pharma. Chemistry)	2108257016 to 2108257029	
37	Dr. B.R. Mohanty	M.Pharm 2nd year (Pharmaceutics)	2108257030 to 2108257043	

Coordinator

Principal 25/4/23.

Principal
Institute of Pharmacy & Technology
Salipur, Dist-Cuttack-754202, Odisha

Copy to: Student notice board/Staff circular/Mentor mentee file/Notice file/Guard file.

26/04/23

Institute of Pharmacy & Technology, Salipur

LESSON PLAN

(Tentative Academic Planer 16.02.2023 to 13.05.2023)

Class: B. Pharm 1st Semester

Session: 2022-2023

Subject Title: HAP I (Theory)

Course Code: BP101T.

Faculty: Dr Chandrasekhar Barik

Schedule of allotted class work (w.e.f.): 16.02.2023 (Thursday)

Available Periods: 02/ week

Daily Teaching Schedule

UNIT – II (Class as per Syllabus for Section A & B)

Sl No	Class Schedule Date as per time table	Day & Time	Actual date & Time of classes	Topic	Discussion On Class
1.	**21/02/23**	TUES. 2pm to 3pm(Sec-A), 3pm to 4pm (Sec-B)		Divisions of skeletal system	
2.	**24/02/23**	Fri. 2pm to 3pm(Sec-A), 3pm to 4pm (Sec-B)		Divisions of skeletal system	
3.	28/02/23	TUES. 2pm to 3pm(Sec-A), 3pm to 4pm (Sec-B)		types of bone	
4.	03/03/23	Fri. 2pm to 3pm(Sec-A), 3pm to 4pm (Sec-B)		types of bone	
5.	10/03/23	Fri. 2pm to 3pm(Sec-A), 3pm to 4pm (Sec-B)		salient features and functions of bones of axial and appendicular skeletal system	
6.	14/03/23	TUES. 2pm to 3pm(Sec-A), 3pm to 4pm (Sec-B)		salient features and functions of bones of axial and appendicular skeletal system	
7.	17/03/23	Fri. 2pm to 3pm(Sec-A), 3pm to 4pm (Sec-B)		Organization of skeletal muscle	

8.	21/03/23	TUES. 2pm to 3pm(Sec-A), 3pm to 4pm (Sec-B)		physiology of muscle contraction, neuromuscular junction	
9.	24/03/23	Fri. 2pm to 3pm(Sec-A), 3pm to 4pm (Sec-B)		physiology of muscle contraction, neuromuscular junction	

UNIT – IV (Class as per Syllabus for Section A & B)

1.	28/03/23	TUES. 2pm to 3pm(Sec-A), 3pm to 4pm (Sec-B)		**Peripheral nervous system**: Classification of peripheral nervous system:	
2.	31/03/23	Fri. 2pm to 3pm(Sec-A), 3pm to 4pm (Sec-B)		Structure and functions of sympathetic and parasympathetic nervous system.	
3.	04/04/23	TUES. 2pm to 3pm(Sec-A), 3pm to 4pm (Sec-B)		Origin and functions of spinal and cranial nerves.	
4.	11/04/23	TUES. 2pm to 3pm(Sec-A), 3pm to 4pm (Sec-B)		• **Special senses** Structure and functions of eye,	
5.	18/04/23	TUES. 2pm to 3pm(Sec-A), 3pm to 4pm (Sec-B)		• **Special senses** Structure and functions of ear	
6.	21/04/23	Fri. 2pm to 3pm(Sec-A), 3pm to 4pm (Sec-B)		• **Special senses** Structure and functions of nose • **Special senses** Structure and functions of tongue	

UNIT – V (Class as per Syllabus for Section A & B)

1.	25/04/23	TUES. 2pm to 3pm(Sec-A), 3pm to 4pm (Sec-B)		**Cardiovascular system** Heart – anatomy of heart, blood circulation,	

2.	28/04/23	Fri. 2pm to 3pm(Sec-A), 3pm to 4pm (Sec-B)		blood vessels, structure and functions of artery, vein and capillaries,	
3.	02/05/23	TUES. 2pm to 3pm(Sec-A), 3pm to 4pm (Sec-B)		elements of conduction system of heart and heart beat, its regulation by autonomic nervous system, elements of conduction system of heart and heart beat, its regulation by autonomic nervous system, cardiac output, cardiac cycle.	
4.	09/05/23	TUES. 2pm to 3pm(Sec-A), 3pm to 4pm (Sec-B)		Regulation of blood pressure, pulse, electrocardiogram disorders of heart	

Daily Teaching Schedule for Practical
Group I

Sl.No.	Date	Day & Time	No. of hours	Title of the Experiments to be conducted
1	**20/02/23**	Monday 10 am. To 1pm.	3hr.	Study of compound microscope.
2	27/02/23	Monday 10 am. To 1pm.	3hr.	Microscopic study of epithelial and connective tissue
3	06/03/23	Monday 10 am. To 1pm.	3hr.	Microscopic study of muscular and nervous tissue
4	13/03/23	Monday 10 am. To 1pm.	3hr.	Identification of axial bones
5	20/03/23	Monday 10 am. To 1pm.	3hr.	Identification of appendicular bones
6	27/03/23	Monday 10 am. To 1pm.	3hr.	Introduction to hemocytometry.
7	03/04/23	Monday 10 am. To 1pm.	3hr.	Enumeration of white blood cell (WBC) count
8	10/04/23	Monday 10 am. To 1pm.	3hr.	Enumeration of total red blood corpuscles (RBC) count

9	17/04/23	Monday 10 am. To 1pm.	3hr.	Determination of bleeding time
10	24/04/23	Monday 10 am. To 1pm.	3hr.	Determination of clotting time Estimation of hemoglobin content
11				
12	01/05/23	Monday 10 am. To 1pm.	3hr.	Determination of blood group. Determination of erythrocyte sedimentation rate (ESR).
13				
14	08/05/23	Monday 10 am. To 1pm.	3hr.	Determination of heart rate and pulse rate.. Recording of blood pressure
15				

Group II

Sl.No.	Date	Day & Time	No. of hours	Title of the Experiments to be conducted
1	**22/02/23**	Wednesday 10 am. To 1pm.	3hr.	Study of compound microscope.
2	01/03/23	Wednesday 10 am. To 1pm.	3hr.	Microscopic study of epithelial and connective tissue
3	08/03/23	Wednesday 10 am. To 1pm.	3hr.	Microscopic study of muscular and nervous tissue
4	15/03/23	Wednesday 10 am. To 1pm.	3hr.	Identification of axial bones
5	22/03/23	Wednesday 10 am. To 1pm.	3hr.	Identification of appendicular bones
6	29/03/23	Wednesday 10 am. To 1pm.	3hr.	Introduction to hemocytometry.
7	05/04/23	Wednesday 10 am. To 1pm.	3hr.	Enumeration of white blood cell (WBC) count
8	12/04/23	Wednesday 10 am. To 1pm.	3hr.	Enumeration of total red blood corpuscles (RBC) count
9	19/04/23	Wednesday 10 am. To 1pm.	3hr.	Determination of bleeding time
10	26/04/23	Wednesday 10 am. To 1pm.	3hr.	Determination of clotting time Estimation of hemoglobin content
11				
12	03/05/23	Wednesday 10 am. To 1pm.	3hr.	Determination of blood group. Determination of erythrocyte sedimentation rate (ESR).
13				

14	10/05/23	Wednesday 10 am. To 1pm.	3hr.	Determination of heart rate and pulse rate.. Recording of blood pressure
15				

Group III

Sl.No.	Date	Day & Time	No. of hours	Title of the Experiments to be conducted
1	**17/02/23**	Friday 10 am. To 1pm.	3hr.	Study of compound microscope.
2	24/02/23	Friday 10 am. To 1pm.	3hr.	Microscopic study of epithelial and connective tissue
3	03/03/23	Friday 10 am. To 1pm.	3hr.	Microscopic study of muscular and nervous tissue
4	10/03/23	Friday 10 am. To 1pm.	3hr.	Identification of axial bones
5	17/03/23	Friday 10 am. To 1pm.	3hr.	Identification of appendicular bones
6	24/03/23	Friday 10 am. To 1pm.	3hr.	Introduction to hemocytometry.
7	31/03/23	Friday 10 am. To 1pm.	3hr.	Enumeration of white blood cell (WBC) count
8	07/04/23	Friday 10 am. To 1pm.	3hr.	Enumeration of total red blood corpuscles (RBC) count
9	14/04/23	Friday 10 am. To 1pm.	3hr.	Determination of bleeding time
10	21/04/23	Friday 10 am. To 1pm.	3hr.	Determination of clotting time
11	28/04/23	Friday 10 am. To 1pm.	3hr.	Estimation of hemoglobin content
12	05/05/23	Friday 10 am. To 1pm.	3hr.	Determination of blood group. Determination of erythrocyte sedimentation rate (ESR).
13				
14	12/05/23	Friday 10 am. To 1pm.	3hr.	Determination of heart rate and pulse rate.. Recording of blood pressure
15				

SIGNATURE OF THE FACULTY

Institute of Pharmacy & Technology, Salipur

LESSON PLAN

(Tentative Academic Planer 16.02.2023 to 13.05.2023)

Class: B. Pharm 1st Semester

Session: 2022-2023

Subject Title: HAP I (Theory)

Course Code: BP101T.

Faculty: Dr Ranjan Kumar Giri

Schedule of allotted class work (w.e.f.): 16.02.2023 (Thursday)

Available Periods: 02/ week

Daily Teaching Schedule

UNIT – I (Class as per Syllabus for Section A & B)

Sl No	Class Schedule Date as per time table	Day & Time	Actual date & Time of classes	Topic	Discussion On Class
1	**20/02/23**	Monday 2pm to 3pm(Sec-A), 3pm to 4pm (Sec-B)		Definition and scope of anatomy and physiology,	
2	**23/02/23**	Thursday 2pm to 3pm (Sec-A) 3pm to 4pm(Sec-B),		levels of structural organization and body systems,	
3	27/02/23	Monday 2pm to 3pm(Sec-A), 3pm to 4pm (Sec-B)		basic life processes, homeostasis, basic anatomical terminology.	
4	02/03/23	Thursday 2pm to 3pm (Sec-A) 3pm to 4pm(Sec-B),		Structure and functions of cell, transport across cell membrane,	
5	06/03/23	Monday 2pm to 3pm(Sec-A), 3pm to 4pm (Sec-B)		Cell division,	
6	09/03/23	Thursday 2pm to 3pm (Sec-A) 3pm to 4pm(Sec-B),		Cell junctions. General principles of cell communication,	
7	13/03/23	Monday 2pm to 3pm(Sec-A), 3pm to 4pm (Sec-B)		intracellular signaling pathway activation by extracellular signal molecule,	
8	16/03/23	Thursday 2pm to 3pm (Sec-A) 3pm to 4pm(Sec-B),		Forms of intracellular signaling: a) Contact-dependent b) Paracrine	

9	20/03/23	Monday 2pm to 3pm(Sec-A), 3pm to 4pm (Sec-B)		Forms of intracellular signaling: c) Synaptic d) Endocrine	
1	23/03/23	Thursday 2pm to 3pm (Sec-A) 3pm to 4pm(Sec-B),		Classification of tissues, structure, location and functions of epithelial,	
1	27/03/23	Monday 2pm to 3pm(Sec-A), 3pm to 4pm (Sec-B)		Classification of tissues, structure, location and functions of muscular tissue.	
1	03/04/23	Monday 2pm to 3pm(Sec-A), 3pm to 4pm (Sec-B)		Classification of tissues, structure, location and functions of nervous and connective tissues.	

UNIT – II (Class as per Syllabus for Section A & B)

1.	06/04/23	Thursday 2pm to 3pm (Sec-A) 3pm to 4pm(Sec-B),		**Integumentary system** Structure of skin	
2.	10/04/23	Monday 2pm to 3pm(Sec-A), 3pm to 4pm (Sec-B)		Functions of skin	
3.	13/04/23	Thursday 2pm to 3pm (Sec-A) 3pm to 4pm(Sec-B),		**Joints** Structural and functional classification of joints,	
4.	17/04/23	Monday 2pm to 3pm(Sec-A), 3pm to 4pm (Sec-B)		types of joints	
5.	20/04/23	Thursday 2pm to 3pm (Sec-A) 3pm to 4pm(Sec-B),		movements and its articulation	

UNIT – III (Class as per Syllabus for Section A & B)

1.	24/04/23	Monday 2pm to 3pm(Sec-A), 3pm to 4pm (Sec-B)		Body fluids, composition and functions of blood,	
2.	27/04/23	Thursday 2pm to 3pm (Sec-A) 3pm to 4pm(Sec-B),		composition of blood	
3.	01/05/23	Monday 2pm to		mechanisms of coagulation	

		3pm to 4pm (Sec-B)			
4.	04/05/23	Thursday 2pm to 3pm (Sec-A) 3pm to 4pm(Sec-B),		blood grouping, Rh factors, transfusion, its significance	
5.	08/05/23	Monday 2pm to 3pm(Sec-A), 3pm to 4pm (Sec-B)		disorders of blood Reticulo endothelial system	
6.	11/05/23	Thursday 2pm to 3pm (Sec-A) 3pm to 4pm(Sec-B),		Lymphatic organs and tissues , lymphatic vessels, lymph circulation,	

Daily Teaching Schedule for Practical

Sl.No.	Date	Day & Time	No. of hours	Title of the Experiments to be conducted
1	**23/02/23**	Thursday 10am. To 1pm.	3hr.	Study of compound microscope.
2	02/03/23	Thursday 10am. To 1pm.	3hr.	Microscopic study of epithelial and connective tissue
3	09/03/23	Thursday 10am. To 1pm.	3hr.	Microscopic study of muscular and nervous tissue
4	16/03/23	Thursday 10am. To 1pm.	3hr.	Identification of axial bones
5	23/03/23	Thursday 10am. To 1pm.	3hr.	Identification of appendicular bones
6	06/04/23	Thursday 10am. To 1pm.	3hr.	Introduction to hemocytometry.
7	13/04/23	Thursday 10am. To 1pm.	3hr.	Enumeration of white blood cell (WBC) count
8	20/04/23	Thursday 10am. To 1pm.	3hr.	Enumeration of total red blood corpuscles (RBC) count
9	20/04/23	Thursday 10am. To 1pm.	3hr.	Determination of bleeding time
10	27/04/23	Thursday 10am. To 1pm.	3hr.	Determination of clotting time
11	27/04/23	Thursday 10am. To 1pm.	3hr.	Estimation of hemoglobin content
12	04/05/23	Thursday 10am. To 1pm.	3hr.	Determination of blood group.
13	04/05/23	Thursday 10am. To 1pm.	3hr.	Determination of erythrocyte sedimentation rate (ESR).
14	11/05/23	Thursday 10am. To 1pm.	3hr.	Determination of heart rate and pulse rate..
15	11/05/23	Thursday 10am. To 1pm.	3hr.	Recording of blood pressure

SIGNATURE OF THE FACULTY

Lesson Plan

Class: B. Pharm 1st Semester
Session: 2022-2023
Subject Title: PHARMACEUTICAL ANALYSIS-I (Theory)
Course Code: BP102T
Faculty: Dr Minaketan Sahoo
Schedule of allotted class work (w.e.f.): 20.02.2023 (Monday)
Available Periods: 02 per week

Daily Teaching Schedule (Theory)

UNIT – I (Class as per Syllabus for Section A & B)

Sl No	Class Schedule Date as per time table	Day & Time	Actual date & Time of classes	Topic	Discussion On Class
1.	22/02/23	Wednesday (2PM-4PM)		Pharmaceutical analysis- Definition and scope	Significance of Pharma. Analysis, Qualitative and Quantitative
2.	25/02/23	Saturday (3PM-5PM)		Different techniques of analysis	Volumetric, Electrochemical and Optical techniques
3.	01/03/23	Wednesday (2PM-4PM)		Methods of expressing concentration	Molar and Normal Preparations
4.	04/03/23	Saturday (3PM-5PM)		Primary and secondary standards.	Standard solutions preparation methods
5.	11/03/23	Saturday (3PM-5PM)		Preparation and standardization of various molar and normal solutions- Oxalic acid, sodium hydroxide,	Preparation and standardisation methods Oxalic acid, sodium hydroxide,
6.	15/03/23	Wednesday (2PM-4PM)		hydrochloric acid, sodium thiosulphate,	Preparation and standardisation methods hydrochloric acid, sodium thiosulphate
7.	18/03/23	Saturday (3PM-5PM)		sulphuric acid, potassium permanganate and ceric ammonium sulphate	Preparation and standardisation methods sulphuric acid, potassium permanganate and ceric ammonium sulphate
8.	22/03/23	Wednesday (2PM-4PM)		Pharmacopoeia, Sources of impurities in medicinal agents	Pharmacopoeia, Sources of impurities in medicinal agents
9.	25/03/23	Saturday (3PM-5PM)		limit tests for Chloride	limit tests for Chloride
10.	29/03/23	Wednesday (2PM-4PM)		limit tests for Sulphate and Iron	limit tests for Sulphate and Iron
11.	05/04/23	Wednesday (2PM-4PM)		limit tests for Arsenic	limit tests for Arsenic

Institute of Pharmacy & Technology, Salipur.

Lesson Plan

Academic Planner 13/10/2022 to 16.1.23

Course Name	B. Pharm
Year/ Semester	7th Semester
Subject	Instrumental Methods Analysis
Course Code	BP 701 T
Name of the Faculty	Dr. Saroja Kumar Patro
Date of Starting of Class	13/10/2022
Date of Closing of Class	23/01/2023
Class allotted per week	3
Available No of Class	

Lect. No.	UNIT	DATE	DAY & Time	TOPIC	Actual date & Time of classes held	Discussion on Class
1	III	14/10/2022	Friday (10 to 11AM)	Introduction to chromatography	14.10.22 (10 to 11AM)	Introduction to Instrumental method of analysis
2		15/10/2022	Saturday (10 to 11AM)	Column chromatography	15.10.22 (10 to 11AM)	Column chromatography
3		17/10/2022	Monday (11 to 12.00 noon)	Thin layer chromatography	17.10.22 (11 to 12.00 noon)	Thin layer chromatography
4		21/10/2022	Friday (10 to 11AM)	TLC	----------	----------
5		22/10/2022	Saturday (10 to 11AM)	Paper Chromatography	22.10.22 (10 to 11AM)	Thin layer chromatography
6		28/10/2022	Friday (10 to 11AM)	Introduction to electrophoresis, factors affecting electrophoretic mobility	----------	----------
7		29/10/2022	Saturday (10 to 11AM)	Paper electrophoresis	29.10.22 (10 to 11AM)	Introduction to electrophoresis, factors affecting electrophoretic mobility
8		31/10/2022	Monday (11 to 12.00 noon)	Agarose electrophoresis	31.10.22 (11 to 12.00 noon)	Paper electrophoresis
9		4/11/2022	Friday (10 to 11AM)	Poly acrylamide gel electrophoresis	2.11.22 (Wednesday) 11to 12.00 noon	Agarose electrophoresis
10		5/11/2022	Saturday (10 to 11AM)	Capillary electrophoresis	4.11.22 (10 to	Capillary electrophoresis

					11AM)	
11	IV	11/11/2022	Friday (10 to 11AM)	Introduction to Gas chromatography & theory	5.11.22 (10 to 11AM)	Introduction to Gas chromatography & theory
12		12/11/2022	Saturday (10 to 11AM)	instrumentation of Gas chromatography	9.11.22 (Wednesday) 11to 12.00 noon	instrumentation of Gas chromatography
13		14/11/2022	Monday (11 to 12.00 noon)	Derivatization, temperature programming, advantages, disadvantages and applications	11.11.22 (10 to 11AM)	Derivatization, temperature programming, advantages, disadvantages and applications
14		18/11/2022	Friday (10 to 11AM)	Introduction to HPLC, Principle,	14.11.22 (11 to 12.00 noon)	Introduction to HPLC, Principle,
15		19/11/2022	Saturday (10 to 11AM)	Theory & Instrumentation of HPLC	19.11.22 (10 to 11AM)	Theory & Instrumentation of HPLC
16		21/11/2022	Monday (11 to 12.00 noon)	Application of HPLC	21.11.22 (11 to 12.00 noon)	Application of HPLC
17		25/11/2022	Friday (10 to 11AM)	Ion exchange chromatography- Introduction, classification	25.11.22 (10 to 11AM)	Ion exchange chromatography- Introduction, classification
18		26/11/2022	Saturday (10 to 11AM)	ion exchange resins, properties,	26.11.22 (10 to 11AM)	Ion exchange chromatography- Introduction, classification
19		28/11/2022	Monday (11 to 12noon	mechanism of ion exchange process	28.11.22 (11 to 12noon	ion exchange resins, properties,
20		2/12/2022	Friday (10 to 11AM)	factors affecting ion exchange, methodology and applications	30.11.22 Wednesday 11 to 12 noon	mechanism of ion exchange process
21		3/12/2022	Saturday (10 to 11AM)	Gel chromatography- Introduction, theory,	2.12.22 (10 to 11AM)	factors affecting ion exchange, methodology and applications
22		5/12/2022	Monday (11 to 12.00 noon)	instrumentation and applications of Gel chromatograph	3.12.22 (10 to 11AM)	Gel chromatography- Introduction, theory,
23		9/12/2022	Friday (10 to 11AM)	Affinity chromatography- Introduction, theory	9.12.22 (10 to 11AM)	instrumentation and applications of Gel chromatograph
24		10/12/2022	Saturday	instrumentation and	10.12.22	Affinity

			(10 to 11AM)	applications of Affinity chromatograph	(10 to 11AM)	chromatography- Introduction, theory instrumentation and applications of Affinity chromatograph
25	II	12/12/2022	Monday (11 to 12.00)	IR: Introduction, fundamental modes of vibrations in poly atomic molecules,	12.12.22 (11 to 12.00)	IR: Introduction, fundamental modes of vibrations in poly atomic molecules,
26		16/12/2022	Friday (10 to 11AM)	Sample handling, factors affecting vibrations	16.12.22 (10 to 11AM)	sample handling, factors affecting vibrations
27		17/12/2022	Saturday (10 to 11AM)	Instrumentation - Sources of radiation, wavelength selectors,	17.12.22 (10 to 11AM)	Instrumentation - Sources of radiation, wavelength selectors,
28		19/12/2022	Monday (11 to 12noon)	Golay cell, Bolometer, Thermocouple,	19.12.22 (11 to 12noon)	Golay cell, Bolometer, Thermocouple,
29		23/12/2022	Friday (10 to 11AM)	Thermister, Pyroelectric detector	26.12.22	Thermister, Pyroelectric detector
30		24/12/2022	Saturday (10 to 11AM)	Flame Photometry- Principle, interferences,	6.1.23	Flame Photometry- Principle, instrumentation, application and interferences,
31		26/12/2022	Monday (11 to 12.00 noon)	Instrumentation and applications of flame photometry	7.1.23 (11 to 12.00 noon)	Nepheloturbidometry- Principle, & Instrumentation
32		30/12/2022	Friday (10 to 11AM)	Nepheloturbidometry- Principle,	9.1.23 (11 to 12.00 noon) (Monday)	Application of nephloturbidimetry & Introduction to AAS
33		31/12/2022	Saturday (10 to 11AM)	Instrumentation & Application nephloturbidimetry	13.1.23 (10 to 11AM) Friday	Atomic absorption spectroscopy- Principle, instrumentation and application of Atomic absorption spectroscopy
34		2/1/2023	Monday (11 to 12.00 noon)	Atomic absorption spectroscopy- Principle, interferences	16.1.23 (11 to 12.00 noon) (Monday)	
35		6/1/2023	Friday (10 to 11AM)	Instrumentation and applications of Atomic absorption spectroscopy		

Sanjkumar Patra.

INSTITUTE OF PHARMACY AND TECHNOLOGY, SALIPUR
LESSON PLAN

Course Name: B. Pharm
Year/ Semester: 7th
Subject: Industrial Pharmacy II
Course Code: BP 702 T
Name of the Faculty: Dr. Bhabani Shankar Nayak
Date of Starting of Class: 13-10-2022
Date of Closing of Class:
Class allotted per week: 02
Available No of Class: 24

Unit 1 (Pilot plant scale up techniques)					
Sl. No.	**Class Schedule Date as per time table**	**Day & Time**	**Actual date & Time of classes**	**Topic**	**Discussion onClass**
1	15-10-2022	Saturday 11 am	18-10-22	Introduction to Pilot plant scale up techniques	Same
2	19-10-2022	Wednesday 10 am	19-10-2022	General considerations of Pilot plant	Same
3	22-10-2022	Saturday 11 am	22-10-2022	General considerations of Pilot plant	Same
4	26-10-2022	Wednesday 10 am	27-10-2022	Pilot plant scale up considerations for solids	Same
5	29-10-2022	Saturday 11 am	29-10-2022	Pilot plant scale up considerations for solids	Same
6	5-11-2022	Saturday 11 am	2-11-22	Pilot plant scale up considerations for liquid orals	Same
8	9-11-2022	Wednesday 10 am	5-11-22	Pilot plant scale up considerations for semisolid, SUPAC guidelines	Same
9	12-11-2022	Saturday 11 am	19-11-22	SUPAC guidelines	Same
10	19-11-2022	Wednesday 10 am	19-11-22	Introduction to platform technology	Same
Unit II (Technology development and transfer)					
11	23-11-2022	Wednesday 10 am	23-11-2022	WHO guidelines for Technology Transfer(TT)	Same
12	26-11-2022	Saturday 11 am	26-11-2022	Terminology, Technology transfer protocol, Quality risk management	Same
13	30-11-2022	Wednesday 10 am	1-12-22	Transfer from R & D to production (Process, packaging and cleaning)	Same
14	7-12-2022	Wednesday 10 am	3-12-22	Granularity of TT Process (API, excipients, finished products, packaging materials)	Same
15	10-12-2022	Saturday 11 am	7-12-22	Documentation, Premises and equipments, qualification and validation,	Same
16	14-12-2022	Wednesday 10 am	10-12-22	quality control, analytical method transfer, Approved regulatory bodies and agencies	Same

17	17-12-2022	Saturday 11 am	21-12-22	Commercialization - practical aspects and problems (case studies)	Same
18	21-12-2022	Wednesday 10 am	26-12-22	TT agencies in India - APCTD, NRDC, TIFAC, BCIL, TBSE / SIDBI	Same
19	28-12-2022	Wednesday 10 am	28-12-22	TT related documentation - confidentiality agreement, licensing, MoUs, legal issues	Same
20	31-12-2022	Saturday 11 am	7-1-23	TT related documentation - confidentiality agreement, licensing, MoUs, legal issues	Same
21	11-1-2023	Wednesday 10 am	11-1-2023	TT related documentation - confidentiality agreement, licensing, MoUs, legal issues	Same

10-03-2022

Dr. B.S. Nayak
(Asso. Prof.)

Institute of Pharmacy & Technology, Salipur

LESSON PLAN

(Tentative Academic Planer 24.11.2022)

Class: B.Pharm 1st Semester

Session: Odd semester 2022

Subject Title: NDDS (Theory)

Course Code: BP704T

Faculty: Dr. Satyajit Panda

Schedule of allotted class work (w.e.f.):

Available Periods: 11 **(Actually Conducted: 12)**

Daily Teaching Schedule

Sl. No.	Class Schedule Date as per time table	Day & Time	Actual date & Time of classes	Topic to be covered
1	17-10-22	Monday 10am-11am	Monday 10am-11am	Introduction to Novel drug delivery systems
2	31-10-22	Monday 10am-11am	Monday 10am-11am	Introduction to TDDS. History, advantages and disadvantages
3	14-11-22	Monday 10am-11am	28-11-22 Monday 10am-11am	Permeation through skin, factors affecting permeation, permeation enhancers.
4	21-11-22	Monday 10am-11am	12-12-22 Monday 10am-11am	Basic components of TDDS and Formulation approaches
5	28-11-22	Monday 10am-11am	14-12-22 Wednesday 12pm-1pm	Evaluation parameters
6	05-12-22	Monday 10am-11am	15-12-22 Thursday 10am-11am	Gastroretentive drug delivery systems: Introduction, advantages, disadvantages
7	12-12-22	Monday 10am-11am	19-12-22 Monday 10am-11am	Approaches for GRDDS – Floating drug delivery systems,
8	19-12-22	Monday 10am-11am	24-12-22 Saturday 10am-11am	High density & inflatable systems

9	26-12-22	Monday 10am-11am	11-01-23 Wednesday 12pm-1pm	Gastroadhesive systems
10	02-01-23	Monday 10am-11am	12-01-23 Thursday 10am-11am	Applications of gastroretentive drug delivery systems.
11	09-01-23	Monday 10am-11am	16-01-2 Monday 10am-11am	Introduction to Nasal and Pulmonary routes of drug delivery
12	16-01-23	Monday 10am-11am	16-01-22 Monday 11am-12pm	Inhalers (dry powder and metered dose), nasal sprays, nebulizers

SIGNATURE OF THE FACULTY

Institute of Pharmacy & Technology, Salipur

LESSON PLAN

Class: B. Pharm 7th Semester (Both Sections)
Session: 2022-23
Subject Title: INDUSTRIAL PHARMACY
Course Code BP 702 T
Faculty: Pharmacy
Schedule of allotted class work (w.e.f.): One classes per week (Both sections)
Total Periods: 12

Daily Teaching Schedule

Sl. No.	Scheduled Date	Class Taken on	Topic covered
			Unit-4
1	21/10/22	21/10/22	Concept of Quality
2	28/10/22	28/10/22	Total Quality Managemen
3	11/11/22	11/10/22	Quality by Design (QbD)
4	18/11/22	18/11/22	Six Sigma concept
5	25/11/22	25/11/22	Out of Specifications (OOS),
6	02/12/22	02/12/22	Introduction to ISO 9000
7	09/12/22	09/12/22	ISO 14000, NABL,
8	16/12/22	16/12/22	GLP
9	23/12/22	23/12/22	Central Drug Standard Control Organization (CDSCO)
10	06/1/23	06/1/23	State Licensing Authority:
11	13/01/23	13/01/23	Certificate of Pharmaceutical Product (COPP)
12	20/01/23	20/01/23	Regulatory requirements and approval procedures for New Drugs.

Dr, Prabhat Kumar Sahoo

Institute of Pharmacy & Technology, Salipur

LESSON PLAN

Class: B. Pharm 7th Semester (Both Sections)
Session: 2022-23
Subject Title: INDUSTRIAL PHARMACY
Course Code BP 702 T
Faculty: Pharmacy
Schedule of allotted class work (w.e.f.): One classes per week (Both sections)
Total Periods: 12

Daily Teaching Schedule

Sl. No.	Scheduled Date	Class Taken on	Topic covered
			Unit-4
1	21/10/22	21/10/22	Concept of Quality
2	28/10/22	28/10/22	Total Quality Managemen
3	11/11/22	11/10/22	Quality by Design (QbD)
4	18/11/22	18/11/22	Six Sigma concept
5	25/11/22	25/11/22	Out of Specifications (OOS),
6	02/12/22	02/12/22	Introduction to ISO 9000
7	09/12/22	09/12/22	ISO 14000, NABL,
8	16/12/22	16/12/22	GLP
9	23/12/22	23/12/22	Central Drug Standard Control Organization (CDSCO)
10	06/1/23	06/1/23	State Licensing Authority:
11	13/01/23	13/01/23	Certificate of Pharmaceutical Product (COPP)
12	20/01/23	20/01/23	Regulatory requirements and approval procedures for New Drugs.

Dr, Prabhat Kumar Sahoo

Institute of Pharmacy & Technology, Salipur

LESSON PLAN

(Tentative Academic Planer 01.10.2022)

Class: B.Pharm 7th Semester

Session: Odd semester 2022-23

Subject Title: PHARMACY PRACTICE (Theory)

Course Code: BP703T

Faculty: Dr. Chandra Sekhar Barik

Schedule of allotted class work (w.e.f.): 13-10-22

Available Periods: 23

Daily Teaching Schedule

SN	Class Schedule Date as per time table	Day & Time	Actual date & Time of classes	Topic	Discussion On Class
1	18/10/22	Tuesday 11am-12pm	Tuesday 11am-12pm	**UNIT-I** Adverse drug reaction	Adverse drug reaction Classifications - Excessive pharmacological effects
2	22/10/22	Saturday 12pm-1pm	Saturday 12pm-1pm	Secondary pharmacological effects	Secondary pharmacological effects, idiosyncrasy, allergic drug reactions, genetically determined toxicity, toxicity following sudden withdrawal of drugs
3	29/10/22	Saturday 12pm-1pm	Saturday 12pm-1pm	Drug interaction	Drug interaction- beneficial interactions, adverse interactions, and pharmacokinetic drug interactions, Methods for detecting drug interactions
4	01/11/22	Tuesday 11am-12pm	Tuesday 11am-12pm	Spontaneous case reports and record linkage studies	Spontaneous case reports and record linkage studies, and Adverse drug reaction reporting and management
5	05/11/22	Saturday 12pm-1pm	Saturday 12pm-1pm	Adverse drug reaction reporting and management	spontaneous case reports and record linkage studies, and Adverse drug reaction reporting and management
6	12/11/22	Saturday 12pm-1pm	Saturday 12pm-1pm	**UNIT-II** Therapeutic drug monitoring	Therapeutic drug monitoring Need for Therapeutic Drug Monitoring, Factors to be considered during the

					Therapeutic Drug Monitoring, and Indian scenario for Therapeutic Drug Monitoring.
7	15/11/22	Tuesday 11am-12pm	Tuesday 11am-12pm	Medication adherence	Medication adherence Causes of medication non-adherence, pharmacist role in the medication adherence, and monitoring of patient medication adherence
8	19/11/22	Saturday 12pm-1pm	Saturday 12pm-1pm	Patient medication history interview	Patient medication history interview Need for the patient medication history interview, medication interview forms
9	22/11/22	Tuesday 11am-12pm	Tuesday 11am-12pm	**UNIT-III** Community pharmacy	Community pharmacy management Financial, materials, staff, and infrastructure requirements
10	26/11/22	Saturday 12pm-1pm	Saturday 12pm-1pm	Patient counseling	Patient counseling Definition of patient counseling; steps involved in patient counseling, and Special cases that require the pharmacist
11	03/12/22	Saturday 12pm-1pm	Saturday 12pm-1pm	Education and training program in the hospital	Education and training program in the hospital Role of pharmacist in the education and training program, Internal and external training program, Services to the nursing homes/clinics
12	06/12/22	Tuesday 11am-12pm	Tuesday 11am-12pm	Prescribed medication order	Prescribed medication order and communication skills Prescribed medication order
13	10/12/22	Saturday 12pm-1pm	Saturday 12pm-1pm	Interpretation and legal requirements	Interpretation and legal requirements, and Communication skills-communication with prescribers and patients
14	13/12/22	Tuesday 11am-12pm	Tuesday 11am-12pm	**UNIT-IV** Clinical Pharmacy	Clinical Pharmacy Introduction to Clinical Pharmacy
15	17/12/22	Saturday 12pm-1pm	Saturday 12pm-1pm	Clinical Pharmacy	Concept of clinical pharmacy, functions and responsibilities of clinical pharmacist
16	20/12/22	Tuesday 11am-12pm	Tuesday 11am-12pm	Drug therapy monitoring	Drug therapy monitoring - medication chart review, clinical review
17	27/12/22	Tuesday 11am-12pm	Tuesday 11am-12pm	Pharmacist intervention	Pharmacist intervention, Ward round participation, Medication history and Pharmaceutical care.
18		Saturday	Saturday		Dosing pattern and drug

	31/12/22	12pm-1pm	12pm-1pm	Dosing pattern and drug therapy	therapy based on Pharmacokinetic & disease pattern
19	03/01/23	Tuesday 11am-12pm	Tuesday 11am-12pm	Over the counter (OTC)	Over the counter (OTC) sales Introduction and sale of over the counter
20	07/01/23	Saturday 12pm-1pm	Saturday 12pm-1pm	Over the counter (OTC)	Rational use of common over the counter medications
21	10/01/23	Tuesday 11am-12pm	Tuesday 11am-12pm	**UNIT-V** Investigational use of drugs	Investigational use of drugs, Description, principles involved, classification, control, identification
22	17/01/23	Tuesday 11am-12pm	Tuesday 11am-12pm	Investigational use of drugs	Role of hospital pharmacist, advisory committee
23	21/01/23	Saturday 12pm-1pm	Saturday 12pm-1pm	Investigational use of drugs	Interpretation of Clinical Laboratory Tests Blood chemistry, hematology, and urinalysis

CHANDRA SEKHAR BARIK

SIGNATURE OF THE FACULTY

Institute of Pharmacy & Technology, Salipur

LESSON PLAN

(Tentative Academic Planer 01.10.2022)

Class: B.Pharm 7th Semester

Session: Odd semester 2022-23

Subject Title: PHARMACY PRACTICE (Theory)

Course Code: BP703T

Faculty: Dr. Swalin Parija

Schedule of allotted class work (w.e.f.): 13-10-22

Available Periods: 22

Daily Teaching Schedule

SN	Class Schedule Date as per time table	Day & Time	Actual date & Time of classes	Topic	Discussion On Class
1	17/10/22	Monday 12pm-1pm	Monday 12pm-1pm	Introduction to Pharmacy Practice	Introduction to Pharmacy Practice
2	21/10/22	Friday 11am-12pm	Friday 11am-12pm	**UNIT-I:** Hospital and it's organization	Hospital and it's organization Definition, Classification of hospital
3	28/10/22	Friday 11am-12pm	Friday 11am-12pm	Classification of hospital	Classification of hospital- Primary, Secondary and Tertiary hospitals, Classification based on clinical and non- clinical basis,
4	31/10/22	Monday 12pm-1pm	Monday 12pm-1pm	Organization Structure of a Hospital	Organization Structure of a Hospital, and Medical staffs involved in the hospital and their functions.
5	04/11/22	Friday 11am-12pm	Friday 11am-12pm	Hospital pharmacy and its organization	Hospital pharmacy and its organization Definition, functions of hospital pharmacy
6	11/11/22	Friday 11am-12pm	Friday 11am-12pm	Organization structure	Organization structure, Location, Layout and staff requirements
7	14/11/22	Monday 12pm-1pm	Monday 12pm-1pm	Responsibilities and functions	Responsibilities and functions of hospital pharmacists
8	18/11/22	Friday 11am-12pm	Friday 11am-12pm	Dispensing of proprietary products	Dispensing of proprietary products, maintenance of records of retail and wholesale drug store
9	21/11/22	Monday 12pm-1pm	Monday 12pm-1pm	**Unit-II** Drug distribution system	Drug distribution system in a hospital Dispensing of drugs to inpatients,

				in a hospital	types of drug distribution systems
10	25/11/22	Friday 11am-12pm	Friday 11am-12pm	Charging policy	Charging policy and labelling, Dispensing of drugs to ambulatory patients, and Dispensing of controlled drugs
11	02/12/22	Friday 11am-12pm	Friday 11am-12pm	Hospital formulary	Hospital formulary Definition, contents of hospital formulary, Differentiation of hospital formulary and Drug list, preparation and revision, and addition and deletion of drug from hospital formulary
12	05/12/22	Monday 12pm-1pm	Monday 12pm-1pm	**Unit- III** Pharmacy and therapeutic committee	Pharmacy and therapeutic committee Organization, functions
13	09/12/22	Friday 11am-12pm	Friday 11am-12pm	Policies of the pharmacy and therapeutic committee	Policies of the pharmacy and therapeutic committee in including drugs into formulary, inpatient and outpatient prescription, automatic stop order, and emergency drug list preparation
14	12/12/22	Monday 12pm-1pm	Monday 12pm-1pm	Drug information services	Drug information services, Drug and Poison information centre
15	16/12/22	Friday 11am-12pm	Friday 11am-12pm	Sources of drug information,	Sources of drug information, Computerized services, and storage and retrieval of information
16	19/12/22	Monday 12pm-1pm	Monday 12pm-1pm	Code of ethics for community pharmacy	Code of ethics for community pharmacy, and Role of pharmacist in the interdepartmental communication and community health education
17	23/12/22	Friday 11am-12pm	Friday 11am-12pm	**Unit-IV** Budget preparation and implementation	Budget preparation and implementation
18	26/12/23	Monday 12pm-1pm	Monday 12pm-1pm	**Unit-V** Drug store management	Drug store management and inventory control
19	30/12/23	Friday 11am-12pm	Friday 11am-12pm	Drug store management	Organisation of drug store, types of materials stocked and storage conditions
20	06/01/23	Friday 11am-12pm	Friday 11am-12pm	Drug store management	Purchase and inventory control: principles, purchase procedure, purchase order,

					procurement and stocking
21	09/01/23	Monday 12pm-1pm	Monday 12pm-1pm	Drug store management	Economic order quantity, Reorder quantity level, and Methods used for the analysis of the drug expenditure
22	16/01/23	Monday 12pm-1pm	Monday 12pm-1pm	Revision & Old questions discussion	Revision & Old questions discussion

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Institute of Pharmacy & Technology, Salipur

LESSON PLAN

Class: B. Pharm 7th Semester (Both Sections)
Session: 2022-23
Subject Title: NOVEL DRUG DELIVERY SYSTEMS
Course Code BP 704 T
Faculty: Pharmacy
Schedule of allotted class work (w.e.f.): Two classes per week (Both sections)
Total Periods: 24

Daily Teaching Schedule

Sl. No.	Scheduled Date	Class Taken on	Topic covered
			Unit-2
1	18/10/22	18/10/22	Definition, advantages and disadvantages, Microspheres / microcapsules, microparticles
2	19/10/22	19/10/22	Methods of microencapsulation, Co-acervation Phase separation-1
3	26/10/22	26/10/22	Methods for Co-acervation Phase separation-2
4	01/11/22	01/11/22	Air Suspension, Multi-orifice ultra-centrifugation,
5	02/11/22	02/11/22	Spray drying and spray congealing, Polymerization, Pan coating, applications of microcapsules.
6	Extra Class	07/12/22	Introduction to mucosal drug delivery
7	09/11/22	09/11/22	Principles of bioadhesion / mucoadhesion
8	Extra Class	13/12/22	Concepts, advantages and disadvantages of mucosal drug delivery
9	Extra Class	14/12/22	Transmucosal permeability, Formulation considerations of buccal delivery systems
10	15/11/22	15/11/22	Marketed products as mucosal drug delivery.
11	22/11/22	21/11/22	Introduction, advantages and disadvantages of implantable drug delivery system
12	Extra Class	22/11/22	Implants Classification, Osmotic pump-1.
13	23/11/22	23/11/22	Power driven implantable device.
			Unit-4
14	29/11/22	29/11/22	Concepts and approaches to targeted drug delivery.
15	07/12/22	07/12/22	Advantages and disadvantages and introduction to liposomes.
16	13/12/22	13/12/22	Manufacturing of liposomes-1
17	14/12/22	14/12/22	Manufacturing of liposomes-2 and their applications.
18	20/12/22	20/12/22	Niosomes and their applications
19	21/12/22	21/12/22	Nanoparticles and their applications
20	27/12/22	27/12/22	Manufacturing of nanoparticles.
21	10/01/23	10/01/23	Monoclonal Antibodies and their applications

			Unit-5
22	11/01/23	11/01/23	Introduction to Intrauterine drug delivery system, Advantages and disadvantages
23	17/01/23	17/01/23	Classification and application of Intrauterine drug delivery system,
24	18/01/23	18/01/23	Approaches to Intrauterine drug delivery system

Dr, Bibaswan Mishra

Institute of Pharmacy & Technology, Salipur

LESSON PLAN

(Tentative Academic Planer 01.12.2022 onwards)

Session: Odd semester 2022-23

Class: B.Pharm 7th Semester

Subject Title: Novel Drug Delivery Systems (Theory) Course Code: BP 704T

Faculty: Dr. Biswaranjan Mohanty

Schedule of allotted class work (w.e.f.): 01.12.2022 **Available Periods: 14**

Daily Teaching Schedule

UNIT –I (10 Classes as per Syllabus)

Sl. No	Class Schedule Date as per time table	Day & Time	Actual date & Time of classes	Topic	Discussion On Class
1	13-10-2022	Thursday 11-12PM	13/10/22	**Controlled drug delivery systems**	Introduction, terminology/definitions and rationale, advantages, disadvantages od CDDS
2	20-10-2022	Thursday 11-12PM	20/10/22	**Controlled drug delivery systems**	selection of drug candidates. Physicochemical and biological properties of drugs relevant to controlled release Formulations.
3	27-10-2022	Thursday 11-12PM	27/10/22	**Controlled drug delivery systems**	Different approaches. Diffusion Controlled System Reservoir Type and Matrix Type
4	03-11-2022	Thursday 11-12PM	3/11/22	**Controlled drug delivery systems**	Dissolution Controlled Systems Encapsulation Dissolution Controlled Systems Matrix Dissolution Controlled Systems Dissolution and Diffusion Controlled Release Systems
5	10-11-2022	Thursday 11-12PM	10/11/2022	**Controlled drug delivery systems**	Osmotically Controlled Release Systems Methods using ion Exchange.
6	17-11-2022	Thursday 11-12PM	14/11/2022 to 17/11/2022	**Controlled drug delivery systems**	Parenteral Controlled drug delivery systems Introduction. Routes of parentral administration
7	24-11-2022	Thursday 11-12PM	24/11/22	**Controlled drug delivery systems**	Types of PCDDS Aqueous solutions Oily solutions Suspensions Emulsions
8	01-12-2022	Thursday 11-12PM	30/11/2022	**Controlled drug delivery systems**	Biocompatible carriers- Liposome, Niosome, Nanoparticles, Implants

9	08-12-2022	Thursday 11-12PM	8/12/2022	**Controlled drug delivery systems**	Infusion devices- Osmotic pressure activated drug delivery systems Vapor pressure activated drug delivery systems Battery powered drug delivery systems
10	15-12-2022	Thursday 11-12PM	12/12/22	**Controlled drug delivery systems**	Evaluation of PCDDS Sterility test Pyrogen test Particulate matter Clarity test Leak test
UNIT –IV (04 Classes as per Syllabus)					
11	22-12-2022	Thursday 11-12PM	22/12/22	Ocular Drug Delivery system	Introduction, Anatomy and physiology of eye Intraocular barriers
12	29-12-2022	Thursday 11-12PM	9/01/2023	Ocular Drug Delivery system	Methods to overcome –Preliminary study
13	05-01-2023	Thursday 11-12PM		Ocular Drug Delivery system	Various ocular formulations and its evaluation
14	12-01-2023	Thursday 11-12PM		Ocular Drug Delivery system	Ocuserts- types,Formulations, Evaluation

I have taken 13 classes out of 14 classes.

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Institute of Pharmacy & Technology, Salipur

LESSON PLAN /Lesson Note

(Tentative Academic Planner 01.12.2022 to 09.03.2023)

Class: B Pharmacy 3rd Semester

Session: 2022-2023

Subject Title: PHARMACEUTICAL ORGANIC CHEMISTRY –II

Course Code: BP301T

Faculty: Dr Mrityunjay Banerjee

Schedule of allotted class work (w.e.f.): 3x2

Available Periods: 3 / week

Daily Teaching Schedule

UNIT – I (Class as per Syllabus)

LecNo	Class Schedule Date as per time table	Day & Time	Actual date & Time of classes held	Topic	Discussion On Class
1	02.12.22	Friday & 2-4 pm	06/12/22 2-4 pm (Two clock)	Introduction of Aromatic Chemistry	Aromatic compounds 6/12/22
2	06.12.22	Tue &3-5pm	07/12/22 3-5 pm (Two clock)	Classification & IUPAC of Aromatic Compounds.	classification & Nomenclature of Ar. comp. 7/12/22
3	09.12.22	Fri & 2-4 pm	9-12-22 2-4 pm	Benzene	Benzene. 9/12/22
4	10.12.22	Sat&2-4pm	13/12/22 2-4 pm Sec-A & Sec B.	Analytical, synthetic and other evidences in the derivation of structure of benzene	Prof. the structure of Benzene 13/12/22
5	13.12.22	Tue &3-5pm	15/12/2022 3pm-5 pm Sec A & Sec B	Resonance in benzene, aromatic characters, Huckel's rule General methods of preparation of	Huckle rule Aromaticity of phenol Benzene 13/12/22

				Benzene & Benzene Derivatives	
6	16.12.22	Fri &2-4pm	16/12/22 2 pm to 4 pm. Sec-A & Sec-B	Chemical Reactions of benzene & its derivatives	Rt of Benzene & Aromatic comp. Bajo 16/12/2
7	17.12.22	Sat & 2-4pm	22/12/22 2 to 4 pm	Electrophilic Aromatic Substitution of Benzene & its derivatives	EAS Reaction details & QA discussion. By 22/12/22
8	20.12.22	Tue & 3-5 pm	27/12/22 3 pm to 5 pm. (Sec A&B)	Nitration, sulphonation, halogenation reactivity of Benzene	Nitration, Sulphonation. Halogination Rxn By 27/12/22
9	30.12.22	Fri & 2-4 pm	03/1/23 3 pm to 5 pm. (A & B)	Friedelcrafts alkylation-reactivity, limitations, Friedelcrafts acylation.	FCA & FC Alkylation Limitation etc. By 03/1/23
10	3.1.23	Tue &3-5 pm	03/1/23 3 pm to 5 pm (A & B section)	Substituents, effect of substituents on reactivity and orientation of mono substituted benzene compounds towards electrophilic substitution reaction	Substituent's effect on orientation of Aromatic Compounds. Introduction By 3/1/23
11	06.1.,23	Fri & 2-4 pm	6/1/23 2 pm to 4 pm Sec-A & Sec-B	Substituents, effect of substituents on reactivity and orientation of mono substituted benzene compounds towards electrophilic substitution reaction	Mechanism of orientation of MSB towards EAS Rxn. By 6/1/23

12	7.1.23	Sat & 2-4pm	06/1/23 2pm to 4 pm (A&B)	Structure and uses of DDT, Saccharin, BHC and Chloramine	Str. & use of DDT; BHC Saccharin Chloramine etc. 6/1/23

UNIT – II (Class as per Syllabus)

LecNo	Class Schedule Date as per time table	Day & Time	Actual date & Time of classes held	Topic	Discussion On Class
13	**10.1.23**	Tue & 3-5 pm	7/11/23 3-5 pm Sec A & B	Phenols	Introduction & its Def. 7/11/23
14	**17.1.23**	Tue & 3-5 pm	7/11/23 3-5 pm Sec B & A	General methods of preparation of Phenol	phenol prep (chemical & Natural process) 7/11/23
15	20.1.23	Fri & 2-4 pm	16/1/23 2 to 4 pm	General reactions of Phenol	Chemical Rxn & Mechanism of Phenol 16/11/23
16	21.1.23	Sat & 2-4 pm	17/1/23 3 to 5 pm. (A&B)	Acidity of phenols, effect of substituents on acidity	Acidity of Phenol & its Sub. Effect on Acidity. 17/11/22
17	24.01.23	Tue & 2-4 pm	12/1/23 2 to 5 pm	qualitative tests & electrophilic substitution reaction of Phenol	Qualitative Test & Rx of Phenol. 17/11/23
18	27.1.23	Fri & 2-4 pm	30/11/23 3 to 5 pm (A&B)	General methods of preparation and reactions of Aromatic Amines.	Aromatic Amine. 30/11/23
19	31.1.23	Tue & 3-5 pm	21/11/23 3 to 5 pm.	GeneralChemical reactions of Aromatic Amines	Chemical Rx & Mechanism of Aromatic Amine. 21/11/23

20	3.02.23	Fri & 2-4 pm	02/2/23 2 pm to 5 pm.	Basicity of amines, effect of substituents on basicity	Basicity of Aromatic Amin & Sub. Effect. 2/2/23
21	4.2.23	Sat & 2-4 pm	03/2/23 2 to 4 PM (A's & B)	Chemistry & synthetic uses of aryl diazonium salts	BDC & Rxn. 8/2/23
22	7.2.23	Tue & 3-5 pm	4/2/23 2-4 Pm.	Aromatic Acids & Its Compound	Aromatic Acid (Benzoic Acid) 4/2/23
23	10.2.23	Fri & 2-4 pm	10/2/23 2 PM to 4 PM (for A's & B's)	General methods of preparation and reactions of Aromatic Acid	Prep & Chemical Rxn of Aromatic Acid 10/2/23
24	11.2.23	Sat & 2-4 pm	10/2/23 2 to 4 pm	Important Chemical reactions of Aromatic Acid	Imp. Chemical Rxn & Mechanism of Benzoic Acid 10/2/23

UNIT – V (Class as per Syllabus)

LecNo	Class Schedule Date as per time table	Day & Time	Actual date & Time of classes held	Topic	Discussion On Class
25	**14.2.23**	Tue & 3-5 pm	14/2/23 3 to 5 pm (A & B)	General methods of preparation and reactions of Cyclo Alkanes	Preparation of cyclo Alkanes details. 14/2/23
26	**17.2.23**	Fri &2-4 pm	17/2/23 2 to 4 pm.	Stabilities – Baeyer's strain theory, limitation of Baeyer's strain theory	BST, limitations, Banan-bowdek. 17/2/23

20	3.02.23	Fri & 2-4 pm	02/2/23 2 PM to 5 PM.	Basicity of amines, effect of substituents on basicity	Basicity of Aromatic Amin & Sub. Effect. 2/2/23
21	4.2.23	Sat & 2-4 pm	03/2/23 2 to 4 PM. (A's (B)	Chemistry & synthetic uses of aryl diazonium salts	BDC & Rxn. 8/2/23
22	7.2.23	Tue & 3-5 pm	4/2/23 2-4 PM.	Aromatic Acids & Its Compound	Aromatic Acid (Benzoic Acid) 4/2/23
23	10.2.23	Fri & 2-4 pm	10/2/23 2 PM to 4 PM (Sc A & B)	General methods of preparation and reactions of Aromatic Acid	Pre & Chemical Rxn of Aromatic Acid 10/2/23
24	11.2.23	Sat & 2-4 pm	10/2/23 2 to 4 PM	Important Chemical reactions of Aromatic Acid	Imp. chemical Rxn & Mechanism of Benzoic Acid 10/2/23

UNIT – V (Class as per Syllabus)

LecNo	Class Schedule Date as per time table	Day & Time	Actual date & Time of classes held	Topic	Discussion On Class
25	**14.2.23**	Tue & 3-5 pm	14/2/23 3 to 5 PM	General methods of preparation and reactions of Cyclo Alkanes	Prep & chem. Rxn of cyclo Alkanes. detail. 14/2/23
26	**17.2.23**	Fri &2-4 pm	17/2/23 2 to 4 PM.	Stabilities – Baeyer's strain theory, limitation of Baeyer's strain theory	BST, limitation, Banan-Sondek. 17/2/23

20	3.02.23	Fri & 2-4 pm	02/2/23 4 pm to 5 pm.	Basicity of amines, effect of substituents on basicity	Basicity of Aromatic Amin & Sub. Effect. 2/2/23
21	4 2.23	Sat & 2-4 pm	08/2/23 2 to 4 PM. (A & B)	Chemistry & synthetic uses of aryl diazonium salts	B.D.C & Rxn. 8/2/23
22	7.2.23	Tue & 3-5 pm	4/2/23 2-4 pm.	Aromatic Acids & Its Compound	Aromatic Acid (Benzoic Acid) 4/2/23
23	10.2.23	Fri & 2-4 pm	10/2/23 2 PM to 4 PM (B.C.A & B)	General methods of preparation and reactions of Aromatic Acid	Pre & Chemical Rxn of Aromatic Acid 10/2/23
24	11.2.23	Sat & 2-4 pm	10/2/23 2 to 4 pm	Important Chemical reactions of Aromatic Acid	Sub. chemical Rxn & Mechanism of Benzoic Acid 10/2/23

UNIT – V (Class as per Syllabus)

LecNo	Class Schedule Date as per time table	Day & Time	Actual date & Time of classes held	Topic	Discussion On Class
25	**14.2.23**	Tue & 3-5 pm	14/2/23 3 to 5 pm C-A & B	General methods of preparation and reactions of Cyclo Alkanes	Pre & chemical of Cyclo Alkanes. detail. 14/2/23
26	**17.2.23**	Fri &2-4 pm	17/2/23 2 to 4 pm.	Stabilities – Baeyer's strain theory, limitation of Baeyer's strain theory	BST, limitation, Banan-boudek. 17/2/23

27	21.2.23	Tue & 3-5 pm	17/2/23 2pd pm.	Coulson and Moffitt's modification, Sachse Mohr's theory (Theory of strainless rings)	Coulson & Moffit's modification & SM Theory of cyclo Alkane 17/2/23
28	24.2.23	Fri.& 2-4 pm	21/2/23 3rd pm	Reactions of cyclopropane and cyclobutane	Reaction of cyclopropane & cyclobutane 21/2/23
29	25.2.23	Sat & 2-4 pm	01/3/23 4th pm	Previous year BPUT Question (unit 1)	Unit-I as per University Exam Question discuss 4/3/23
30	28.2.23	Tue & 3-5 pm	04/3/23 4th pm	Previous year BPUT Question (unit 2)	BPUT Previous yr question & Model Question discuss 4/3/23
31	03.03.23	Fri& 2-4 pm	2/3/23 Unit 5	Previous year BPUT Question (unit 5)	Unit 5 BPUT & All as per syllabus question discuss 2/3/23
32	04.03.23	Sat& 2-4 pm	4/3/23 3rd pm	All Unit Question	All Unit Question discuss (Syllabus over) 04/3/23

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Institute of Pharmacy & Technology, Salipur

LESSON PLAN

(Tentative Academic Planer 22/01/21 to 30/04/2021)

Class:-B.Pharm 3rd Semester

Session:- 2022-2023

Subject Title:- Pharmaceutical Organic Chemistry-II (Theory)

Course Code-:- BP301T

Faculty: Dr.H K Sundeep Kumar

Schedule of allotted class work (w.e.f.):- 05/12/2022

Available Periods: 01

Daily Teaching Schedule

UNIT – III (01)

Sl No	Class Schedule Date as per time table	Day & Time	Actual date & Time of classes	Topics taught	Discussion On Class
1	09/12/2022	Fri2:00 -4:00 PM	09/12/2022 & 2:00-4:00 PM	Fatty acids – reactions.	Sectio A & Section B
2	16/12/2022	Fri2:00 -4:00 PM	16/12/2022 & 2:00-4:00 PM	Hydrolysis, Hydrogenation, Saponification and Rancidity of oils, Drying oils.	Sectio A & Section B
3	23/12/2022	Fri2:00 -4:00 PM	23/12/2022 & 2:00-4:00 PM	Analytical constants – Acid value, Saponification value, Ester value, significance and principle involved in their determination.	Sectio A & Section B
4	30/12/2022	Fri2:00 -4:00 PM	30/12/2022 & 2:00-4:00 PM	Analytical constants – Iodine value, Acetyl value, Reichert Meissl (RM) value. significance and principle involved in their determination.	Sectio A & Section B

UNIT – IV (01)

Sl No	Class schedule date as per time table	Day and Time	Actual date and time of classes	Topics Taught	Discussion on class
5	05/01/2023	Mon & 2:00-4:00 PM	05/01/2023 & 2:00-4:00 PM	Polynuclear hydrocarbon synthesis, reactions, structure and uses of Napthalene	Sectio A & Section B
6	12/01/2023	Mon & 2:00-4:00 PM	12/01/2023 & 2:00-4:00 PM	Polynuclear hydrocarbon synthesis, reactions, structure and uses of Napthalene	Sectio A & Section B
7	19/01/2023	Thur & 2:00-4:00 PM	19/01/2023 Thur & 2:00-4:00 PM	Polynuclear hydrocarbon synthesis, reactions, structure and uses of Phenanthrene	Sectio A & Section B
8	02/02/2023	Thur & 2:00-4:00 PM	02/02/2023 Thur & 2:00-4:00 PM	Polynuclear hydrocarbon synthesis, reactions, structure and uses of Phenanthrene	Sectio A & Section B
9	09/02/2023	Thur & 12:00-1:00 PM	09/02/2023 Thur & 2:00-4:00 PM	Polynuclear hydrocarbon synthesis, reactions, structure and uses of Anthracene	Sectio A & Section B
10	16/02/2023	Thur & 12:00-1:00 PM	16/02/2023 Thur & 2:00-4:00 PM	Polynuclear hydrocarbon synthesis, reactions, structure and uses of Anthracene	Sectio A & Section B
11	02/03/2023	Thur & 12:00-1:00 PM	02/03/2023 Thur & 2:00-4:00 PM	Polynuclear hydrocarbon synthesis, reactions, structure and uses of Diphenylmethane and triphenylmethane	Sectio A & Section B
12	09/03/2023	Thur & 12:00-1:00 PM	09/03/2023 Thur & 2:00-4:00 PM	Polynuclear hydrocarbon synthesis, reactions, structure and uses of Diphenylmethane and triphenylmethane	Sectio A & Section B

H K Sundeep Kumar
SIGNATURE OF THE FACULTY

Institute of Pharmacy & Technology, Salipur

LESSON PLAN

Class: B. Pharm 3rd Semester
Session: 2022-23
Class: B. Pharm 3rd Semester
Session: 2022-23
Subject Title: Physical Pharmaceutics-I
Course Code BP302T
Faculty: Pharmacy
Schedule of allotted class work (w.e.f.) Two classes per week(section A & section B)
Available Periods: 23

Sl. No.	Scheduled Date	Class Taken on	Topic Covered
1	06.12.22	06.12.22	Liquid interface
2	07.12.22	07.12.22	Surface & Interfacial tensions
3	13.12.22	13.12.22	Surface free energy
4	14.12.22	14.12.22	Measurement of surface & interfacial tensions
5	20.12.22	20.12.22	Spreading coefficient
6	21.12.22	21.12.22	Adsorption at liquid interfaces
7	03.01.23	03.01.23	Surface active agents
8	04.01.23	04.01.23	HLB Scale
9	10.01.23	05.01.23	Solubilisation
10	11.01.23	10.01.23	Detergency
11	17.01.23	11.01.23	Adsorption at solid interface(Adsorption isotherm)
12	18.01.23	18.01.23	Sorensen's pH scale
13	24.01.23	24.01.23	pH determination (electrometric and calorimetric)
14	25.01.23	25.01.23	Applications of buffers & buffer equation,
15	31.01.23	31.01.23	Buffer capacity
16	1.02.23	02.02.23	Buffers in pharmaceutical and biological system
17	07.02.23	07.02.23	Buffered isotonic solutions
18	08.02.23	08.02.23	Introduction on complexation
19	14.02.23	11.02.23	Classification of Complexation, Applications
20	15.02.23	14.02.23	Inorganic complex
21	21.02.23	15.02.23	Organic Complex
22	22.02.23	17.02.23(extra class)	Inclusion complex
23	28.02.23	20.02.23(extra class)	Methods of analysis of complexation

Dr. Prabhat Kumar Sahoo

LESSON PLAN

SEM: 3rd BPHARM **SUBJECT: PHARM. MICROBIOLOGY (T)** **Code: BP 303 T**

Class started on: 05/12/2022 **Name of Faculty: Dr. Amiya Kumar Prusty, PhD**

SL. NO	DATE	UNIT	TOPIC	DATE TAKEN	A/E	SIG
1	5.12.22	I	Introduction, history of microbiology, its branches, scope and its importance.	5.12.22	A	
2	5.12.22	I	Introduction to Prokaryotes and Eukaryotes	5.12.22	A	
3	6.12.22	I	Study of ultra-structure and morphological classification of bacteria	6.12.22	A	
4	8.12.22	I	Nutritional requirements, raw materials used for culture media	8.12.22	A	
5	12.12.22	I	physical parameters for growth, growth curve	12.12.22	A	
6	19.12.22	I	Isolation and preservation methods for pure culture	19.12.22	A	
7	19.12.22	I	Cultivation of anaerobes	19.12.22	A	
8	20.12.22	I	Quantitative measurement of bacterial growth (total & viable count).	20.12.22	A	
9	24.12.22	I	Study of different types of phase constrast microscopy, dark field microscopy a	24.12.22	A	
10	24.12.22	I	Study of different types of electron microscopy	24.12.22	A	
11	3.1.23	II	Identification of bacteria using staining techniques (simple, Gram's)	3.1.23	A	
12	3.1.23	II	Identification of bacteria using staining techniques (Acid fast staining)	3.1.23	A	
13	6.1.23	II	biochemical tests (IMViC)	6.1.23	A	
14	6.1.23	II	Study of principle, procedure, merits, demerits and applications of physical, method of sterilization	6.1.23	A	
15	7.1.23	II	Study of principle, procedure, merits, demerits and applications of chemical method of sterilization	7.1.23	A	
16	9.1.23	II	Study of principle, procedure, merits, demerits and applications of gaseous,radiation and mechanical method of sterilization	9.1.23	A	

LESSON PLAN

SEM: 3rd BPHARM **SUBJECT: PHARM. MICROBIOLOGY (T)** **Code: BP 303 T**

Class started on: 05/12/2022 **Name of Faculty: Dr. Amiya Kumar Prusty, PhD**

SL. NO	DATE	UNIT	TOPIC	DATE TAKEN	A/E	SIG
17	10.1.23	II	Evaluation of the efficiency of sterilization methods	10.1.23	A	
18	13.1.23	II	Equipments employed in large scale sterilization	13.1.23	A	
19	16.1.23	II	Sterility indicators	16.1.23	A	
20	17.1.23	III	Study of morphology, classification, reproduction/replication and cultivation of Fungi	17.1.23	A	
21	24.1.23	III	Study of morphology, classification, reproduction/replication and cultivation of Viruses	24.1.23	A	
22	27.1.23	III	Classification and mode of action of disinfectants	27.1.23	A	
23	31.1.23	III	Factors influencing disinfection, antiseptics and their evaluation for bacteriostatic and bactericidal actions	31.1.23	A	
24	3.2.23	III	Sterility testing of solid products, liquid products	3.2.23	A	
25	4.2.23	III	Sterility testing of ophthalmic and other sterile products	4.2.23	A	
26	6.2.23	IV	Designing of aseptic area, laminar flow equipments	6.2.23	A	
27	10.2.23	IV	study of different sources of contamination in an aseptic area and methods of prevention	10.2.23	A	
28	14.2.23	IV	Clean area classification.	14.2.23	A	
29	17.2.23	IV	Principles and methods of different microbiological assay	17.2.23	A	

LESSON PLAN

SEM: 3rd BPHARM **SUBJECT: PHARM. MICROBIOLOGY (T)** **Code: BP 303 T**

Class started on: 05/12/2022 **Name of Faculty: Dr. Amiya Kumar Prusty, PhD**

30	20.2.23	IV	Methods for standardization of antibiotics, vitamins and amino acids and Assessment of a new antibiotic	20.2.23	A	
31	20/03/23	V	Types of spoilage, factors affecting the microbial spoilage of pharmaceutical products	20/03/23		
32	20/03/23	V	sources and types of microbial contaminants, assessment of microbial contamination and spoilage	20/3/23		
33	27/3/23	V	Preservation of pharmaceutical products using antimicrobial agent	27/3/23		
34		V	Evaluation of microbial stability of formulations.			
35		V	Growth of animal cells in culture, general procedure for cell culture, Primary, established and transformed cell cultures.			
37		V	Application of cell cultures in pharmaceutical industry and research.			
			Discussion			

INSTITUTE OF PHARMACY AND TECHNOLOGY, SALIPUR
LESSON PLAN

Course Name: B. Pharm
Year/ Semester: 3rd
Subject: Pharmaceutical Engineering
Course Code: BP 304 T
Name of the Faculty: Dr. Bhabani Shankar Nayak
Date of Starting of Class: 01-12-2022
Date of Closing of Class: Class allotted per week: 01+01
Available No of Class: 12+12

Unit 1 (Flow of fluids, Size reduction, and Size separation)					
Sl. No.	**Class Schedule Dateas per time table**	**Day &Time**	**Actual date & Time of classes**	**Topic**	**Discussionon Class**
1	02-12-2022	Friday 2.00 pm (sec-B), 4.00 pm (SecA)	9|12|22	Flow of fluids: Introduction	
2	09-12-2022	Friday 2.00 pm (sec-B), 4.00 pm (SecA)	16|12|22	Types of manometers, Reynolds number and its significance	
3	16-12-2022	Friday 2.00 pm (sec-B), 4.00 pm (SecA)	23|12|22	Bernoulli's theorem and its applications	
4	23-12-2022	Friday 2.00 pm (sec-B), 4.00 pm (SecA)	6|1|23	Energy losses, Orifice meter, Venturimeter	
5	30-12-2022	Friday 2.00 pm (sec-B), 4.00 pm (SecA)	13|1|23	Pitot tube and Rotometer	
6	06-01-2023	Friday 2.00 pm (sec-B), 4.00 pm (SecA)	3|2|23	Size Reduction: Objectives, Mechanisms & Laws governing size reduction,factors affecting size reduction	
8	13-01-2023	Friday 2.00 pm (sec-B), 4.00 pm (SecA)	17|2|23	principles, construction, working, uses, merits and demerits of Hammer mill, ball mill	
9	20-01-2023	Friday 2.00 pm (sec-B), 4.00 pm (SecA)	3|3|23	principles, construction, working, uses, merits and demerits of fluid energy mill, Edge runner mill & end runner mill	
10	27-01-2023	Friday 2.00 pm (sec-B), 4.00 pm (SecA)	3|3|23	Size Separation: Objectives, applications & mechanism of size separation, official standards of powders, sieves	
11	03-02-2023	Friday 2.00 pm (sec-B), 4.00 pm (SecA)	4|3|23	Principles, construction, working, uses, merits and demerits of Sieveshaker, cyclone separator,	
12	10-02-2023	Friday 2.00 pm (sec-B), 4.00 pm (SecA)	4|3|23	Principles, construction, working, uses, merits and demerits of Air separator, Bag filter & elutriation tank	

* 2|12|23 - Mam absent.
20|0|23 - I was on leave.

10|3|2023

Institute of Pharmacy & Technology, Salipur

LESSON PLAN

(Tentative Academic Planner -01-12-2022- to 10 04 2023)

Class B.Pharm.3rd.Semester
Session 2022-2023
Sub Title PHARMACEUTICAL ENGINEERING
Course Code: BP304T
Faculty DR.SUSANTA KUMAR BEHERA
Schedule of allotted class work w.e.f. 01.12.2022
Available Periods / week: 6

Daily Teaching Schedule

UNIT – II (Class as per Syllabus)

LecNo	Class Schedule Date as per time table	Day & Time	Actual Day and time of class held	Topic	Discussion onClass
1	05.12.2022	MON,2 PM - 4 PM	5.12.22. MON	Heat transfer;Objective,application.	Heat transfer;Objective,application.
2	07.12.2022	Wed,2PM-3 PM,4 PM - 5 PM	9.12.22. FRI	Heat Transfer Mechanisism,Fourier's Law	Heat Transfer Mechanisism,Fourier's Law
3	08.12.2022	Thu,2PM-3 PM,4 PM - 5 PM	10.12.22, SAT	Heat transfer by coduction,convection, Radiation(Grey body,Black body)	Heat transfer by coduction,convection, Radiation(Grey body,Black body)
4	12.12.2022	MON,2 PM - 4 PM	12.12.22, MON	Heat Interchangers	Heat Interchangers
5	14.12.2022	Wed,2PM-3 PM,4 PM - 5 PM	14.12.22, WED	Heat Exchangers	Heat Exchangers
6	15.12.2022	Thu,2PM-3 PM,4 PM - 5 PM	17.12.22, SAT	Evaporation: Objective Applications and factors affecting evaporation	Evaporation: Objective Applications and factors affecting evaporation

7	19.12.2022	MON,2 PM - 4 PM	19.12.22, MON	Difference between evaporation and other heat process,Steam jacketed kettle,Horizental tube evaporator,climbing film evaporator	Difference between evaporation and other heat process,Steam jacketed kettle,Horizental tube evaporator,climbing film evaporator
8	21.12.2022	Wed,2PM-3 PM,4 PM - 5 PM	21.12.22, WED	Force circulation evaporator,Multiple effect evaporator and economy of multiple effect evaporator	Force circulation evaporator,Multiple effect evaporator and economy of multiple effect evaporator
9	22.12.2022	Thu,2PM-3 PM,4 PM - 5 PM	22.12.22, THU	Disstillatoon: Basic principle and methodology of simple distillation	Disstillatoon: Basic principle and methodology of simple distillation
10	26.12.2022	MON,2 PM - 4 PM	04.01.23, WED	Flash distillation,Fractional distillation	Flash distillation,Fractional distillation
11	28.12.2022	Wed,2PM-3 PM,4 PM - 5 PM	05.01.23, THU	Distillation unde reduced pressure,steam distillation and molecullar distilation	Distillation unde reduced pressure,steam distillation and molecullar distilation

UNIT – III (Class as per Syllabus)

LecNo	Class Schedule Date as per time table	Day & Time	Actual Day and time of class held	Topic	Discussion onClass
12	02.01.2023	MON,2 PM - 4 PM	09.01.2023, MON	Drying: Objective application & mechanisim of drying process	Drying: Objective application & mechanisim of drying process
13	04.01.2023	Wed,2PM-3 PM,4 PM - 5 PM	11.01.2023, WED	Measurement and application of EMC,Rate of drying curve	Measurement and application of EMC,Rate of drying curve
14	05.01.2023	Thu,2PM-3 PM,4 PM - 5 PM	17.01.2023, TUE	Tray dryer,Drum dryer,Spray dryer	Tray dryer,Drum dryer,Spray dryer
15	09.01.2023	MON,2 PM - 4 PM	18.01.2023, WED	Fluidized bed dryer,Vaccum dryer,Freeze dryer	Fluidized bed dryer,Vaccum dryer,Freeze dryer

16	11.01.2023	Wed,2PM-3 PM,4 PM - 5 PM	25.01.2023, WED	Mixing: Objectives,applications & factors affecting mixing,Difference between solid and liquid mixing	Mixing: Objectives,applications & factors affecting mixing,Difference between solid and liquid mixing
17	12.01.2023	Thu,2PM-3 PM,4 PM - 5 PM	01.02.2023, WED	Mechanism of solid mixing,liquid mixing and semisolid mixing,Double cone blender	Mechanism of solid mixing,liquid mixing and semisolid mixing,Double cone blender
18	16.01.2023	MON,2 PM - 4 PM	06.02.2023, MON	Twin shell blender,Ribbon blender,Sigma blade mixture,Planetary mixture	Twin shell blender,Ribbon blender,Sigma blade mixture,Planetary mixture
19	18.01.2023	Wed,2PM-3 PM,4 PM - 5 PM	07.02.2023, TUE	Propellers,Turbine, Paddles and Silverson emulsifier	Propellers,Turbine, Paddles and Silverson emulsifier

UNIT – IV (Class as per Syllabus)

LecNo	Class Schedule Date as per time table	Day & Time	Actual Day and time of class held	Topic	Discussion onClass
20	19.01.2023	Thu,2PM-3 PM,4 PM - 5 PM	08.02.2023, WED	Filtration: Objectives,Applications	Filtration: Objectives,Applications
21	25.01.2023	Wed,2PM-3 PM,4 PM - 5 PM	09.02.2023 , THU	Theories and factors affecting filtration	Theories and factors affecting filtration
22	30.01.2023	MON,2 PM - 4 PM	15.02.2023, WED	Filter aids,Filter media	Filter aids,Filter media
23	01.02.2023	Wed,2PM-3 PM,4 PM - 5 PM	16.02.2023, THU	Plate and frame filter,Filter leaf,	Plate and frame filter,Filter leaf,
24	02.02.2023	Thu,2PM-3 PM,4 PM - 5 PM	20.02.2023, MON	Rotary drum filter,Meta filter	Rotary drum filter,Meta filter
25	06.02.2023	MON,2 PM - 4 PM	01.03.2023, WED	Catridge filter,Membrane filter, and Seidtz filter	Catridge filter,Membrane filter, and Seidtz filter
26	08.02.2023	Wed,2PM-3 PM,4 PM - 5 PM	02.03.2023,THU	Centrifugation: Objectives,Principle and Applications	Centrifugation: Objectives,Principle and Applications

27	09.02.2023	Thu,2PM-3 PM,4 PM - 5 PM	06.03.2023, MON	Perforated and non perforated centrifuge	Perforated and non perforated centrifuge
28	13.02.2023	MON,2 PM - 4 PM	15.03.2023, WED	Semicontineous and super centrifuge	Semicontineous and super centrifuge

UNIT – V (Class as per Syllabus)

LecNo	Class Schedule Date as per time table	Day & Time	Actual Day and time of class held	Topic	Discussion onClass
29	15.02.2023	Wed,2PM-3 PM,4 PM - 5 PM	16.03.2023,THU	Materials of pharmaceutical plant construction,Factor affecting during materials selected for pharmacutical plant construction	Materials of pharmaceutical plant construction,Factor affecting during materials selected for pharmacutical plant construction
30	16.02.2023	Thu,2PM-3 PM,4 PM - 5 PM	20.03.2023, MON	Corossion and its preventions	Corossion and its preventions
31	20.02.2023	MON, 2 PM - 4 PM	23.03.2023,THU	Throry of corosion	Throry of corosion
32	22.02.2023	Wed,2PM-3 PM,4 PM - 5 PM	27.03.2023, MON	Types of corosion and their preventions	Types of corosion and their preventions
33	23.02.2023	Thu,2PM-3 PM,4 PM - 5 PM	29.03.2023, WED	Ferrous and non ferrous metal used in pharma plant construction	Ferrous and non ferrous metal used in pharma plant construction
34	27.02.2023	MON,2 PM - 4 PM	03.04.2023, MON	Inorganic and organic non metals used in pharma plant construction	Inorganic and organic non metals used in pharma plant construction
35	01.03.2023	Wed,2PM-3 PM,4 PM - 5 PM	05.04.2023, WED	Basic of materials handling system	Basic of materials handling system
36	02.03.2023	Thu,2PM-3 PM,4 PM - 5 PM	10.04.2023, MON	Previous questions discussion and reviews	Previous questions discussion and reviews

Signature Of Faculty

Institute of Pharmacy & Technology, Salipur

LESSON PLAN /Lesson Note

(Tentative Academic Planner 01.12.2022 to 09.03.2023)

Class: B Pharmacy 3rd Semester

Session: 2022-2023

Subject Title: PHARMACEUTICAL ORGANIC CHEMISTRY –II

Course Code: BP301T

Faculty: Dr Mrityunjay Banerjee

Schedule of allotted class work (w.e.f.): 3x2

Available Periods: 3 / week

Daily Teaching Schedule

UNIT – I (Class as per Syllabus)

LecNo	Class Schedule Date as per time table	Day & Time	Actual date & Time of classes held	Topic	Discussion On Class
1	02.12.22	Friday & 2-4 pm	06/12/22 2-4 pm (Two clock)	Introduction of Aromatic Chemistry	Aromatic compounds 6/12/22
2	06.12.22	Tue &3-5pm	07/12/22 3-5 pm (Two clock)	Classification & IUPAC of Aromatic Compounds.	classification & Nomenclature of Ar. comp. 7/12/22
3	09.12.22	Fri & 2-4 pm	9-12-22 2-4 pm	Benzene	Benzene. 9/12/22
4	10.12.22	Sat&2-4pm	13/12/22 2-4 pm Sec-A & Sec B.	Analytical, synthetic and other evidences in the derivation of structure of benzene	Prof. the structure of Benzene 13/12/22
5	13.12.22	Tue &3-5pm	15/12/2022 3pm-5 pm Sec A & Sec B	Resonance in benzene, aromatic characters, Huckel's rule General methods of preparation of	Huckle rule Aromaticity of phenol Benzene 13/12/22

				Benzene & Benzene Derivatives	
6	16.12.22	Fri &2-4pm	16/12/22 2 pm to 4 pm. Sec-A & Sec-B	Chemical Reactions of benzene & its derivatives	Rt of Benzene & Aromatic comp. Bajo 16/12/2
7	17.12.22	Sat & 2-4pm	22/12/22 2 to 4 pm	Electrophilic Aromatic Substitution of Benzene & its derivatives	EAS Reaction details & QA discussion. By 22/12/22
8	20.12.22	Tue & 3-5 pm	27/12/22 3 pm to 5 pm. (Sec A&B)	Nitration, sulphonation, halogenation reactivity of Benzene	Nitration, Sulphonation. Halogination Rxn By 27/12/22
9	30.12.22	Fri & 2-4 pm	03/1/23 3 pm to 5 pm. (A & B)	Friedelcrafts alkylation-reactivity, limitations, Friedelcrafts acylation.	FCA & FC Alkylation Limitation etc. By 03/1/23
10	3.1.23	Tue &3-5 pm	03/1/23 3 pm to 5 pm (A & B section)	Substituents, effect of substituents on reactivity and orientation of mono substituted benzene compounds towards electrophilic substitution reaction	Substituent's effect on orientation of Aromatic Compounds. Introduction By 3/1/23
11	06.1.,23	Fri & 2-4 pm	6/1/23 2 pm to 4 pm Sec-A & Sec-B	Substituents, effect of substituents on reactivity and orientation of mono substituted benzene compounds towards electrophilic substitution reaction	Mechanism of orientation of MSB towards EAS Rxn. By 6/1/23

12	7.1.23	Sat & 2-4pm	06/1/23 2pm to 4 pm (A&B)	Structure and uses of DDT, Saccharin, BHC and Chloramine	Str. & use of DDT; BHC Saccharin Chloramine etc. 6/1/23

UNIT – II (Class as per Syllabus)

LecNo	Class Schedule Date as per time table	Day & Time	Actual date & Time of classes held	Topic	Discussion On Class
13	**10.1.23**	Tue & 3-5 pm	7/11/23 3-5 pm Sec A & B	Phenols	Introduction & its Def. 7/11/23
14	**17.1.23**	Tue & 3-5 pm	7/11/23 3-5 pm Sec B & A	General methods of preparation of Phenol	phenol prep (chemical & Natural process) 7/11/23
15	20.1.23	Fri & 2-4 pm	16/1/23 2 to 4 pm	General reactions of Phenol	Chemical Rxn & Mechanism of Phenol 16/11/23
16	21.1.23	Sat & 2-4 pm	17/1/23 3 to 5 pm. (A&B)	Acidity of phenols, effect of substituents on acidity	Acidity of Phenol & its Sub. Effect on Acidity. 17/11/22
17	24.01.23	Tue & 2-4 pm	12/1/23 2 to 5 pm	qualitative tests & electrophilic substitution reaction of Phenol	Qualitative Test & Rx of Phenol. 17/11/23
18	27.1.23	Fri & 2-4 pm	30/11/23 3 to 5 pm (A&B)	General methods of preparation and reactions of Aromatic Amines.	Aromatic Amine. 30/11/23
19	31.1.23	Tue & 3-5 pm	21/11/23 3 to 5 pm.	GeneralChemical reactions of Aromatic Amines	Chemical Rx & Mechanism of Aromatic Amine. 21/11/23

20	3.02.23	Fri & 2-4 pm	02/2/23 2 pm to 5 pm.	Basicity of amines, effect of substituents on basicity	Basicity of Aromatic Amin & Sub. Effect. 2/2/23
21	4.2.23	Sat & 2-4 pm	03/2/23 2 to 4 PM (A's & B)	Chemistry & synthetic uses of aryl diazonium salts	BDC & Rxn. 8/2/23
22	7.2.23	Tue & 3-5 pm	4/2/23 2-4 Pm.	Aromatic Acids & Its Compound	Aromatic Acid (Benzoic Acid) 4/2/23
23	10.2.23	Fri & 2-4 pm	10/2/23 2 PM to 4 PM (for A's & B's)	General methods of preparation and reactions of Aromatic Acid	Prep & Chemical Rxn of Aromatic Acid 10/2/23
24	11.2.23	Sat & 2-4 pm	10/2/23 2 to 4 pm	Important Chemical reactions of Aromatic Acid	Imp. Chemical Rxn & Mechanism of Benzoic Acid 10/2/23

UNIT – V (Class as per Syllabus)

LecNo	Class Schedule Date as per time table	Day & Time	Actual date & Time of classes held	Topic	Discussion On Class
25	**14.2.23**	Tue & 3-5 pm	14/2/23 3 to 5 pm (A & B)	General methods of preparation and reactions of Cyclo Alkanes	Preparation of cyclo Alkanes details. 14/2/23
26	**17.2.23**	Fri &2-4 pm	17/2/23 2 to 4 pm.	Stabilities – Baeyer's strain theory, limitation of Baeyer's strain theory	BST, limitations, Banan-bowdek. 17/2/23

20	3.02.23	Fri & 2-4 pm	02/2/23 2 PM to 5 PM.	Basicity of amines, effect of substituents on basicity	Basicity of Aromatic Amin & Sub. Effect. 2/2/23
21	4.2.23	Sat & 2-4 pm	03/2/23 2 to 4 PM. (A's (B)	Chemistry & synthetic uses of aryl diazonium salts	BDC & Rxn. 8/2/23
22	7.2.23	Tue & 3-5 pm	4/2/23 2-4 PM.	Aromatic Acids & Its Compound	Aromatic Acid (Benzoic Acid) 4/2/23
23	10.2.23	Fri & 2-4 pm	10/2/23 2 PM to 4 PM (Sc A & B)	General methods of preparation and reactions of Aromatic Acid	Pre & Chemical Rxn of Aromatic Acid 10/2/23
24	11.2.23	Sat & 2-4 pm	10/2/23 2 to 4 PM	Important Chemical reactions of Aromatic Acid	Imp. chemical Rxn & Mechanism of Benzoic Acid 10/2/23

UNIT – V (Class as per Syllabus)

LecNo	Class Schedule Date as per time table	Day & Time	Actual date & Time of classes held	Topic	Discussion On Class
25	**14.2.23**	Tue & 3-5 pm	14/2/23 3 to 5 PM	General methods of preparation and reactions of Cyclo Alkanes	Prep & chem. Rxn of cyclo Alkanes. detail. 14/2/23
26	**17.2.23**	Fri &2-4 pm	17/2/23 2 to 4 PM.	Stabilities – Baeyer's strain theory, limitation of Baeyer's strain theory	BST, limitation, Banan-Sondek. 17/2/23

20	3.02.23	Fri & 2-4 pm	02/2/23 4 pm to 5 pm.	Basicity of amines, effect of substituents on basicity	Basicity of Aromatic Amin & Sub. Effect. 2/2/23
21	4 2.23	Sat & 2-4 pm	08/2/23 2 to 4 PM. (A & B)	Chemistry & synthetic uses of aryl diazonium salts	B.D.C & Rxn. 8/2/23
22	7.2.23	Tue & 3-5 pm	4/2/23 2-4 pm.	Aromatic Acids & Its Compound	Aromatic Acid (Benzoic Acid) 4/2/23
23	10.2.23	Fri & 2-4 pm	10/2/23 2 PM to 4 PM (B.C.A & B)	General methods of preparation and reactions of Aromatic Acid	Pre & Chemical Rxn of Aromatic Acid 10/2/23
24	11.2.23	Sat & 2-4 pm	10/2/23 2 to 4 pm	Important Chemical reactions of Aromatic Acid	Sub. chemical Rxn & Mechanism of Benzoic Acid 10/2/23

UNIT – V (Class as per Syllabus)

LecNo	Class Schedule Date as per time table	Day & Time	Actual date & Time of classes held	Topic	Discussion On Class
25	**14.2.23**	Tue & 3-5 pm	14/2/23 3 to 5 pm C-A & B	General methods of preparation and reactions of Cyclo Alkanes	Pre & chemical of Cyclo Alkanes. detail. 14/2/23
26	**17.2.23**	Fri &2-4 pm	17/2/23 2 to 4 pm.	Stabilities – Baeyer's strain theory, limitation of Baeyer's strain theory	BST, limitation, Banan-boudek. 17/2/23

27	21.2.23	Tue & 3-5 pm	17/2/23 2pd pm.	Coulson and Moffitt's modification, Sachse Mohr's theory (Theory of strainless rings)	Coulson & Moffit's modification & SM Theory of cyclo Alkane 17/2/23
28	24.2.23	Fri.& 2-4 pm	21/2/23 3rd pm	Reactions of cyclopropane and cyclobutane	Reaction of cyclopropane & cyclobutane 21/2/23
29	25.2.23	Sat & 2-4 pm	01/3/23 4th pm	Previous year BPUT Question (unit 1)	Unit-I as per University Exam Question discuss 4/3/23
30	28.2.23	Tue & 3-5 pm	04/3/23 4th pm	Previous year BPUT Question (unit 2)	BPUT Previous yr question & Model Question discuss 4/3/23
31	03.03.23	Fri& 2-4 pm	2/3/23 Unit 5	Previous year BPUT Question (unit 5)	Unit 5 BPUT & All as per syllabus question discuss 2/3/23
32	04.03.23	Sat& 2-4 pm	4/3/23 3rd pm	All Unit Question	All Unit Question discuss (Syllabus over) 04/3/23

SIGNATURE OF THE FACULTY

Institute of Pharmacy & Technology, Salipur

LESSON PLAN

(Tentative Academic Planer 22/01/21 to 30/04/2021)

Class:-B.Pharm 3rd Semester

Session:- 2022-2023

Subject Title:- Pharmaceutical Organic Chemistry-II (Theory)

Course Code-:- BP301T

Faculty: Dr.H K Sundeep Kumar

Schedule of allotted class work (w.e.f.):- 05/12/2022

Available Periods: 01

Daily Teaching Schedule

UNIT – III (01)

Sl No	Class Schedule Date as per time table	Day & Time	Actual date & Time of classes	Topics taught	Discussion On Class
1	09/12/2022	Fri2:00 -4:00 PM	09/12/2022 & 2:00-4:00 PM	Fatty acids – reactions.	Sectio A & Section B
2	16/12/2022	Fri2:00 -4:00 PM	16/12/2022 & 2:00-4:00 PM	Hydrolysis, Hydrogenation, Saponification and Rancidity of oils, Drying oils.	Sectio A & Section B
3	23/12/2022	Fri2:00 -4:00 PM	23/12/2022 & 2:00-4:00 PM	Analytical constants – Acid value, Saponification value, Ester value, significance and principle involved in their determination.	Sectio A & Section B
4	30/12/2022	Fri2:00 -4:00 PM	30/12/2022 & 2:00-4:00 PM	Analytical constants – Iodine value, Acetyl value, Reichert Meissl (RM) value. significance and principle involved in their determination.	Sectio A & Section B

UNIT – IV (01)

Sl No	Class schedule date as per time table	Day and Time	Actual date and time of classes	Topics Taught	Discussion on class
5	05/01/2023	Mon & 2:00-4:00 PM	05/01/2023 & 2:00-4:00 PM	Polynuclear hydrocarbon synthesis, reactions, structure and uses of Napthalene	Sectio A & Section B
6	12/01/2023	Mon & 2:00-4:00 PM	12/01/2023 & 2:00-4:00 PM	Polynuclear hydrocarbon synthesis, reactions, structure and uses of Napthalene	Sectio A & Section B
7	19/01/2023	Thur & 2:00-4:00 PM	19/01/2023 Thur & 2:00-4:00 PM	Polynuclear hydrocarbon synthesis, reactions, structure and uses of Phenanthrene	Sectio A & Section B
8	02/02/2023	Thur & 2:00-4:00 PM	02/02/2023 Thur & 2:00-4:00 PM	Polynuclear hydrocarbon synthesis, reactions, structure and uses of Phenanthrene	Sectio A & Section B
9	09/02/2023	Thur & 12:00-1:00 PM	09/02/2023 Thur & 2:00-4:00 PM	Polynuclear hydrocarbon synthesis, reactions, structure and uses of Anthracene	Sectio A & Section B
10	16/02/2023	Thur & 12:00-1:00 PM	16/02/2023 Thur & 2:00-4:00 PM	Polynuclear hydrocarbon synthesis, reactions, structure and uses of Anthracene	Sectio A & Section B
11	02/03/2023	Thur & 12:00-1:00 PM	02/03/2023 Thur & 2:00-4:00 PM	Polynuclear hydrocarbon synthesis, reactions, structure and uses of Diphenylmethane and triphenylmethane	Sectio A & Section B
12	09/03/2023	Thur & 12:00-1:00 PM	09/03/2023 Thur & 2:00-4:00 PM	Polynuclear hydrocarbon synthesis, reactions, structure and uses of Diphenylmethane and triphenylmethane	Sectio A & Section B

H K Sundeep Kumar
SIGNATURE OF THE FACULTY

Institute of Pharmacy & Technology, Salipur

LESSON PLAN

Class: B. Pharm 3rd Semester
Session: 2022-23
Class: B. Pharm 3rd Semester
Session: 2022-23
Subject Title: Physical Pharmaceutics-I
Course Code BP302T
Faculty: Pharmacy
Schedule of allotted class work (w.e.f.) Two classes per week(section A & section B)
Available Periods: 23

Sl. No.	Scheduled Date	Class Taken on	Topic Covered
1	06.12.22	06.12.22	Liquid interface
2	07.12.22	07.12.22	Surface & Interfacial tensions
3	13.12.22	13.12.22	Surface free energy
4	14.12.22	14.12.22	Measurement of surface & interfacial tensions
5	20.12.22	20.12.22	Spreading coefficient
6	21.12.22	21.12.22	Adsorption at liquid interfaces
7	03.01.23	03.01.23	Surface active agents
8	04.01.23	04.01.23	HLB Scale
9	10.01.23	05.01.23	Solubilisation
10	11.01.23	10.01.23	Detergency
11	17.01.23	11.01.23	Adsorption at solid interface(Adsorption isotherm)
12	18.01.23	18.01.23	Sorensen's pH scale
13	24.01.23	24.01.23	pH determination (electrometric and calorimetric)
14	25.01.23	25.01.23	Applications of buffers & buffer equation,
15	31.01.23	31.01.23	Buffer capacity
16	1.02.23	02.02.23	Buffers in pharmaceutical and biological system
17	07.02.23	07.02.23	Buffered isotonic solutions
18	08.02.23	08.02.23	Introduction on complexation
19	14.02.23	11.02.23	Classification of Complexation, Applications
20	15.02.23	14.02.23	Inorganic complex
21	21.02.23	15.02.23	Organic Complex
22	22.02.23	17.02.23(extra class)	Inclusion complex
23	28.02.23	20.02.23(extra class)	Methods of analysis of complexation

Dr. Prabhat Kumar Sahoo

LESSON PLAN

SEM: 3rd BPHARM **SUBJECT: PHARM. MICROBIOLOGY (T)** **Code: BP 303 T**

Class started on: 05/12/2022 **Name of Faculty: Dr. Amiya Kumar Prusty, PhD**

SL. NO	DATE	UNIT	TOPIC	DATE TAKEN	A/E	SIG
1	5.12.22	I	Introduction, history of microbiology, its branches, scope and its importance.	5.12.22	A	
2	5.12.22	I	Introduction to Prokaryotes and Eukaryotes	5.12.22	A	
3	6.12.22	I	Study of ultra-structure and morphological classification of bacteria	6.12.22	A	
4	8.12.22	I	Nutritional requirements, raw materials used for culture media	8.12.22	A	
5	12.12.22	I	physical parameters for growth, growth curve	12.12.22	A	
6	19.12.22	I	Isolation and preservation methods for pure culture	19.12.22	A	
7	19.12.22	I	Cultivation of anaerobes	19.12.22	A	
8	20.12.22	I	Quantitative measurement of bacterial growth (total & viable count).	20.12.22	A	
9	24.12.22	I	Study of different types of phase constrast microscopy, dark field microscopy a	24.12.22	A	
10	24.12.22	I	Study of different types of electron microscopy	24.12.22	A	
11	3.1.23	II	Identification of bacteria using staining techniques (simple, Gram's)	3.1.23	A	
12	3.1.23	II	Identification of bacteria using staining techniques (Acid fast staining)	3.1.23	A	
13	6.1.23	II	biochemical tests (IMViC)	6.1.23	A	
14	6.1.23	II	Study of principle, procedure, merits, demerits and applications of physical, method of sterilization	6.1.23	A	
15	7.1.23	II	Study of principle, procedure, merits, demerits and applications of chemical method of sterilization	7.1.23	A	
16	9.1.23	II	Study of principle, procedure, merits, demerits and applications of gaseous,radiation and mechanical method of sterilization	9.1.23	A	

LESSON PLAN

SEM: 3rd BPHARM **SUBJECT: PHARM. MICROBIOLOGY (T)** **Code: BP 303 T**

Class started on: 05/12/2022 **Name of Faculty: Dr. Amiya Kumar Prusty, PhD**

SL. NO	DATE	UNIT	TOPIC	DATE TAKEN	A/E	SIG
17	10.1.23	II	Evaluation of the efficiency of sterilization methods	10.1.23	A	
18	13.1.23	II	Equipments employed in large scale sterilization	13.1.23	A	
19	16.1.23	II	Sterility indicators	16.1.23	A	
20	17.1.23	III	Study of morphology, classification, reproduction/replication and cultivation of Fungi	17.1.23	A	
21	24.1.23	III	Study of morphology, classification, reproduction/replication and cultivation of Viruses	24.1.23	A	
22	27.1.23	III	Classification and mode of action of disinfectants	27.1.23	A	
23	31.1.23	III	Factors influencing disinfection, antiseptics and their evaluation for bacteriostatic and bactericidal actions	31.1.23	A	
24	3.2.23	III	Sterility testing of solid products, liquid products	3.2.23	A	
25	4.2.23	III	Sterility testing of ophthalmic and other sterile products	4.2.23	A	
26	6.2.23	IV	Designing of aseptic area, laminar flow equipments	6.2.23	A	
27	10.2.23	IV	study of different sources of contamination in an aseptic area and methods of prevention	10.2.23	A	
28	14.2.23	IV	Clean area classification.	14.2.23	A	
29	17.2.23	IV	Principles and methods of different microbiological assay	17.2.23	A	

LESSON PLAN

SEM: 3rd BPHARM **SUBJECT: PHARM. MICROBIOLOGY (T)** **Code: BP 303 T**

Class started on: 05/12/2022 **Name of Faculty: Dr. Amiya Kumar Prusty, PhD**

30	20.2.23	IV	Methods for standardization of antibiotics, vitamins and amino acids and Assessment of a new antibiotic	20.2.23	A	
31	20/03/23	V	Types of spoilage, factors affecting the microbial spoilage of pharmaceutical products	20/03/23		
32	20/03/23	V	sources and types of microbial contaminants, assessment of microbial contamination and spoilage	20/3/23		
33	27/3/23	V	Preservation of pharmaceutical products using antimicrobial agent	27/3/23		
34		V	Evaluation of microbial stability of formulations.			
35		V	Growth of animal cells in culture, general procedure for cell culture, Primary, established and transformed cell cultures.			
37		V	Application of cell cultures in pharmaceutical industry and research.			
			Discussion			

INSTITUTE OF PHARMACY AND TECHNOLOGY, SALIPUR
LESSON PLAN

Course Name: B. Pharm
Year/ Semester: 3rd
Subject: Pharmaceutical Engineering
Course Code: BP 304 T
Name of the Faculty: Dr. Bhabani Shankar Nayak
Date of Starting of Class: 01-12-2022
Date of Closing of Class: Class allotted per week: 01+01
Available No of Class: 12+12

Unit 1 (Flow of fluids, Size reduction, and Size separation)					
Sl. No.	**Class Schedule Dateas per time table**	**Day &Time**	**Actual date & Time of classes**	**Topic**	**Discussionon Class**
1	02-12-2022	Friday 2.00 pm (sec-B), 4.00 pm (SecA)	9|12|22	Flow of fluids: Introduction	
2	09-12-2022	Friday 2.00 pm (sec-B), 4.00 pm (SecA)	16|12|22	Types of manometers, Reynolds number and its significance	
3	16-12-2022	Friday 2.00 pm (sec-B), 4.00 pm (SecA)	23|12|22	Bernoulli's theorem and its applications	
4	23-12-2022	Friday 2.00 pm (sec-B), 4.00 pm (SecA)	6|1|23	Energy losses, Orifice meter, Venturimeter	
5	30-12-2022	Friday 2.00 pm (sec-B), 4.00 pm (SecA)	13|1|23	Pitot tube and Rotometer	
6	06-01-2023	Friday 2.00 pm (sec-B), 4.00 pm (SecA)	3|2|23	Size Reduction: Objectives, Mechanisms & Laws governing size reduction,factors affecting size reduction	
8	13-01-2023	Friday 2.00 pm (sec-B), 4.00 pm (SecA)	17|2|23	principles, construction, working, uses, merits and demerits of Hammer mill, ball mill	
9	20-01-2023	Friday 2.00 pm (sec-B), 4.00 pm (SecA)	3|3|23	principles, construction, working, uses, merits and demerits of fluid energy mill, Edge runner mill & end runner mill	
10	27-01-2023	Friday 2.00 pm (sec-B), 4.00 pm (SecA)	3|3|23	Size Separation: Objectives, applications & mechanism of size separation, official standards of powders, sieves	
11	03-02-2023	Friday 2.00 pm (sec-B), 4.00 pm (SecA)	4|3|23	Principles, construction, working, uses, merits and demerits of Sieveshaker, cyclone separator,	
12	10-02-2023	Friday 2.00 pm (sec-B), 4.00 pm (SecA)	4|3|23	Principles, construction, working, uses, merits and demerits of Air separator, Bag filter & elutriation tank	

* 2|12|23 - Mam absent.
20|0|23 - I was on leave.

10|3|2023

Institute of Pharmacy & Technology, Salipur

LESSON PLAN

(Tentative Academic Planner -01-12-2022- to 10 04 2023)

Class B.Pharm.3rd.Semester
Session 2022-2023
Sub Title PHARMACEUTICAL ENGINEERING
Course Code: BP304T
Faculty DR.SUSANTA KUMAR BEHERA
Schedule of allotted class work w.e.f. 01.12.2022
Available Periods / week: 6

Daily Teaching Schedule

UNIT – II (Class as per Syllabus)

LecNo	Class Schedule Date as per time table	Day & Time	Actual Day and time of class held	Topic	Discussion onClass
1	05.12.2022	MON,2 PM - 4 PM	5.12.22. MON	Heat transfer;Objective,application.	Heat transfer;Objective,application.
2	07.12.2022	Wed,2PM-3 PM,4 PM - 5 PM	9.12.22. FRI	Heat Transfer Mechanisism,Fourier's Law	Heat Transfer Mechanisism,Fourier's Law
3	08.12.2022	Thu,2PM-3 PM,4 PM - 5 PM	10.12.22, SAT	Heat transfer by coduction,convection, Radiation(Grey body,Black body)	Heat transfer by coduction,convection, Radiation(Grey body,Black body)
4	12.12.2022	MON,2 PM - 4 PM	12.12.22, MON	Heat Interchangers	Heat Interchangers
5	14.12.2022	Wed,2PM-3 PM,4 PM - 5 PM	14.12.22, WED	Heat Exchangers	Heat Exchangers
6	15.12.2022	Thu,2PM-3 PM,4 PM - 5 PM	17.12.22, SAT	Evaporation: Objective Applications and factors affecting evaporation	Evaporation: Objective Applications and factors affecting evaporation

7	19.12.2022	MON,2 PM - 4 PM	19.12.22, MON	Difference between evaporation and other heat process,Steam jacketed kettle,Horizental tube evaporator,climbing film evaporator	Difference between evaporation and other heat process,Steam jacketed kettle,Horizental tube evaporator,climbing film evaporator
8	21.12.2022	Wed,2PM-3 PM,4 PM - 5 PM	21.12.22, WED	Force circulation evaporator,Multiple effect evaporator and economy of multiple effect evaporator	Force circulation evaporator,Multiple effect evaporator and economy of multiple effect evaporator
9	22.12.2022	Thu,2PM-3 PM,4 PM - 5 PM	22.12.22, THU	Disstillatoon: Basic principle and methodology of simple distillation	Disstillatoon: Basic principle and methodology of simple distillation
10	26.12.2022	MON,2 PM - 4 PM	04.01.23, WED	Flash distillation,Fractional distillation	Flash distillation,Fractional distillation
11	28.12.2022	Wed,2PM-3 PM,4 PM - 5 PM	05.01.23, THU	Distillation unde reduced pressure,steam distillation and molecullar distilation	Distillation unde reduced pressure,steam distillation and molecullar distilation

UNIT – III (Class as per Syllabus)

LecNo	Class Schedule Date as per time table	Day & Time	Actual Day and time of class held	Topic	Discussion onClass
12	02.01.2023	MON,2 PM - 4 PM	09.01.2023, MON	Drying: Objective application & mechanisim of drying process	Drying: Objective application & mechanisim of drying process
13	04.01.2023	Wed,2PM-3 PM,4 PM - 5 PM	11.01.2023, WED	Measurement and application of EMC,Rate of drying curve	Measurement and application of EMC,Rate of drying curve
14	05.01.2023	Thu,2PM-3 PM,4 PM - 5 PM	17.01.2023, TUE	Tray dryer,Drum dryer,Spray dryer	Tray dryer,Drum dryer,Spray dryer
15	09.01.2023	MON,2 PM - 4 PM	18.01.2023, WED	Fluidized bed dryer,Vaccum dryer,Freeze dryer	Fluidized bed dryer,Vaccum dryer,Freeze dryer

16	11.01.2023	Wed,2PM-3 PM,4 PM - 5 PM	25.01.2023, WED	Mixing: Objectives,applications & factors affecting mixing,Difference between solid and liquid mixing	Mixing: Objectives,applications & factors affecting mixing,Difference between solid and liquid mixing
17	12.01.2023	Thu,2PM-3 PM,4 PM - 5 PM	01.02.2023, WED	Mechanism of solid mixing,liquid mixing and semisolid mixing,Double cone blender	Mechanism of solid mixing,liquid mixing and semisolid mixing,Double cone blender
18	16.01.2023	MON,2 PM - 4 PM	06.02.2023, MON	Twin shell blender,Ribbon blender,Sigma blade mixture,Planetary mixture	Twin shell blender,Ribbon blender,Sigma blade mixture,Planetary mixture
19	18.01.2023	Wed,2PM-3 PM,4 PM - 5 PM	07.02.2023, TUE	Propellers,Turbine, Paddles and Silverson emulsifier	Propellers,Turbine, Paddles and Silverson emulsifier

UNIT – IV (Class as per Syllabus)

LecNo	Class Schedule Date as per time table	Day & Time	Actual Day and time of class held	Topic	Discussion onClass
20	19.01.2023	Thu,2PM-3 PM,4 PM - 5 PM	08.02.2023, WED	Filtration: Objectives,Applications	Filtration: Objectives,Applications
21	25.01.2023	Wed,2PM-3 PM,4 PM - 5 PM	09.02.2023 , THU	Theories and factors affecting filtration	Theories and factors affecting filtration
22	30.01.2023	MON,2 PM - 4 PM	15.02.2023, WED	Filter aids,Filter media	Filter aids,Filter media
23	01.02.2023	Wed,2PM-3 PM,4 PM - 5 PM	16.02.2023, THU	Plate and frame filter,Filter leaf,	Plate and frame filter,Filter leaf,
24	02.02.2023	Thu,2PM-3 PM,4 PM - 5 PM	20.02.2023, MON	Rotary drum filter,Meta filter	Rotary drum filter,Meta filter
25	06.02.2023	MON,2 PM - 4 PM	01.03.2023, WED	Catridge filter,Membrane filter, and Seidtz filter	Catridge filter,Membrane filter, and Seidtz filter
26	08.02.2023	Wed,2PM-3 PM,4 PM - 5 PM	02.03.2023,THU	Centrifugation: Objectives,Principle and Applications	Centrifugation: Objectives,Principle and Applications

27	09.02.2023	Thu,2PM-3 PM,4 PM - 5 PM	06.03.2023, MON	Perforated and non perforated centrifuge	Perforated and non perforated centrifuge
28	13.02.2023	MON,2 PM - 4 PM	15.03.2023, WED	Semicontineous and super centrifuge	Semicontineous and super centrifuge

UNIT – V (Class as per Syllabus)

LecNo	Class Schedule Date as per time table	Day & Time	Actual Day and time of class held	Topic	Discussion onClass
29	15.02.2023	Wed,2PM-3 PM,4 PM - 5 PM	16.03.2023,THU	Materials of pharmaceutical plant construction,Factor affecting during materials selected for pharmacutical plant construction	Materials of pharmaceutical plant construction,Factor affecting during materials selected for pharmacutical plant construction
30	16.02.2023	Thu,2PM-3 PM,4 PM - 5 PM	20.03.2023, MON	Corossion and its preventions	Corossion and its preventions
31	20.02.2023	MON, 2 PM - 4 PM	23.03.2023,THU	Throry of corosion	Throry of corosion
32	22.02.2023	Wed,2PM-3 PM,4 PM - 5 PM	27.03.2023, MON	Types of corosion and their preventions	Types of corosion and their preventions
33	23.02.2023	Thu,2PM-3 PM,4 PM - 5 PM	29.03.2023, WED	Ferrous and non ferrous metal used in pharma plant construction	Ferrous and non ferrous metal used in pharma plant construction
34	27.02.2023	MON,2 PM - 4 PM	03.04.2023, MON	Inorganic and organic non metals used in pharma plant construction	Inorganic and organic non metals used in pharma plant construction
35	01.03.2023	Wed,2PM-3 PM,4 PM - 5 PM	05.04.2023, WED	Basic of materials handling system	Basic of materials handling system
36	02.03.2023	Thu,2PM-3 PM,4 PM - 5 PM	10.04.2023, MON	Previous questions discussion and reviews	Previous questions discussion and reviews

Signature Of Faculty

Institute of Pharmacy & Technology, Salipur.

Lesson Plan

Academic Planner 13/10/2022 to 16.1.23

Course Name	B. Pharm
Year/ Semester	7th Semester
Subject	Instrumental Methods Analysis
Course Code	BP 701 T
Name of the Faculty	Dr. Saroja Kumar Patro
Date of Starting of Class	13/10/2022
Date of Closing of Class	23/01/2023
Class allotted per week	3
Available No of Class	

Lect. No.	UNIT	DATE	DAY & Time	TOPIC	Actual date & Time of classes held	Discussion on Class
1	III	14/10/2022	Friday (10 to 11AM)	Introduction to chromatography	14.10.22 (10 to 11AM)	Introduction to Instrumental method of analysis
2		15/10/2022	Saturday (10 to 11AM)	Column chromatography	15.10.22 (10 to 11AM)	Column chromatography
3		17/10/2022	Monday (11 to 12.00 noon)	Thin layer chromatography	17.10.22 (11 to 12.00 noon)	Thin layer chromatography
4		21/10/2022	Friday (10 to 11AM)	TLC	----------	----------
5		22/10/2022	Saturday (10 to 11AM)	Paper Chromatography	22.10.22 (10 to 11AM)	Thin layer chromatography
6		28/10/2022	Friday (10 to 11AM)	Introduction to electrophoresis, factors affecting electrophoretic mobility	----------	----------
7		29/10/2022	Saturday (10 to 11AM)	Paper electrophoresis	29.10.22 (10 to 11AM)	Introduction to electrophoresis, factors affecting electrophoretic mobility
8		31/10/2022	Monday (11 to 12.00 noon)	Agarose electrophoresis	31.10.22 (11 to 12.00 noon)	Paper electrophoresis
9		4/11/2022	Friday (10 to 11AM)	Poly acrylamide gel electrophoresis	2.11.22 (Wednesday) 11to 12.00 noon	Agarose electrophoresis
10		5/11/2022	Saturday (10 to 11AM)	Capillary electrophoresis	4.11.22 (10 to	Capillary electrophoresis

					11AM)	
11	IV	11/11/2022	Friday (10 to 11AM)	Introduction to Gas chromatography & theory	5.11.22 (10 to 11AM)	Introduction to Gas chromatography & theory
12		12/11/2022	Saturday (10 to 11AM)	instrumentation of Gas chromatography	9.11.22 (Wednesday) 11to 12.00 noon	instrumentation of Gas chromatography
13		14/11/2022	Monday (11 to 12.00 noon)	Derivatization, temperature programming, advantages, disadvantages and applications	11.11.22 (10 to 11AM)	Derivatization, temperature programming, advantages, disadvantages and applications
14		18/11/2022	Friday (10 to 11AM)	Introduction to HPLC, Principle,	14.11.22 (11 to 12.00 noon)	Introduction to HPLC, Principle,
15		19/11/2022	Saturday (10 to 11AM)	Theory & Instrumentation of HPLC	19.11.22 (10 to 11AM)	Theory & Instrumentation of HPLC
16		21/11/2022	Monday (11 to 12.00 noon)	Application of HPLC	21.11.22 (11 to 12.00 noon)	Application of HPLC
17		25/11/2022	Friday (10 to 11AM)	Ion exchange chromatography- Introduction, classification	25.11.22 (10 to 11AM)	Ion exchange chromatography- Introduction, classification
18		26/11/2022	Saturday (10 to 11AM)	ion exchange resins, properties,	26.11.22 (10 to 11AM)	Ion exchange chromatography- Introduction, classification
19		28/11/2022	Monday (11 to 12noon	mechanism of ion exchange process	28.11.22 (11 to 12noon	ion exchange resins, properties,
20		2/12/2022	Friday (10 to 11AM)	factors affecting ion exchange, methodology and applications	30.11.22 Wednesday 11 to 12 noon	mechanism of ion exchange process
21		3/12/2022	Saturday (10 to 11AM)	Gel chromatography- Introduction, theory,	2.12.22 (10 to 11AM)	factors affecting ion exchange, methodology and applications
22		5/12/2022	Monday (11 to 12.00 noon)	instrumentation and applications of Gel chromatograph	3.12.22 (10 to 11AM)	Gel chromatography- Introduction, theory,
23		9/12/2022	Friday (10 to 11AM)	Affinity chromatography- Introduction, theory	9.12.22 (10 to 11AM)	instrumentation and applications of Gel chromatograph
24		10/12/2022	Saturday	instrumentation and	10.12.22	Affinity

			(10 to 11AM)	applications of Affinity chromatograph	(10 to 11AM)	chromatography- Introduction, theory instrumentation and applications of Affinity chromatograph
25	II	12/12/2022	Monday (11 to 12.00)	IR: Introduction, fundamental modes of vibrations in poly atomic molecules,	12.12.22 (11 to 12.00)	IR: Introduction, fundamental modes of vibrations in poly atomic molecules,
26		16/12/2022	Friday (10 to 11AM)	Sample handling, factors affecting vibrations	16.12.22 (10 to 11AM)	sample handling, factors affecting vibrations
27		17/12/2022	Saturday (10 to 11AM)	Instrumentation - Sources of radiation, wavelength selectors,	17.12.22 (10 to 11AM)	Instrumentation - Sources of radiation, wavelength selectors,
28		19/12/2022	Monday (11 to 12noon)	Golay cell, Bolometer, Thermocouple,	19.12.22 (11 to 12noon)	Golay cell, Bolometer, Thermocouple,
29		23/12/2022	Friday (10 to 11AM)	Thermister, Pyroelectric detector	26.12.22	Thermister, Pyroelectric detector
30		24/12/2022	Saturday (10 to 11AM)	Flame Photometry- Principle, interferences,	6.1.23	Flame Photometry- Principle, instrumentation, application and interferences,
31		26/12/2022	Monday (11 to 12.00 noon)	Instrumentation and applications of flame photometry	7.1.23 (11 to 12.00 noon)	Nepheloturbidometry- Principle, & Instrumentation
32		30/12/2022	Friday (10 to 11AM)	Nepheloturbidometry- Principle,	9.1.23 (11 to 12.00 noon) (Monday)	Application of nephloturbidimetry & Introduction to AAS
33		31/12/2022	Saturday (10 to 11AM)	Instrumentation & Application nephloturbidimetry	13.1.23 (10 to 11AM) Friday	Atomic absorption spectroscopy- Principle, instrumentation and application of Atomic absorption spectroscopy
34		2/1/2023	Monday (11 to 12.00 noon)	Atomic absorption spectroscopy- Principle, interferences	16.1.23 (11 to 12.00 noon) (Monday)	
35		6/1/2023	Friday (10 to 11AM)	Instrumentation and applications of Atomic absorption spectroscopy		

Sanjkumar Patra.

INSTITUTE OF PHARMACY AND TECHNOLOGY, SALIPUR
LESSON PLAN

Course Name: B. Pharm
Year/ Semester: 7th
Subject: Industrial Pharmacy II
Course Code: BP 702 T
Name of the Faculty: Dr. Bhabani Shankar Nayak
Date of Starting of Class: 13-10-2022
Date of Closing of Class:
Class allotted per week: 02
Available No of Class: 24

Unit 1 (Pilot plant scale up techniques)					
Sl. No.	**Class Schedule Date as per time table**	**Day & Time**	**Actual date & Time of classes**	**Topic**	**Discussion onClass**
1	15-10-2022	Saturday 11 am	18-10-22	Introduction to Pilot plant scale up techniques	Same
2	19-10-2022	Wednesday 10 am	19-10-2022	General considerations of Pilot plant	Same
3	22-10-2022	Saturday 11 am	22-10-2022	General considerations of Pilot plant	Same
4	26-10-2022	Wednesday 10 am	27-10-2022	Pilot plant scale up considerations for solids	Same
5	29-10-2022	Saturday 11 am	29-10-2022	Pilot plant scale up considerations for solids	Same
6	5-11-2022	Saturday 11 am	2-11-22	Pilot plant scale up considerations for liquid orals	Same
8	9-11-2022	Wednesday 10 am	5-11-22	Pilot plant scale up considerations for semisolid, SUPAC guidelines	Same
9	12-11-2022	Saturday 11 am	19-11-22	SUPAC guidelines	Same
10	19-11-2022	Wednesday 10 am	19-11-22	Introduction to platform technology	Same
Unit II (Technology development and transfer)					
11	23-11-2022	Wednesday 10 am	23-11-2022	WHO guidelines for Technology Transfer(TT)	Same
12	26-11-2022	Saturday 11 am	26-11-2022	Terminology, Technology transfer protocol, Quality risk management	Same
13	30-11-2022	Wednesday 10 am	1-12-22	Transfer from R & D to production (Process, packaging and cleaning)	Same
14	7-12-2022	Wednesday 10 am	3-12-22	Granularity of TT Process (API, excipients, finished products, packaging materials)	Same
15	10-12-2022	Saturday 11 am	7-12-22	Documentation, Premises and equipments, qualification and validation,	Same
16	14-12-2022	Wednesday 10 am	10-12-22	quality control, analytical method transfer, Approved regulatory bodies and agencies	Same

17	17-12-2022	Saturday 11 am	21-12-22	Commercialization - practical aspects and problems (case studies)	Same
18	21-12-2022	Wednesday 10 am	26-12-22	TT agencies in India - APCTD, NRDC, TIFAC, BCIL, TBSE / SIDBI	Same
19	28-12-2022	Wednesday 10 am	28-12-22	TT related documentation - confidentiality agreement, licensing, MoUs, legal issues	Same
20	31-12-2022	Saturday 11 am	7-1-23	TT related documentation - confidentiality agreement, licensing, MoUs, legal issues	Same
21	11-1-2023	Wednesday 10 am	11-1-2023	TT related documentation - confidentiality agreement, licensing, MoUs, legal issues	Same

10-03-2022

Dr. B.S. Nayak
(Asso. Prof.)

Institute of Pharmacy & Technology, Salipur

LESSON PLAN

(Tentative Academic Planer 24.11.2022)

Class: B.Pharm 1st Semester

Session: Odd semester 2022

Subject Title: NDDS (Theory)

Course Code: BP704T

Faculty: Dr. Satyajit Panda

Schedule of allotted class work (w.e.f.):

Available Periods: 11 **(Actually Conducted: 12)**

Daily Teaching Schedule

Sl. No.	Class Schedule Date as per time table	Day & Time	Actual date & Time of classes	Topic to be covered
1	17-10-22	Monday 10am-11am	Monday 10am-11am	Introduction to Novel drug delivery systems
2	31-10-22	Monday 10am-11am	Monday 10am-11am	Introduction to TDDS. History, advantages and disadvantages
3	14-11-22	Monday 10am-11am	28-11-22 Monday 10am-11am	Permeation through skin, factors affecting permeation, permeation enhancers.
4	21-11-22	Monday 10am-11am	12-12-22 Monday 10am-11am	Basic components of TDDS and Formulation approaches
5	28-11-22	Monday 10am-11am	14-12-22 Wednesday 12pm-1pm	Evaluation parameters
6	05-12-22	Monday 10am-11am	15-12-22 Thursday 10am-11am	Gastroretentive drug delivery systems: Introduction, advantages, disadvantages
7	12-12-22	Monday 10am-11am	19-12-22 Monday 10am-11am	Approaches for GRDDS – Floating drug delivery systems,
8	19-12-22	Monday 10am-11am	24-12-22 Saturday 10am-11am	High density & inflatable systems

9	26-12-22	Monday 10am-11am	11-01-23 Wednesday 12pm-1pm	Gastroadhesive systems
10	02-01-23	Monday 10am-11am	12-01-23 Thursday 10am-11am	Applications of gastroretentive drug delivery systems.
11	09-01-23	Monday 10am-11am	16-01-2 Monday 10am-11am	Introduction to Nasal and Pulmonary routes of drug delivery
12	16-01-23	Monday 10am-11am	16-01-22 Monday 11am-12pm	Inhalers (dry powder and metered dose), nasal sprays, nebulizers

SIGNATURE OF THE FACULTY

Institute of Pharmacy & Technology, Salipur

LESSON PLAN

Class: B. Pharm 7th Semester (Both Sections)
Session: 2022-23
Subject Title: INDUSTRIAL PHARMACY
Course Code BP 702 T
Faculty: Pharmacy
Schedule of allotted class work (w.e.f.): One classes per week (Both sections)
Total Periods: 12

Daily Teaching Schedule

Sl. No.	Scheduled Date	Class Taken on	Topic covered
			Unit-4
1	21/10/22	21/10/22	Concept of Quality
2	28/10/22	28/10/22	Total Quality Managemen
3	11/11/22	11/10/22	Quality by Design (QbD)
4	18/11/22	18/11/22	Six Sigma concept
5	25/11/22	25/11/22	Out of Specifications (OOS),
6	02/12/22	02/12/22	Introduction to ISO 9000
7	09/12/22	09/12/22	ISO 14000, NABL,
8	16/12/22	16/12/22	GLP
9	23/12/22	23/12/22	Central Drug Standard Control Organization (CDSCO)
10	06/1/23	06/1/23	State Licensing Authority:
11	13/01/23	13/01/23	Certificate of Pharmaceutical Product (COPP)
12	20/01/23	20/01/23	Regulatory requirements and approval procedures for New Drugs.

Dr, Prabhat Kumar Sahoo

Institute of Pharmacy & Technology, Salipur

LESSON PLAN

Class: B. Pharm 7th Semester (Both Sections)
Session: 2022-23
Subject Title: INDUSTRIAL PHARMACY
Course Code BP 702 T
Faculty: Pharmacy
Schedule of allotted class work (w.e.f.): One classes per week (Both sections)
Total Periods: 12

Daily Teaching Schedule

Sl. No.	Scheduled Date	Class Taken on	Topic covered
			Unit-4
1	21/10/22	21/10/22	Concept of Quality
2	28/10/22	28/10/22	Total Quality Managemen
3	11/11/22	11/10/22	Quality by Design (QbD)
4	18/11/22	18/11/22	Six Sigma concept
5	25/11/22	25/11/22	Out of Specifications (OOS),
6	02/12/22	02/12/22	Introduction to ISO 9000
7	09/12/22	09/12/22	ISO 14000, NABL,
8	16/12/22	16/12/22	GLP
9	23/12/22	23/12/22	Central Drug Standard Control Organization (CDSCO)
10	06/1/23	06/1/23	State Licensing Authority:
11	13/01/23	13/01/23	Certificate of Pharmaceutical Product (COPP)
12	20/01/23	20/01/23	Regulatory requirements and approval procedures for New Drugs.

Dr, Prabhat Kumar Sahoo

Institute of Pharmacy & Technology, Salipur

LESSON PLAN

(Tentative Academic Planer 01.10.2022)

Class: B.Pharm 7th Semester

Session: Odd semester 2022-23

Subject Title: PHARMACY PRACTICE (Theory)

Course Code: BP703T

Faculty: Dr. Chandra Sekhar Barik

Schedule of allotted class work (w.e.f.): 13-10-22

Available Periods: 23

Daily Teaching Schedule

SN	Class Schedule Date as per time table	Day & Time	Actual date & Time of classes	Topic	Discussion On Class
1	18/10/22	Tuesday 11am-12pm	Tuesday 11am-12pm	**UNIT-I** Adverse drug reaction	Adverse drug reaction Classifications - Excessive pharmacological effects
2	22/10/22	Saturday 12pm-1pm	Saturday 12pm-1pm	Secondary pharmacological effects	Secondary pharmacological effects, idiosyncrasy, allergic drug reactions, genetically determined toxicity, toxicity following sudden withdrawal of drugs
3	29/10/22	Saturday 12pm-1pm	Saturday 12pm-1pm	Drug interaction	Drug interaction- beneficial interactions, adverse interactions, and pharmacokinetic drug interactions, Methods for detecting drug interactions
4	01/11/22	Tuesday 11am-12pm	Tuesday 11am-12pm	Spontaneous case reports and record linkage studies	Spontaneous case reports and record linkage studies, and Adverse drug reaction reporting and management
5	05/11/22	Saturday 12pm-1pm	Saturday 12pm-1pm	Adverse drug reaction reporting and management	spontaneous case reports and record linkage studies, and Adverse drug reaction reporting and management
6	12/11/22	Saturday 12pm-1pm	Saturday 12pm-1pm	**UNIT-II** Therapeutic drug monitoring	Therapeutic drug monitoring Need for Therapeutic Drug Monitoring, Factors to be considered during the

					Therapeutic Drug Monitoring, and Indian scenario for Therapeutic Drug Monitoring.
7	15/11/22	Tuesday 11am-12pm	Tuesday 11am-12pm	Medication adherence	Medication adherence Causes of medication non-adherence, pharmacist role in the medication adherence, and monitoring of patient medication adherence
8	19/11/22	Saturday 12pm-1pm	Saturday 12pm-1pm	Patient medication history interview	Patient medication history interview Need for the patient medication history interview, medication interview forms
9	22/11/22	Tuesday 11am-12pm	Tuesday 11am-12pm	**UNIT-III** Community pharmacy	Community pharmacy management Financial, materials, staff, and infrastructure requirements
10	26/11/22	Saturday 12pm-1pm	Saturday 12pm-1pm	Patient counseling	Patient counseling Definition of patient counseling; steps involved in patient counseling, and Special cases that require the pharmacist
11	03/12/22	Saturday 12pm-1pm	Saturday 12pm-1pm	Education and training program in the hospital	Education and training program in the hospital Role of pharmacist in the education and training program, Internal and external training program, Services to the nursing homes/clinics
12	06/12/22	Tuesday 11am-12pm	Tuesday 11am-12pm	Prescribed medication order	Prescribed medication order and communication skills Prescribed medication order
13	10/12/22	Saturday 12pm-1pm	Saturday 12pm-1pm	Interpretation and legal requirements	Interpretation and legal requirements, and Communication skills-communication with prescribers and patients
14	13/12/22	Tuesday 11am-12pm	Tuesday 11am-12pm	**UNIT-IV** Clinical Pharmacy	Clinical Pharmacy Introduction to Clinical Pharmacy
15	17/12/22	Saturday 12pm-1pm	Saturday 12pm-1pm	Clinical Pharmacy	Concept of clinical pharmacy, functions and responsibilities of clinical pharmacist
16	20/12/22	Tuesday 11am-12pm	Tuesday 11am-12pm	Drug therapy monitoring	Drug therapy monitoring - medication chart review, clinical review
17	27/12/22	Tuesday 11am-12pm	Tuesday 11am-12pm	Pharmacist intervention	Pharmacist intervention, Ward round participation, Medication history and Pharmaceutical care.
18		Saturday	Saturday		Dosing pattern and drug

	31/12/22	12pm-1pm	12pm-1pm	Dosing pattern and drug therapy	therapy based on Pharmacokinetic & disease pattern
19	03/01/23	Tuesday 11am-12pm	Tuesday 11am-12pm	Over the counter (OTC)	Over the counter (OTC) sales Introduction and sale of over the counter
20	07/01/23	Saturday 12pm-1pm	Saturday 12pm-1pm	Over the counter (OTC)	Rational use of common over the counter medications
21	10/01/23	Tuesday 11am-12pm	Tuesday 11am-12pm	**UNIT-V** Investigational use of drugs	Investigational use of drugs, Description, principles involved, classification, control, identification
22	17/01/23	Tuesday 11am-12pm	Tuesday 11am-12pm	Investigational use of drugs	Role of hospital pharmacist, advisory committee
23	21/01/23	Saturday 12pm-1pm	Saturday 12pm-1pm	Investigational use of drugs	Interpretation of Clinical Laboratory Tests Blood chemistry, hematology, and urinalysis

CHANDRA SEKHAR BARIK

SIGNATURE OF THE FACULTY

Institute of Pharmacy & Technology, Salipur

LESSON PLAN

(Tentative Academic Planer 01.10.2022)

Class: B.Pharm 7th Semester

Session: Odd semester 2022-23

Subject Title: PHARMACY PRACTICE (Theory)

Course Code: BP703T

Faculty: Dr. Swalin Parija

Schedule of allotted class work (w.e.f.): 13-10-22

Available Periods: 22

Daily Teaching Schedule

SN	Class Schedule Date as per time table	Day & Time	Actual date & Time of classes	Topic	Discussion On Class
1	17/10/22	Monday 12pm-1pm	Monday 12pm-1pm	Introduction to Pharmacy Practice	Introduction to Pharmacy Practice
2	21/10/22	Friday 11am-12pm	Friday 11am-12pm	**UNIT-I:** Hospital and it's organization	Hospital and it's organization Definition, Classification of hospital
3	28/10/22	Friday 11am-12pm	Friday 11am-12pm	Classification of hospital	Classification of hospital- Primary, Secondary and Tertiary hospitals, Classification based on clinical and non- clinical basis,
4	31/10/22	Monday 12pm-1pm	Monday 12pm-1pm	Organization Structure of a Hospital	Organization Structure of a Hospital, and Medical staffs involved in the hospital and their functions.
5	04/11/22	Friday 11am-12pm	Friday 11am-12pm	Hospital pharmacy and its organization	Hospital pharmacy and its organization Definition, functions of hospital pharmacy
6	11/11/22	Friday 11am-12pm	Friday 11am-12pm	Organization structure	Organization structure, Location, Layout and staff requirements
7	14/11/22	Monday 12pm-1pm	Monday 12pm-1pm	Responsibilities and functions	Responsibilities and functions of hospital pharmacists
8	18/11/22	Friday 11am-12pm	Friday 11am-12pm	Dispensing of proprietary products	Dispensing of proprietary products, maintenance of records of retail and wholesale drug store
9	21/11/22	Monday 12pm-1pm	Monday 12pm-1pm	**Unit-II** Drug distribution system	Drug distribution system in a hospital Dispensing of drugs to inpatients,

				in a hospital	types of drug distribution systems
10	25/11/22	Friday 11am-12pm	Friday 11am-12pm	Charging policy	Charging policy and labelling, Dispensing of drugs to ambulatory patients, and Dispensing of controlled drugs
11	02/12/22	Friday 11am-12pm	Friday 11am-12pm	Hospital formulary	Hospital formulary Definition, contents of hospital formulary, Differentiation of hospital formulary and Drug list, preparation and revision, and addition and deletion of drug from hospital formulary
12	05/12/22	Monday 12pm-1pm	Monday 12pm-1pm	**Unit- III** Pharmacy and therapeutic committee	Pharmacy and therapeutic committee Organization, functions
13	09/12/22	Friday 11am-12pm	Friday 11am-12pm	Policies of the pharmacy and therapeutic committee	Policies of the pharmacy and therapeutic committee in including drugs into formulary, inpatient and outpatient prescription, automatic stop order, and emergency drug list preparation
14	12/12/22	Monday 12pm-1pm	Monday 12pm-1pm	Drug information services	Drug information services, Drug and Poison information centre
15	16/12/22	Friday 11am-12pm	Friday 11am-12pm	Sources of drug information,	Sources of drug information, Computerized services, and storage and retrieval of information
16	19/12/22	Monday 12pm-1pm	Monday 12pm-1pm	Code of ethics for community pharmacy	Code of ethics for community pharmacy, and Role of pharmacist in the interdepartmental communication and community health education
17	23/12/22	Friday 11am-12pm	Friday 11am-12pm	**Unit-IV** Budget preparation and implementation	Budget preparation and implementation
18	26/12/23	Monday 12pm-1pm	Monday 12pm-1pm	**Unit-V** Drug store management	Drug store management and inventory control
19	30/12/23	Friday 11am-12pm	Friday 11am-12pm	Drug store management	Organisation of drug store, types of materials stocked and storage conditions
20	06/01/23	Friday 11am-12pm	Friday 11am-12pm	Drug store management	Purchase and inventory control: principles, purchase procedure, purchase order,

					procurement and stocking
21	09/01/23	Monday 12pm-1pm	Monday 12pm-1pm	Drug store management	Economic order quantity, Reorder quantity level, and Methods used for the analysis of the drug expenditure
22	16/01/23	Monday 12pm-1pm	Monday 12pm-1pm	Revision & Old questions discussion	Revision & Old questions discussion

SWATI S PARIJA

SIGNATURE OF THE FACULTY

Institute of Pharmacy & Technology, Salipur

LESSON PLAN

Class: B. Pharm 7th Semester (Both Sections)
Session: 2022-23
Subject Title: NOVEL DRUG DELIVERY SYSTEMS
Course Code BP 704 T
Faculty: Pharmacy
Schedule of allotted class work (w.e.f.): Two classes per week (Both sections)
Total Periods: 24

Daily Teaching Schedule

Sl. No.	Scheduled Date	Class Taken on	Topic covered
			Unit-2
1	18/10/22	18/10/22	Definition, advantages and disadvantages, Microspheres / microcapsules, microparticles
2	19/10/22	19/10/22	Methods of microencapsulation, Co-acervation Phase separation-1
3	26/10/22	26/10/22	Methods for Co-acervation Phase separation-2
4	01/11/22	01/11/22	Air Suspension, Multi-orifice ultra-centrifugation,
5	02/11/22	02/11/22	Spray drying and spray congealing, Polymerization, Pan coating, applications of microcapsules.
6	Extra Class	07/12/22	Introduction to mucosal drug delivery
7	09/11/22	09/11/22	Principles of bioadhesion / mucoadhesion
8	Extra Class	13/12/22	Concepts, advantages and disadvantages of mucosal drug delivery
9	Extra Class	14/12/22	Transmucosal permeability, Formulation considerations of buccal delivery systems
10	15/11/22	15/11/22	Marketed products as mucosal drug delivery.
11	22/11/22	21/11/22	Introduction, advantages and disadvantages of implantable drug delivery system
12	Extra Class	22/11/22	Implants Classification, Osmotic pump-1.
13	23/11/22	23/11/22	Power driven implantable device.
			Unit-4
14	29/11/22	29/11/22	Concepts and approaches to targeted drug delivery.
15	07/12/22	07/12/22	Advantages and disadvantages and introduction to liposomes.
16	13/12/22	13/12/22	Manufacturing of liposomes-1
17	14/12/22	14/12/22	Manufacturing of liposomes-2 and their applications.
18	20/12/22	20/12/22	Niosomes and their applications
19	21/12/22	21/12/22	Nanoparticles and their applications
20	27/12/22	27/12/22	Manufacturing of nanoparticles.
21	10/01/23	10/01/23	Monoclonal Antibodies and their applications

			Unit-5
22	11/01/23	11/01/23	Introduction to Intrauterine drug delivery system, Advantages and disadvantages
23	17/01/23	17/01/23	Classification and application of Intrauterine drug delivery system,
24	18/01/23	18/01/23	Approaches to Intrauterine drug delivery system

Dr, Bibaswan Mishra

Institute of Pharmacy & Technology, Salipur

LESSON PLAN

(Tentative Academic Planer 01.12.2022 onwards)

Session: Odd semester 2022-23

Class: B.Pharm 7th Semester

Subject Title: Novel Drug Delivery Systems (Theory) Course Code: BP 704T

Faculty: Dr. Biswaranjan Mohanty

Schedule of allotted class work (w.e.f.): 01.12.2022 **Available Periods: 14**

Daily Teaching Schedule

UNIT –I (10 Classes as per Syllabus)

Sl. No	Class Schedule Date as per time table	Day & Time	Actual date & Time of classes	Topic	Discussion On Class
1	13-10-2022	Thursday 11-12PM	13/10/22	**Controlled drug delivery systems**	Introduction, terminology/definitions and rationale, advantages, disadvantages od CDDS
2	20-10-2022	Thursday 11-12PM	20/10/22	**Controlled drug delivery systems**	selection of drug candidates. Physicochemical and biological properties of drugs relevant to controlled release Formulations.
3	27-10-2022	Thursday 11-12PM	27/10/22	**Controlled drug delivery systems**	Different approaches. Diffusion Controlled System Reservoir Type and Matrix Type
4	03-11-2022	Thursday 11-12PM	3/11/22	**Controlled drug delivery systems**	Dissolution Controlled Systems Encapsulation Dissolution Controlled Systems Matrix Dissolution Controlled Systems Dissolution and Diffusion Controlled Release Systems
5	10-11-2022	Thursday 11-12PM	10/11/2022	**Controlled drug delivery systems**	Osmotically Controlled Release Systems Methods using ion Exchange.
6	17-11-2022	Thursday 11-12PM	14/11/2022 to 17/11/2022	**Controlled drug delivery systems**	Parenteral Controlled drug delivery systems Introduction. Routes of parentral administration
7	24-11-2022	Thursday 11-12PM	24/11/22	**Controlled drug delivery systems**	Types of PCDDS Aqueous solutions Oily solutions Suspensions Emulsions
8	01-12-2022	Thursday 11-12PM	30/11/2022	**Controlled drug delivery systems**	Biocompatible carriers- Liposome, Niosome, Nanoparticles, Implants

9	08-12-2022	Thursday 11-12PM	8/12/2022	**Controlled drug delivery systems**	Infusion devices- Osmotic pressure activated drug delivery systems Vapor pressure activated drug delivery systems Battery powered drug delivery systems
10	15-12-2022	Thursday 11-12PM	12/12/22	**Controlled drug delivery systems**	Evaluation of PCDDS Sterility test Pyrogen test Particulate matter Clarity test Leak test
UNIT –IV (04 Classes as per Syllabus)					
11	22-12-2022	Thursday 11-12PM	22/12/22	Ocular Drug Delivery system	Introduction, Anatomy and physiology of eye Intraocular barriers
12	29-12-2022	Thursday 11-12PM	9/01/2023	Ocular Drug Delivery system	Methods to overcome –Preliminary study
13	05-01-2023	Thursday 11-12PM		Ocular Drug Delivery system	Various ocular formulations and its evaluation
14	12-01-2023	Thursday 11-12PM		Ocular Drug Delivery system	Ocuserts- types,Formulations, Evaluation

I have taken 13 classes out of 14 classes.

SIGNATURE OF THE FACULTY

Institute of Pharmacy & Technology, Salipur.

Lesson Plan

Academic Planner 13/10/2022 to 16.1.23

Course Name	B. Pharm
Year/ Semester	7th Semester
Subject	Instrumental Methods Analysis
Course Code	BP 701 T
Name of the Faculty	Dr. Saroja Kumar Patro
Date of Starting of Class	13/10/2022
Date of Closing of Class	23/01/2023
Class allotted per week	3
Available No of Class	

Lect. No.	UNIT	DATE	DAY & Time	TOPIC	Actual date & Time of classes held	Discussion on Class
1	III	14/10/2022	Friday (10 to 11AM)	Introduction to chromatography	14.10.22 (10 to 11AM)	Introduction to Instrumental method of analysis
2		15/10/2022	Saturday (10 to 11AM)	Column chromatography	15.10.22 (10 to 11AM)	Column chromatography
3		17/10/2022	Monday (11 to 12.00 noon)	Thin layer chromatography	17.10.22 (11 to 12.00 noon)	Thin layer chromatography
4		21/10/2022	Friday (10 to 11AM)	TLC	----------	----------
5		22/10/2022	Saturday (10 to 11AM)	Paper Chromatography	22.10.22 (10 to 11AM)	Thin layer chromatography
6		28/10/2022	Friday (10 to 11AM)	Introduction to electrophoresis, factors affecting electrophoretic mobility	----------	----------
7		29/10/2022	Saturday (10 to 11AM)	Paper electrophoresis	29.10.22 (10 to 11AM)	Introduction to electrophoresis, factors affecting electrophoretic mobility
8		31/10/2022	Monday (11 to 12.00 noon)	Agarose electrophoresis	31.10.22 (11 to 12.00 noon)	Paper electrophoresis
9		4/11/2022	Friday (10 to 11AM)	Poly acrylamide gel electrophoresis	2.11.22 (Wednesday) 11to 12.00 noon	Agarose electrophoresis
10		5/11/2022	Saturday (10 to 11AM)	Capillary electrophoresis	4.11.22 (10 to	Capillary electrophoresis

					11AM)	
11	IV	11/11/2022	Friday (10 to 11AM)	Introduction to Gas chromatography & theory	5.11.22 (10 to 11AM)	Introduction to Gas chromatography & theory
12		12/11/2022	Saturday (10 to 11AM)	instrumentation of Gas chromatography	9.11.22 (Wednesday) 11to 12.00 noon	instrumentation of Gas chromatography
13		14/11/2022	Monday (11 to 12.00 noon)	Derivatization, temperature programming, advantages, disadvantages and applications	11.11.22 (10 to 11AM)	Derivatization, temperature programming, advantages, disadvantages and applications
14		18/11/2022	Friday (10 to 11AM)	Introduction to HPLC, Principle,	14.11.22 (11 to 12.00 noon)	Introduction to HPLC, Principle,
15		19/11/2022	Saturday (10 to 11AM)	Theory & Instrumentation of HPLC	19.11.22 (10 to 11AM)	Theory & Instrumentation of HPLC
16		21/11/2022	Monday (11 to 12.00 noon)	Application of HPLC	21.11.22 (11 to 12.00 noon)	Application of HPLC
17		25/11/2022	Friday (10 to 11AM)	Ion exchange chromatography- Introduction, classification	25.11.22 (10 to 11AM)	Ion exchange chromatography- Introduction, classification
18		26/11/2022	Saturday (10 to 11AM)	ion exchange resins, properties,	26.11.22 (10 to 11AM)	Ion exchange chromatography- Introduction, classification
19		28/11/2022	Monday (11 to 12noon	mechanism of ion exchange process	28.11.22 (11 to 12noon	ion exchange resins, properties,
20		2/12/2022	Friday (10 to 11AM)	factors affecting ion exchange, methodology and applications	30.11.22 Wednesday 11 to 12 noon	mechanism of ion exchange process
21		3/12/2022	Saturday (10 to 11AM)	Gel chromatography- Introduction, theory,	2.12.22 (10 to 11AM)	factors affecting ion exchange, methodology and applications
22		5/12/2022	Monday (11 to 12.00 noon)	instrumentation and applications of Gel chromatograph	3.12.22 (10 to 11AM)	Gel chromatography- Introduction, theory,
23		9/12/2022	Friday (10 to 11AM)	Affinity chromatography- Introduction, theory	9.12.22 (10 to 11AM)	instrumentation and applications of Gel chromatograph
24		10/12/2022	Saturday	instrumentation and	10.12.22	Affinity

			(10 to 11AM)	applications of Affinity chromatograph	(10 to 11AM)	chromatography- Introduction, theory instrumentation and applications of Affinity chromatograph
25	II	12/12/2022	Monday (11 to 12.00)	IR: Introduction, fundamental modes of vibrations in poly atomic molecules,	12.12.22 (11 to 12.00)	IR: Introduction, fundamental modes of vibrations in poly atomic molecules,
26		16/12/2022	Friday (10 to 11AM)	Sample handling, factors affecting vibrations	16.12.22 (10 to 11AM)	sample handling, factors affecting vibrations
27		17/12/2022	Saturday (10 to 11AM)	Instrumentation - Sources of radiation, wavelength selectors,	17.12.22 (10 to 11AM)	Instrumentation - Sources of radiation, wavelength selectors,
28		19/12/2022	Monday (11 to 12noon)	Golay cell, Bolometer, Thermocouple,	19.12.22 (11 to 12noon)	Golay cell, Bolometer, Thermocouple,
29		23/12/2022	Friday (10 to 11AM)	Thermister, Pyroelectric detector	26.12.22	Thermister, Pyroelectric detector
30		24/12/2022	Saturday (10 to 11AM)	Flame Photometry- Principle, interferences,	6.1.23	Flame Photometry- Principle, instrumentation, application and interferences,
31		26/12/2022	Monday (11 to 12.00 noon)	Instrumentation and applications of flame photometry	7.1.23 (11 to 12.00 noon)	Nepheloturbidometry- Principle, & Instrumentation
32		30/12/2022	Friday (10 to 11AM)	Nepheloturbidometry- Principle,	9.1.23 (11 to 12.00 noon) (Monday)	Application of nephloturbidimetry & Introduction to AAS
33		31/12/2022	Saturday (10 to 11AM)	Instrumentation & Application nephloturbidimetry	13.1.23 (10 to 11AM) Friday	Atomic absorption spectroscopy- Principle, instrumentation and application of Atomic absorption spectroscopy
34		2/1/2023	Monday (11 to 12.00 noon)	Atomic absorption spectroscopy- Principle, interferences	16.1.23 (11 to 12.00 noon) (Monday)	
35		6/1/2023	Friday (10 to 11AM)	Instrumentation and applications of Atomic absorption spectroscopy		

Sanjkumar Patra.

INSTITUTE OF PHARMACY AND TECHNOLOGY, SALIPUR
LESSON PLAN

Course Name: B. Pharm
Year/ Semester: 7th
Subject: Industrial Pharmacy II
Course Code: BP 702 T
Name of the Faculty: Dr. Bhabani Shankar Nayak
Date of Starting of Class: 13-10-2022
Date of Closing of Class:
Class allotted per week: 02
Available No of Class: 24

Unit 1 (Pilot plant scale up techniques)					
Sl. No.	**Class Schedule Date as per time table**	**Day & Time**	**Actual date & Time of classes**	**Topic**	**Discussion onClass**
1	15-10-2022	Saturday 11 am	18-10-22	Introduction to Pilot plant scale up techniques	Same
2	19-10-2022	Wednesday 10 am	19-10-2022	General considerations of Pilot plant	Same
3	22-10-2022	Saturday 11 am	22-10-2022	General considerations of Pilot plant	Same
4	26-10-2022	Wednesday 10 am	27-10-2022	Pilot plant scale up considerations for solids	Same
5	29-10-2022	Saturday 11 am	29-10-2022	Pilot plant scale up considerations for solids	Same
6	5-11-2022	Saturday 11 am	2-11-22	Pilot plant scale up considerations for liquid orals	Same
8	9-11-2022	Wednesday 10 am	5-11-22	Pilot plant scale up considerations for semisolid, SUPAC guidelines	Same
9	12-11-2022	Saturday 11 am	19-11-22	SUPAC guidelines	Same
10	19-11-2022	Wednesday 10 am	19-11-22	Introduction to platform technology	Same
Unit II (Technology development and transfer)					
11	23-11-2022	Wednesday 10 am	23-11-2022	WHO guidelines for Technology Transfer(TT)	Same
12	26-11-2022	Saturday 11 am	26-11-2022	Terminology, Technology transfer protocol, Quality risk management	Same
13	30-11-2022	Wednesday 10 am	1-12-22	Transfer from R & D to production (Process, packaging and cleaning)	Same
14	7-12-2022	Wednesday 10 am	3-12-22	Granularity of TT Process (API, excipients, finished products, packaging materials)	Same
15	10-12-2022	Saturday 11 am	7-12-22	Documentation, Premises and equipments, qualification and validation,	Same
16	14-12-2022	Wednesday 10 am	10-12-22	quality control, analytical method transfer, Approved regulatory bodies and agencies	Same

17	17-12-2022	Saturday 11 am	21-12-22	Commercialization - practical aspects and problems (case studies)	Same
18	21-12-2022	Wednesday 10 am	26-12-22	TT agencies in India - APCTD, NRDC, TIFAC, BCIL, TBSE / SIDBI	Same
19	28-12-2022	Wednesday 10 am	28-12-22	TT related documentation - confidentiality agreement, licensing, MoUs, legal issues	Same
20	31-12-2022	Saturday 11 am	7-1-23	TT related documentation - confidentiality agreement, licensing, MoUs, legal issues	Same
21	11-1-2023	Wednesday 10 am	11-1-2023	TT related documentation - confidentiality agreement, licensing, MoUs, legal issues	Same

10-03-2022

Dr. B.S. Nayak
(Asso. Prof.)

Institute of Pharmacy & Technology, Salipur

LESSON PLAN

(Tentative Academic Planer 24.11.2022)

Class: B.Pharm 1st Semester

Session: Odd semester 2022

Subject Title: NDDS (Theory)

Course Code: BP704T

Faculty: Dr. Satyajit Panda

Schedule of allotted class work (w.e.f.):

Available Periods: 11 **(Actually Conducted: 12)**

Daily Teaching Schedule

Sl. No.	Class Schedule Date as per time table	Day & Time	Actual date & Time of classes	Topic to be covered
1	17-10-22	Monday 10am-11am	Monday 10am-11am	Introduction to Novel drug delivery systems
2	31-10-22	Monday 10am-11am	Monday 10am-11am	Introduction to TDDS. History, advantages and disadvantages
3	14-11-22	Monday 10am-11am	28-11-22 Monday 10am-11am	Permeation through skin, factors affecting permeation, permeation enhancers.
4	21-11-22	Monday 10am-11am	12-12-22 Monday 10am-11am	Basic components of TDDS and Formulation approaches
5	28-11-22	Monday 10am-11am	14-12-22 Wednesday 12pm-1pm	Evaluation parameters
6	05-12-22	Monday 10am-11am	15-12-22 Thursday 10am-11am	Gastroretentive drug delivery systems: Introduction, advantages, disadvantages
7	12-12-22	Monday 10am-11am	19-12-22 Monday 10am-11am	Approaches for GRDDS – Floating drug delivery systems,
8	19-12-22	Monday 10am-11am	24-12-22 Saturday 10am-11am	High density & inflatable systems

9	26-12-22	Monday 10am-11am	11-01-23 Wednesday 12pm-1pm	Gastroadhesive systems
10	02-01-23	Monday 10am-11am	12-01-23 Thursday 10am-11am	Applications of gastroretentive drug delivery systems.
11	09-01-23	Monday 10am-11am	16-01-2 Monday 10am-11am	Introduction to Nasal and Pulmonary routes of drug delivery
12	16-01-23	Monday 10am-11am	16-01-22 Monday 11am-12pm	Inhalers (dry powder and metered dose), nasal sprays, nebulizers

SIGNATURE OF THE FACULTY

Institute of Pharmacy & Technology, Salipur

LESSON PLAN

Class: B. Pharm 7th Semester (Both Sections)
Session: 2022-23
Subject Title: INDUSTRIAL PHARMACY
Course Code BP 702 T
Faculty: Pharmacy
Schedule of allotted class work (w.e.f.): One classes per week (Both sections)
Total Periods: 12

Daily Teaching Schedule

Sl. No.	Scheduled Date	Class Taken on	Topic covered
			Unit-4
1	21/10/22	21/10/22	Concept of Quality
2	28/10/22	28/10/22	Total Quality Managemen
3	11/11/22	11/10/22	Quality by Design (QbD)
4	18/11/22	18/11/22	Six Sigma concept
5	25/11/22	25/11/22	Out of Specifications (OOS),
6	02/12/22	02/12/22	Introduction to ISO 9000
7	09/12/22	09/12/22	ISO 14000, NABL,
8	16/12/22	16/12/22	GLP
9	23/12/22	23/12/22	Central Drug Standard Control Organization (CDSCO)
10	06/1/23	06/1/23	State Licensing Authority:
11	13/01/23	13/01/23	Certificate of Pharmaceutical Product (COPP)
12	20/01/23	20/01/23	Regulatory requirements and approval procedures for New Drugs.

Dr, Prabhat Kumar Sahoo

Institute of Pharmacy & Technology, Salipur

LESSON PLAN

Class: B. Pharm 7th Semester (Both Sections)
Session: 2022-23
Subject Title: INDUSTRIAL PHARMACY
Course Code BP 702 T
Faculty: Pharmacy
Schedule of allotted class work (w.e.f.): One classes per week (Both sections)
Total Periods: 12

Daily Teaching Schedule

Sl. No.	Scheduled Date	Class Taken on	Topic covered
			Unit-4
1	21/10/22	21/10/22	Concept of Quality
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Dr, Prabhat Kumar Sahoo

Institute of Pharmacy & Technology, Salipur

LESSON PLAN

(Tentative Academic Planer 01.10.2022)

Class: B.Pharm 7th Semester

Session: Odd semester 2022-23

Subject Title: PHARMACY PRACTICE (Theory)

Course Code: BP703T

Faculty: Dr. Chandra Sekhar Barik

Schedule of allotted class work (w.e.f.): 13-10-22

Available Periods: 23

Daily Teaching Schedule

SN	Class Schedule Date as per time table	Day & Time	Actual date & Time of classes	Topic	Discussion On Class
1	18/10/22	Tuesday 11am-12pm	Tuesday 11am-12pm	**UNIT-I** Adverse drug reaction	Adverse drug reaction Classifications - Excessive pharmacological effects
2	22/10/22	Saturday 12pm-1pm	Saturday 12pm-1pm	Secondary pharmacological effects	Secondary pharmacological effects, idiosyncrasy, allergic drug reactions, genetically determined toxicity, toxicity following sudden withdrawal of drugs
3	29/10/22	Saturday 12pm-1pm	Saturday 12pm-1pm	Drug interaction	Drug interaction- beneficial interactions, adverse interactions, and pharmacokinetic drug interactions, Methods for detecting drug interactions
4	01/11/22	Tuesday 11am-12pm	Tuesday 11am-12pm	Spontaneous case reports and record linkage studies	Spontaneous case reports and record linkage studies, and Adverse drug reaction reporting and management
5	05/11/22	Saturday 12pm-1pm	Saturday 12pm-1pm	Adverse drug reaction reporting and management	spontaneous case reports and record linkage studies, and Adverse drug reaction reporting and management
6	12/11/22	Saturday 12pm-1pm	Saturday 12pm-1pm	**UNIT-II** Therapeutic drug monitoring	Therapeutic drug monitoring Need for Therapeutic Drug Monitoring, Factors to be considered during the

					Therapeutic Drug Monitoring, and Indian scenario for Therapeutic Drug Monitoring.
7	15/11/22	Tuesday 11am-12pm	Tuesday 11am-12pm	Medication adherence	Medication adherence Causes of medication non-adherence, pharmacist role in the medication adherence, and monitoring of patient medication adherence
8	19/11/22	Saturday 12pm-1pm	Saturday 12pm-1pm	Patient medication history interview	Patient medication history interview Need for the patient medication history interview, medication interview forms
9	22/11/22	Tuesday 11am-12pm	Tuesday 11am-12pm	**UNIT-III** Community pharmacy	Community pharmacy management Financial, materials, staff, and infrastructure requirements
10	26/11/22	Saturday 12pm-1pm	Saturday 12pm-1pm	Patient counseling	Patient counseling Definition of patient counseling; steps involved in patient counseling, and Special cases that require the pharmacist
11	03/12/22	Saturday 12pm-1pm	Saturday 12pm-1pm	Education and training program in the hospital	Education and training program in the hospital Role of pharmacist in the education and training program, Internal and external training program, Services to the nursing homes/clinics
12	06/12/22	Tuesday 11am-12pm	Tuesday 11am-12pm	Prescribed medication order	Prescribed medication order and communication skills Prescribed medication order
13	10/12/22	Saturday 12pm-1pm	Saturday 12pm-1pm	Interpretation and legal requirements	Interpretation and legal requirements, and Communication skills-communication with prescribers and patients
14	13/12/22	Tuesday 11am-12pm	Tuesday 11am-12pm	**UNIT-IV** Clinical Pharmacy	Clinical Pharmacy Introduction to Clinical Pharmacy
15	17/12/22	Saturday 12pm-1pm	Saturday 12pm-1pm	Clinical Pharmacy	Concept of clinical pharmacy, functions and responsibilities of clinical pharmacist
16	20/12/22	Tuesday 11am-12pm	Tuesday 11am-12pm	Drug therapy monitoring	Drug therapy monitoring - medication chart review, clinical review
17	27/12/22	Tuesday 11am-12pm	Tuesday 11am-12pm	Pharmacist intervention	Pharmacist intervention, Ward round participation, Medication history and Pharmaceutical care.
18		Saturday	Saturday		Dosing pattern and drug

	31/12/22	12pm-1pm	12pm-1pm	Dosing pattern and drug therapy	therapy based on Pharmacokinetic & disease pattern
19	03/01/23	Tuesday 11am-12pm	Tuesday 11am-12pm	Over the counter (OTC)	Over the counter (OTC) sales Introduction and sale of over the counter
20	07/01/23	Saturday 12pm-1pm	Saturday 12pm-1pm	Over the counter (OTC)	Rational use of common over the counter medications
21	10/01/23	Tuesday 11am-12pm	Tuesday 11am-12pm	**UNIT-V** Investigational use of drugs	Investigational use of drugs, Description, principles involved, classification, control, identification
22	17/01/23	Tuesday 11am-12pm	Tuesday 11am-12pm	Investigational use of drugs	Role of hospital pharmacist, advisory committee
23	21/01/23	Saturday 12pm-1pm	Saturday 12pm-1pm	Investigational use of drugs	Interpretation of Clinical Laboratory Tests Blood chemistry, hematology, and urinalysis

CHANDRA SEKHAR BARIK

SIGNATURE OF THE FACULTY

Institute of Pharmacy & Technology, Salipur

LESSON PLAN

(Tentative Academic Planer 01.10.2022)

Class: B.Pharm 7th Semester

Session: Odd semester 2022-23

Subject Title: PHARMACY PRACTICE (Theory)

Course Code: BP703T

Faculty: Dr. Swalin Parija

Schedule of allotted class work (w.e.f.): 13-10-22

Available Periods: 22

Daily Teaching Schedule

SN	Class Schedule Date as per time table	Day & Time	Actual date & Time of classes	Topic	Discussion On Class
1	17/10/22	Monday 12pm-1pm	Monday 12pm-1pm	Introduction to Pharmacy Practice	Introduction to Pharmacy Practice
2	21/10/22	Friday 11am-12pm	Friday 11am-12pm	**UNIT-I:** Hospital and it's organization	Hospital and it's organization Definition, Classification of hospital
3	28/10/22	Friday 11am-12pm	Friday 11am-12pm	Classification of hospital	Classification of hospital- Primary, Secondary and Tertiary hospitals, Classification based on clinical and non- clinical basis,
4	31/10/22	Monday 12pm-1pm	Monday 12pm-1pm	Organization Structure of a Hospital	Organization Structure of a Hospital, and Medical staffs involved in the hospital and their functions.
5	04/11/22	Friday 11am-12pm	Friday 11am-12pm	Hospital pharmacy and its organization	Hospital pharmacy and its organization Definition, functions of hospital pharmacy
6	11/11/22	Friday 11am-12pm	Friday 11am-12pm	Organization structure	Organization structure, Location, Layout and staff requirements
7	14/11/22	Monday 12pm-1pm	Monday 12pm-1pm	Responsibilities and functions	Responsibilities and functions of hospital pharmacists
8	18/11/22	Friday 11am-12pm	Friday 11am-12pm	Dispensing of proprietary products	Dispensing of proprietary products, maintenance of records of retail and wholesale drug store
9	21/11/22	Monday 12pm-1pm	Monday 12pm-1pm	**Unit-II** Drug distribution system	Drug distribution system in a hospital Dispensing of drugs to inpatients,

				in a hospital	types of drug distribution systems
10	25/11/22	Friday 11am-12pm	Friday 11am-12pm	Charging policy	Charging policy and labelling, Dispensing of drugs to ambulatory patients, and Dispensing of controlled drugs
11	02/12/22	Friday 11am-12pm	Friday 11am-12pm	Hospital formulary	Hospital formulary Definition, contents of hospital formulary, Differentiation of hospital formulary and Drug list, preparation and revision, and addition and deletion of drug from hospital formulary
12	05/12/22	Monday 12pm-1pm	Monday 12pm-1pm	**Unit- III** Pharmacy and therapeutic committee	Pharmacy and therapeutic committee Organization, functions
13	09/12/22	Friday 11am-12pm	Friday 11am-12pm	Policies of the pharmacy and therapeutic committee	Policies of the pharmacy and therapeutic committee in including drugs into formulary, inpatient and outpatient prescription, automatic stop order, and emergency drug list preparation
14	12/12/22	Monday 12pm-1pm	Monday 12pm-1pm	Drug information services	Drug information services, Drug and Poison information centre
15	16/12/22	Friday 11am-12pm	Friday 11am-12pm	Sources of drug information,	Sources of drug information, Computerized services, and storage and retrieval of information
16	19/12/22	Monday 12pm-1pm	Monday 12pm-1pm	Code of ethics for community pharmacy	Code of ethics for community pharmacy, and Role of pharmacist in the interdepartmental communication and community health education
17	23/12/22	Friday 11am-12pm	Friday 11am-12pm	**Unit-IV** Budget preparation and implementation	Budget preparation and implementation
18	26/12/23	Monday 12pm-1pm	Monday 12pm-1pm	**Unit-V** Drug store management	Drug store management and inventory control
19	30/12/23	Friday 11am-12pm	Friday 11am-12pm	Drug store management	Organisation of drug store, types of materials stocked and storage conditions
20	06/01/23	Friday 11am-12pm	Friday 11am-12pm	Drug store management	Purchase and inventory control: principles, purchase procedure, purchase order,

					procurement and stocking
21	09/01/23	Monday 12pm-1pm	Monday 12pm-1pm	Drug store management	Economic order quantity, Reorder quantity level, and Methods used for the analysis of the drug expenditure
22	16/01/23	Monday 12pm-1pm	Monday 12pm-1pm	Revision & Old questions discussion	Revision & Old questions discussion

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SIGNATURE OF THE FACULTY

Institute of Pharmacy & Technology, Salipur

LESSON PLAN

Class: B. Pharm 7th Semester (Both Sections)
Session: 2022-23
Subject Title: NOVEL DRUG DELIVERY SYSTEMS
Course Code BP 704 T
Faculty: Pharmacy
Schedule of allotted class work (w.e.f.): Two classes per week (Both sections)
Total Periods: 24

Daily Teaching Schedule

Sl. No.	Scheduled Date	Class Taken on	Topic covered
			Unit-2
1	18/10/22	18/10/22	Definition, advantages and disadvantages, Microspheres / microcapsules, microparticles
2	19/10/22	19/10/22	Methods of microencapsulation, Co-acervation Phase separation-1
3	26/10/22	26/10/22	Methods for Co-acervation Phase separation-2
4	01/11/22	01/11/22	Air Suspension, Multi-orifice ultra-centrifugation,
5	02/11/22	02/11/22	Spray drying and spray congealing, Polymerization, Pan coating, applications of microcapsules.
6	Extra Class	07/12/22	Introduction to mucosal drug delivery
7	09/11/22	09/11/22	Principles of bioadhesion / mucoadhesion
8	Extra Class	13/12/22	Concepts, advantages and disadvantages of mucosal drug delivery
9	Extra Class	14/12/22	Transmucosal permeability, Formulation considerations of buccal delivery systems
10	15/11/22	15/11/22	Marketed products as mucosal drug delivery.
11	22/11/22	21/11/22	Introduction, advantages and disadvantages of implantable drug delivery system
12	Extra Class	22/11/22	Implants Classification, Osmotic pump-1.
13	23/11/22	23/11/22	Power driven implantable device.
			Unit-4
14	29/11/22	29/11/22	Concepts and approaches to targeted drug delivery.
15	07/12/22	07/12/22	Advantages and disadvantages and introduction to liposomes.
16	13/12/22	13/12/22	Manufacturing of liposomes-1
17	14/12/22	14/12/22	Manufacturing of liposomes-2 and their applications.
18	20/12/22	20/12/22	Niosomes and their applications
19	21/12/22	21/12/22	Nanoparticles and their applications
20	27/12/22	27/12/22	Manufacturing of nanoparticles.
21	10/01/23	10/01/23	Monoclonal Antibodies and their applications

			Unit-5
22	11/01/23	11/01/23	Introduction to Intrauterine drug delivery system, Advantages and disadvantages
23	17/01/23	17/01/23	Classification and application of Intrauterine drug delivery system,
24	18/01/23	18/01/23	Approaches to Intrauterine drug delivery system

Dr, Bibaswan Mishra

Institute of Pharmacy & Technology, Salipur

LESSON PLAN

(Tentative Academic Planer 01.12.2022 onwards)

Session: Odd semester 2022-23

Class: B.Pharm 7th Semester

Subject Title: Novel Drug Delivery Systems (Theory) Course Code: BP 704T

Faculty: Dr. Biswaranjan Mohanty

Schedule of allotted class work (w.e.f.): 01.12.2022 **Available Periods: 14**

Daily Teaching Schedule

UNIT –I (10 Classes as per Syllabus)

Sl. No	Class Schedule Date as per time table	Day & Time	Actual date & Time of classes	Topic	Discussion On Class
1	13-10-2022	Thursday 11-12PM	13/10/22	**Controlled drug delivery systems**	Introduction, terminology/definitions and rationale, advantages, disadvantages od CDDS
2	20-10-2022	Thursday 11-12PM	20/10/22	**Controlled drug delivery systems**	selection of drug candidates. Physicochemical and biological properties of drugs relevant to controlled release Formulations.
3	27-10-2022	Thursday 11-12PM	27/10/22	**Controlled drug delivery systems**	Different approaches. Diffusion Controlled System Reservoir Type and Matrix Type
4	03-11-2022	Thursday 11-12PM	3/11/22	**Controlled drug delivery systems**	Dissolution Controlled Systems Encapsulation Dissolution Controlled Systems Matrix Dissolution Controlled Systems Dissolution and Diffusion Controlled Release Systems
5	10-11-2022	Thursday 11-12PM	10/11/2022	**Controlled drug delivery systems**	Osmotically Controlled Release Systems Methods using ion Exchange.
6	17-11-2022	Thursday 11-12PM	14/11/2022 to 17/11/2022	**Controlled drug delivery systems**	Parenteral Controlled drug delivery systems Introduction. Routes of parentral administration
7	24-11-2022	Thursday 11-12PM	24/11/22	**Controlled drug delivery systems**	Types of PCDDS Aqueous solutions Oily solutions Suspensions Emulsions
8	01-12-2022	Thursday 11-12PM	30/11/2022	**Controlled drug delivery systems**	Biocompatible carriers- Liposome, Niosome, Nanoparticles, Implants

9	08-12-2022	Thursday 11-12PM	8/12/2022	**Controlled drug delivery systems**	Infusion devices- Osmotic pressure activated drug delivery systems Vapor pressure activated drug delivery systems Battery powered drug delivery systems
10	15-12-2022	Thursday 11-12PM	12/12/22	**Controlled drug delivery systems**	Evaluation of PCDDS Sterility test Pyrogen test Particulate matter Clarity test Leak test
UNIT –IV (04 Classes as per Syllabus)					
11	22-12-2022	Thursday 11-12PM	22/12/22	Ocular Drug Delivery system	Introduction, Anatomy and physiology of eye Intraocular barriers
12	29-12-2022	Thursday 11-12PM	9/01/2023	Ocular Drug Delivery system	Methods to overcome –Preliminary study
13	05-01-2023	Thursday 11-12PM		Ocular Drug Delivery system	Various ocular formulations and its evaluation
14	12-01-2023	Thursday 11-12PM		Ocular Drug Delivery system	Ocuserts- types,Formulations, Evaluation

I have taken 13 classes out of 14 classes.

SIGNATURE OF THE FACULTY

Institute of Pharmacy & Technology, Salipur, Salipur, Odisha 754202			
Programme:	B. PHARM	Sem.:	SECOND SEMESTER
Name of Course: (*Subject*)	HUMAN ANATOMY AND PHYSIOLOGY II	Course Code:	BP.201T
Teaching faculty of the course	Dr. Chandra Sekhar Barik Faculty of Pharmacology		

Summary of the Lecture Plan

Topic	Description	Hours
Nervous system	Organization of nervous system Neuron, neuroglia classification and properties of nerve fibre, electrophysiology, action potential, nerve impulse, receptors Synapse Neurotransmitters CNS: Meninges, ventricles of brain and cerebrospinal fluid, structure and functions of brain, Spinal cord	02 02 02 04
Digestive system	Anatomy and physiology of GIT Anatomy and functions of accessory glands of GIT. Digestion and absorption Disorders of GIT	02 02 01
Energetics	Formation and role of ATP, Creatinine phosphate and BMR	01
Urinary system	Anatomy and physiology of urinary system Formation of urine Renin Angiotensin system – Juxtaglomerular apparatus - acid base Balance Micturition reflex Kidney disorders	01 01 01 02
Respiratory system	Anatomy of respiratory organs and functions Mechanism / physiology of respiration and regulationof respiration Transport of respiratory gases Respiratory volumes and capacities Resuscitation methods	01 02 02 01

Endocrine system	Classification of hormones, mechanism of hormone action structure and functions of pituitary gland, thyroid gland, parathyroid gland, adrenal gland, pancreas, pineal gland, thymus disorders	01 02 06 01
Reproductive system	Male and female reproductive system Physiology of menstruation Spermatogenesis & Oogenesis Pregnancy and maintenance and parturition	02 02 02
Introduction to genetics	Chromosomes, genes and DNA, protein synthesis,genetic pattern of inheritance	01

Major issues or Core aspects to be addressed/ covered:

Topic Title: Nervous system
Definition and classification of nervous system
Action potential, Synapse
Spinal cord: Structure & reflexes
Cranial nerves – Names and functions
Topic Title: Digestive system
Anatomy and physiology of GIT
Anatomy and functions of accessory glands of GIT
Digestion and absorption
Disorders of GIT
Topic Title: Energetics
Formation and role of ATP, Creatinine phosphate and BMR
Topic Title: Urinary system
Anatomy and physiology of urinary system
Formation of urine
Renin Angiotensin system – Juxtaglomerular apparatus - acid base Balance
Micturition reflex
Topic Title: Endocrine system
Classification of hormones
Mechanism of hormone action
Structure and functions of pituitary gland, thyroid gland, parathyroid gland, adrenal gland, pancreas, pineal gland, thymus
Disorders
Topic Title: Reproductive system a) Male and female reproductive system

b) Their hormones – Physiology of menstruation c) Spermatogenesis & Oogenesis
d) Pregnancy and maintenance and parturition
Topic Title: Introduction to genetics
a) chromosomes Genes and protein synthesis

Sample Questions

Topic Title: Nervous system
Functions of sympathetic nervous systems
Explain the Structure of Spinal cord:
names and functions Cranial nerves
Topic Title: Digestive system
Explain the anatomy of small intestine and stomach.
Structure and functions of liver.
Digestion and absorption of proteins
Structure and functions of pancreas
Topic Title: Energetics
Explain about the role of ATP, creatinine and BMR
Topic Title: Urinary system
Acid-base balance by kidney
Draw a neat labeled diagram of nephron and explain its parts. Explain in detail about the mechanism of urine formation.
Topic Title: Respiratory system
Write about Respiratory volumes
Mechanism of respiration
Topic Title: Endocrine system
List the anterior pituitary hormones and their functions
Describe the role of adrenal gland in salt, sugar and sex regulation.
Synthesis, storage, release and transport of thyroid hormones.
Topic Title: Reproductive system
Note on Oogenesis
Explain the anatomy of ovary and explain about various stages of menstrual cycle
Topic Title: Genetics
Explain about protein synthesis

Institute of Pharmacy & Technology, Salipur, Salipur, Odisha 754202			
Programme:	B. PHARM	Sem.:	SECOND SEMESTER
Name of Course: (*Subject*)	HUMAN ANATOMY AND PHYSIOLOGY II	Course Code:	BP.201T
Teaching faculty of the course	Oishani Chatterjee Faculty of Pharmacology		

Summary of the Lecture Plan

Topic	Description	Hours
Urinary system Respiratory system	Anatomy and physiology of urinary system Formation of urine Renin Angiotensin system – Juxtaglomerular apparatus-acid base Balance Micturition reflex-Kidney disorders	01 01 02 01
Reproductive system	Male and female reproductive system Sex hormones and Physiology of menstruation Spermatogenesis & Oogenesis Pregnancy and maintenance and parturition	02 01 01 02

Major issues or Core aspects to be addressed/ covered:

Topic Title: Urinary system
Anatomy and physiology of urinary system
Formation of urine
Renin Angiotensin system – Juxtaglomerular apparatus - acid base Balance
Micturition reflex
Topic Title: Reproductive system
a) Male and female reproductive system
d) Their hormones – Physiology of menstruation
e) Spermatogenesis & Oogenesis
d) Pregnancy and maintenance and parturition

Sample
Questions

Topic Title: Urinary system Acid-base balance by kidney
Draw a neat labeled diagram of nephron and explain its parts. Explain in detail about the mechanism of urine formation.
Topic Title: Reproductive system
Note on Oogenesis
Explain the anatomy of ovary and explain about various stages of menstrual cycle

Institute of Pharmacy & Technology, Salipur **LESSON PLAN**			
Programme:		Sem.:	4th
Name of Course: (*Subject*)	MEDICINAL CHEMISTRY – I (Theory)	CourseCode:	BP402T
Teaching facultyof the course	Dr. Sunil Kumar Kanungo		

Summary of the Lecture Plan

Topic	Lectures	Hours
Drugs acting on Central Nervous System	Sedatives and Hypnotics: Benzodiazepines: SAR of Benzodiazepines,	2
	Diazepam*, Chlordiazepoxide,	2
	Oxazepam, Chlorazepate, Lorazepam, Alprazolam, Zolpidem	2
	Barbiturtes: SAR of barbiturates, Barbital*	2
	Phenobarbital, Mephobarbital, Amobarbital, Butabarbital,	2
	Amides & imides: Glutethmide. Alcohol & their carbamate derivatives: Pentobarbital, Secobarbital	2
	Meprobomate, Ethchlorvynol. Aldehyde & their derivatives: Triclofos sodium, Paraldehyde.	2
	Anticonvulsants: SAR of Anticonvulsants, mechanism of anticonvulsant action	2
	Barbiturates: Phenobarbitone, Methabarbital. Hydantoins: Phenytoin*, Mephenytoin, Ethotoin	2
	Oxazolidine diones: Trimethadione, Paramethadione	2
	Succinimides:Phensuximide, Methsuximide, Ethosuximide*	2
	Urea and monoacylureas: Phenacemide, Carbamazepine*	2
	Benzodiazepines: Clonazepam Miscellaneous: Primidone, Valproic acid , Gabapentin, Felbamate	2
	General anesthetics: Inhalation anesthetics: Halothane*, Methoxyflurane, Enflurane, Sevoflurane, Isoflurane, Desflurane.	2
	Ultra short acting barbitutrates: Methohexital sodium*, Thiamylal sodium, Thiopental sodium.	2
	Dissociative anesthetics: Ketamine hydrochloride.*	2
	Narcotic and non-narcotic analgesics Morphine and related drugs:	2
	SAR of Morphine analogues,Morphine, sulphate,Codeine,	2
	.Diphenoxylate hydrochloride, Meperidine hydrochloride, Anilerdine hydrochloride,	2
	Fentanyl citrate*, Loperamide hydrochloride, Methadone hydrochloride*,	2
	Propoxyphene hydrochloride, Pentazocine, Levorphanol	2

	tartarate.	
	Narcotic antagonists: Nalorphine hydrochloride, Levallorphan tartarate, Naloxone hydrochloride	2
	Anti-inflammatory agents: Sodium salicylate,	2
	Aspirin, Mefenamic acid*	2
	Meclofenamate, Indomethacin, Sulindac,	2
	Tolmetin, Zomepriac, Diclofenac, Ketorolac, Ibuprofen*,	2
	Naproxen, Piroxicam, Phenacetin, .	2
	Acetaminophen, Antipyrine, Phenylbutazone	2

LESSON PLAN

Course Name	B Pharmacy
Year/ Semester	**1 st year/2nd Semester**
Subject	PHARMACEUTICAL ORGANIC CHEMISTRY –I
Course Code	BP202T
Name of the Faculty	**Dr.Mrityunjay Banerjee**
Date of Starting of Class	24.7.2023
Date of Closing of Class	30.11.2023
Class allotted per week	2x2 =4
Available No of Class	Sec A 26+Sec B 26=52

SL.NO	UNIT			TOPIC
1	I			Introduction of Organic Chemistry
2	I			Classification of Organic Compounds
3	I			Common and IUPAC systems of nomenclature of organic compounds
4	I			Common and IUPAC systems of nomenclature of organic compounds
5	I			Structural isomerisms,Metamarism Tautomerism
6	I			General methods of preparation and reactions of Alkyl Halides
7	I			SN1 and SN2 reactions - kinetics, order of reactivity of alkyl halides
8	I			SN1 versus SN2 reactions, Factors affecting SN1 and SN2 reaction
9	III			Structure and uses of ethylchloride, Chloroform, trichloroethylene.
10	III			Structure and uses of tetrachloroethylene, dichloromethane, tetrachloromethane and iodoform.
11	III			General methods of preparation and reactions of Alcohol
12	III			Alcohols- Qualitative tests
13	III			Structure and uses of Ethyl alcohol, Methyl alcohol, chlorobutanol.
14	III			Structure and uses of Cetosteryl alcohol, Benzyl alcohol, Glycerol, Propylene glycol
15	III			General methods of preparation and reactions of Carboxylic acids
16	III			Acidity of carboxylic acids, effect of substituents on acidity, inductive effec
17	III			qualitative tests for carboxylic acids ,amide and ester
18	III			Structure and Uses of Acetic acid, Lactic acid, Tartaric acid,.
19	V			Structure and Uses of Citric acid, Succinic acid. Oxalic acid, Salicylic acid,

20	v			Aliphatic amines
21	V			General methods of preparation and reactions of Aliphatic Amines
22	v			Basicity, effect of substituent on Basicity. Qualitative test of aliphatic Amine.
23	V			Structure and uses of Ethanolamine, Ethylenediamine, Amphetamine
24	1			Discussion of Question & Model Answer of UNIT 1
25	III			Discussion of Question & Model Answer of UNIT 3
26	IV & V			Discussion of Question & Model Answer of UNIT 4 & 5

Institute of Pharmacy & Technology, Salipur **LESSON PLAN**			
Programme:		Sem.:	2nd
Name of Course: (*Subject*)	PHARMACEUTICAL ORGANIC CHEMISTRY –I (Theory)	CourseCode:	BP202T.
Teaching facultyof the course	Dr Sujit Kumar Sahu		

Summary of the Lecture Plan

Topic	Lectures	Hours
Alkanes*,	SP3 hybridization in alkanes, methods of preparation	2
	Halogenation of alkanes,	2
	Reactions of alkanes	2
	uses of paraffins.	2
Alkene	Alkene, nomenlatuer SP2 hybridization in alkenes	2
	Stabilities of alkenes, Geometrical isomerism	2
	Methods of preparation of alkene	2
	electrophilic addition reactions of alkenes, Markownikoff's	2
Alkene	free radical addition reactions of alkenes, Anti Markownikoff's orientation.	2
	Stability of conjugated dienes,	2
	Diel-Alder, electrophilic addition,	2
	free radical addition reactions of conjugated dienes,	2
Carbonyl compounds* (Aldehydes and ketones)	allylic rearrangement	2
	Methods of preparation of aldehydes and ketones	2
	Nucleophilic addition, Electromeric effect,	2
	aldol condensation	2
Carbonyl compounds* (Aldehydes and ketones)	Crossed Aldol condensation	2
	qualitative tests,	2
	Cannizzaro reaction,	2
	,, Crossed Cannizzaro reaction,	2
	Benzoin condensation,	2
	Perkin condensation,	2
	Structure and uses of Formaldehyde,	2
	Structure and uses ofParaldehyde,	2

Carbonyl compounds* (Aldehydes and ketones)		
	Structure and uses ofAcetone,	2
	Structure and uses ofChloral hydrate,	2
	Structure and uses ofHexamine, .	2
	Structure and uses ofBenzaldehyde, ,	2
	Structure and uses ofVanilin	2
	Structure and uses ofCinnamaldehyde	2
	Question answer discussion	2
	Question answer discussion	2

Institute of Pharmacy & Technology,
Salipur
LESSON PLAN

Programme:	B.Pharm	Sem.:	2nd
Name of Course: (*Subject*)	BIOCHEMISTRY	CourseCode:	BP 203T
Teaching faculty of the course	Mrs. Bipasha Behera		

Summary of the Lecture Plan

Topic	Lectures	Hours
UNIT-II Carbohydrate metabolism	Concept of Carbohydrate metabolism	2Hrs
	Glycolysis – Pathway, energetics and significance	2Hrs
	Rapaport-Leubering cycle	2Hrs
	Citric acid cycle- Pathway, energetics and significance	2Hrs
	HMP shunt and its significance; Glucose-6-Phosphate dehydrogenase (G6PD) deficiency	2Hrs
	Gluconeogenesis- Pathway and its significance	2Hrs
	Glycogen metabolism Pathways	2Hrs
	Glycogen storage diseases (GSD)	2Hrs
	Hormonal regulation of blood glucose level and Diabetes mellitus	2Hrs
Biological oxidation	Electron transport chain (ETC) and its mechanism	2Hrs
	Electron transport chain (ETC) and its mechanism	2Hrs
	Oxidative phosphorylation & its mechanism and substrate phosphorylation	2Hrs
	Inhibitors ETC and oxidative phosphorylation/Uncouplers	2Hrs
UNIT –IV Lipid metabolism	β-Oxidation of saturated fatty acid (Palmitic acid)	2Hrs
	Formation and utilization of ketone bodies; ketoacidosis	2Hrs
	De novo synthesis of fatty acids (Palmitic acid)	2Hrs
	Biological significance of cholesterol and conversion of cholesterol into bile acids	2Hrs
	conversion of cholesterol into steroid hormone	2Hrs
	conversion of cholesterol into vitamin D	2Hrs
	Disorders of lipid metabolism: Hypercholesterolemia atherosclerosis fatty liver and obesity	2Hrs
Amino acid metabolism	General reactions of amino acid metabolism	2Hrs
	Transamination,deamination & decarboxylation	2Hrs
	Urea cycle	2Hrs
	Urea cycle and its disorders	2Hrs
	Catabolism of phenylalanine and tyrosine and	2Hrs

	their metabolic disorders (Phenyketonuria, Albinism, alkeptonuria, tyrosinemia)	
	Catabolism of phenylalanine and tyrosine and their metabolic disorders (Phenyketonuria, Albinism, alkeptonuria, tyrosinemia)	2Hrs
	Synthesis and significance of biological substances; 5-HT melatonin,	2Hrs
	Synthesis and significance of dopamine, noradrenaline, adrenaline	2Hrs
	Catabolism of heme; hyperbilirubinemia,jaundice	2Hrs
	Revision and question discussion.	2Hrs

Reference Book list

1. Principles of Biochemistry by Lehninger.
2. Harper's Biochemistry by Robert K. Murry, Daryl K. Granner and Victor W. Rodwell.
3. Biochemistry by Stryer.
4. Biochemistry by D. Satyanarayan and U.Chakrapani
5. Textbook of Biochemistry by Rama Rao.
6. Textbook of Biochemistry by Deb.
7. Outlines of Biochemistry by Conn and Stumpf
8. Practical Biochemistry by R.C. Gupta and S. Bhargavan.
9. Introduction of Practical Biochemistry by David T. Plummer. (3rd Edition)
10. Practical Biochemistry for Medical students by Rajagopal and Ramakrishna.
11. Practical Biochemistry by Harold Varley.

Institute of Pharmacy & Technology,
Salipur
LESSON PLAN

Programme:	B.Pharm	Sem.:	2nd
Name of Course: (*Subject*)	BIOCHEMISTRY	CourseCode:	BP 203T
Teaching faculty of the course	Mr. Chinmaya panda		

Summary of the Lecture Plan

Topic	Lectures	Hours
UNIT-I Biomolecules	Biomolecules, Introduction, classification,	2Hrs
	Chemical nature and biological role of Carbohydrate	2Hrs
	Chemical nature and biological role of Lipids	2Hrs
	Chemical nature and biological role of Nucleic acid	2Hrs
	Chemical nature and biological role of Protein	2Hrs
	Concept of free energy	2Hrs
	Endergonic and exergonic reaction	2Hrs
	Relationship between free energy, enthalpy and entropy	2Hrs
	Redox potential	2Hrs
Bioenergetics	Energy rich compounds & its classification	2Hrs
	Biological significances of ATP	2Hrs
	Biological significances of Cyclic AMP	2Hrs
	Revision and question discussion	2Hrs
UNIT –IV Nucleic acid metabolism and genetic information transfer	Biosynthesis of purine and pyrimidine nucleotides	2Hrs
	Catabolism of purine nucleotides and Hyperuricemia and Gout disease	2Hrs
	Organization of mammalian genome	2Hrs
	Structure of DNA and RNA and their functions	2Hrs
	DNA replication (semi conservative model)	2Hrs
	Transcription or RNA synthesis	2Hrs
	Genetic code, Translation or Protein synthesis and inhibitors	2Hrs
	Introduction, properties, nomenclature and IUB classification of enzymes	2Hrs
	Enzyme kinetics (Michaelis plot, Line Weaver Burke plot)	2Hrs
	Enzyme inhibitors with examples	2Hrs
	Regulation of enzymes	2Hrs
	Enzyme induction and repression	2Hrs
	Allosteric enzymes regulation	2Hrs

UNIT V Enzymes	Therapeutic and diagnostic applications of enzymes	2Hrs
	Therapeutic and diagnostic applications of isoenzymes	2Hrs
	Coenzymes –Structure and biochemical functions	2Hrs
	Revision and question discussion.	2Hrs

Institute of Pharmacy & Technology, Salipur **LESSON PLAN**			
Programme:	B.Pharm	Sem.:	second
Name of Course: (*Subject*)	Pathophysiology	Course Code:	BP.204T
Teaching faculty of the course	Dr. Bishwanath Mishra		

Summary of the Lecture Plan

Topic	Lecturers	Hours
Respiratory system	Asthma	1
	Chronic obstructive airways diseases	1
Haematological Diseases	Iron deficiency anemia Megaloblastic anemia	1
	Sickle cell anemia Thalasemia	1
	Hereditary acquired anemia Hemophilia	1
Endocrine system	Diabetes	1
	Thyroid diseases and disorders of sex hormones	1
Nervous system & psychiatric disorders	Epilepsy	1
	Parkinson‘s disease	1
	Stroke	1
	Depression	1
	Schizophrenia	1
	Alzheimer‘s disease	1
Gastrointestinal system	Peptic Ulcer	1

Major issues or Core aspects to be addressed/ covered:

Unit I:Basic principles of cell injury and Adaptation **Basic mechanism involved in the process of inflammation and repair**
Causes, Pathogenesis and morphology of cell injury
Components and Types of Feedback systems
Cell swelling, Intra cellular accumulation, Calcification, Enzyme leakage and Cell Death
Causes of cellular injury, Pathogenesis (Cell membrane damage, Mitochondrialdamage, Ribosome damage, Nuclear damage)
Pathogenesis of acute inflammation, Chemical mediators in inflammation, Types of
chronic inflammation, Repairs of wounds in the skin, factors influencing healing of wounds
Alteration in vascular permeability and blood flow, migration of WBC‘s
Unit II:Cardiovascular,Respiratory and Renal systems

Etiology and pathophysiology of Hypertension, congestive heart failure, ischemic heartdisease (angina, myocardial infarction, atherosclerosis and arteriosclerosis)
Etiology and pathophysiology of Asthma, Chronic obstructive airways diseasesAcuteand chronic renal failure
Unit III: Haematological Diseases, Endocrine,Gastrointestinal andNervous systems & psychiatric disorders
Definition and etiopatogenesis of Iron deficiency, megaloblastic anemia (Vit B12 and folic acid), sickle cell anemia, thalasemia, hereditary acquired anemia, hemophilia
Definition,Classification and Pathophysiology of Diabetes, thyroid diseases, disorders ofsex hormones
Epilepsy, Parkinson‘s disease, stroke, psychiatric disorders: depression, schizophrenia and Alzheimer‘s disease,Peptic Ulcer, Inflammatory bowel diseases, jaundice, hepatitis (A,B,C,D,E,F) alcoholic liver disease.
Unit IV: Disease of bones and joints, Principles of cancer
Rheumatoid arthritis, osteoporosis and gout details
classification, etiology and pathogenesis of cancer
Unit IV :Infectious diseases,Sexually transmitted diseases
Definition,Categories and pathophysiology of Meningitis, Typhoid, Leprosy, Tuberculosis Urinary tract infections AIDS, Syphilis and Gonorrhea

Sample Questions

Unit I:Basic principles of cell injury and Adaptation **Basic mechanism involved in the process of inflammation and repair**
Explain Causes, Pathogenesis and morphology of cell injury
Describe Components and Types of Feedback systems
Define Cell swelling, What is Intra cellular accumulation, explain Calcification, Describe Enzyme leakage and Cell Death
List out Causes of cellular injury, Explain Pathogenesis (Cell membrane damage, Mitochondrial damage,Ribosome damage, Nuclear damage)
Explain Pathogenesis of acute inflammation, Describe about Chemical mediators in inflammation
Define and explain chronic inflammation, Repairs of wounds in the skin, factorsinfluencing healing of wounds
What is alteration in vascular permeability and blood flow, migration of WBC‘s
Unit II: Cardiovascular,Respiratory and Renal systems
Etiology and pathophysiology of Hypertension, congestive heart failure, ischemic heartdisease (angina, myocardial infarction, atherosclerosis and arteriosclerosis)
Etiology and pathophysiology of Asthma, Chronic obstructive airways diseasesDefine and describe Acute and chronic renal failure

Unit III: Haematological Diseases, Endocrine,Gastrointestinal andNervous systems & psychiatric disorders
Definition and etiopatogenesis of Iron deficiency, megaloblastic anemia (Vit B12 andfolic acid), sickle cell anemia, thalasemia, hereditary acquired anemia, hemophilia
Definition,Classification and Pathophysiology of Diabetes, thyroid diseases, disorders of sex hormones
Explain Epilepsy, write in detail about Parkinson‘s disease, Define and classify stroke, Classification of depression, Pathophysiology of schizophrenia and Describe about the etiological factors of Alzheimer‘s disease, Define and explain Peptic Ulcer, Describe in detail about Inflammatory bowel diseases, Causative Factors of jaundice, Classify hepatitis (A,B,C,D,E,F) , Pathophysiology of alcoholic liver disease.
Unit IV: Disease of bones and joints, Principles of cancer
Describe Rheumatoid arthritis, Pathophysiology of osteoporosis and Define and describe gout in detail
Define and Describe etiology and pathogenesis of cancer
Unit IV :Infectious diseases,Sexually transmitted diseases
Categories and pathophysiology of Meningitis, Pathophysiology of Typhoid, Etiopathogenesis of Leprosy, Diagnosis and Clinical features of Tuberculosis, types ofUrinary tract infections , Opportunitsic Infections related to AIDS, Classification of Syphilis and Describe about Gonorrhea

Reference Book list

1. Vinay Kumar, Abul K. Abas, Jon C. Aster; Robbins &Cotran Pathologic Basis of Disease; South Asia edition; India; Elsevier; 2014.
2. Harsh Mohan; Text book of Pathology; 6 th edition; India; Jaypee Publications; 2010.
3. Laurence B, Bruce C, Bjorn K. ; Goodman Gilman’s The Pharmacological Basis of Therapeutics; 12 th edition; New York; McGraw-Hill; 2011.
4. Best, Charles Herbert 1899-1978; Taylor, Norman Burke 1885-1972; West, John B (John Burnard); Best and Taylor’s Physiological basis of medical practice; 12th ed; united states;
5. William and Wilkins, Baltimore;1991 [1990 printing].
6. Nicki R. Colledge, Brian R. Walker, Stuart H. Ralston;Davidson’s Principles and Practice of Medicine; 21st edition; London; ELBS/Churchill Livingstone; 2010.
7. Guyton A, John .E Hall; Textbook of Medical Physiology; 12 th edition; WB Saunders Company; 2010.
8. Joseph DiPiro, Robert L. Talbert, Gary Yee, Barbara Wells, L. Michael Posey; Pharmacotherapy: A Pathophysiological Approach; 9 th edition; London; McGraw-Hill Medical; 2014.
9. V. Kumar, R. S. Cotran and S. L. Robbins; Basic Pathology; 6 th edition; Philadelphia; WB Saunders Company; 1997.
10. Roger Walker, Clive Edwards; Clinical Pharmacy and Therapeutics; 3 rd edition; London; Churchill Livingstone publication; 2003.

Institute of Pharmacy & Technology,
Salipur
LESSON PLAN

Programme:	B.Pharm	Sem.:	second
Name of Course: (*Subject*)	Pathophysiology	Course Code:	BP.204T
Teaching faculty of the course	Dr. Ranjan Kumar Giri		

Summary of the Lecture Plan

Topic	Lecturers	Hours
Basic principles of Cell injury and Adaptation	Components and type of feedback systems	1
	Cell injury and Adaptaions	7
	Acidosis & Alkalosis	1
	Electrolyte imbalance	1
Basic mechanism involved in the processof inflammation and repair	Inflammation	2
	Chemical mediators in inflammation	2
	healing of wounds	2
	Pathophysiology of Atherosclerosis	1
Cardiovascular System	Hypetension	1
	congestive heart failure	1
	ischemic heart disease	3
Renal system	Acute renal Failure	1
	chronic renal failure	1
Gastrointestinal system	Inflammatory bowel diseasesJaundice	3
	Hepatitis (A,B,C,D,E,F)Alcoholic liver disease	1
Disease of bones andjoints	Rheumatoid Arthritis	1
	Osteoporosis Gout	1
Principles of cancer	Classification, etiology of cancer	1
	Pathogenesis of cancer	1
Infectious diseases	Meningitis	1
	Typhoid	1
	Leprosy Tuberculosis	1
	Urinary tract infections	1
Sexually transmitteddiseases	AIDS	1
	Syphilis	1
	Gonorrhea	1

Major issues or Core aspects to be addressed/ covered:

Unit I:Basic principles of cell injury and Adaptation

Basic mechanism involved in the process of inflammation and repair

Causes, Pathogenesis and morphology of cell injury
Components and Types of Feedback systems
Cell swelling, Intra cellular accumulation, Calcification, Enzyme leakage and Cell Death
Causes of cellular injury, Pathogenesis (Cell membrane damage, Mitochondrialdamage, Ribosome damage, Nuclear damage)
Pathogenesis of acute inflammation, Chemical mediators in inflammation, Types of
chronic inflammation, Repairs of wounds in the skin, factors influencing healing of wounds
Alteration in vascular permeability and blood flow, migration of WBC‘s
Unit II:Cardiovascular,Respiratory and Renal systems
Etiology and pathophysiology of Hypertension, congestive heart failure, ischemic heartdisease (angina, myocardial infarction, atherosclerosis and arteriosclerosis)
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Unit III: Haematological Diseases, Endocrine,Gastrointestinal andNervous systems & psychiatric disorders
Definition and etiopatogenesis of Iron deficiency, megaloblastic anemia (Vit B12 and folic acid), sickle cell anemia, thalasemia, hereditary acquired anemia, hemophilia
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Epilepsy, Parkinson‘s disease, stroke, psychiatric disorders: depression, schizophrenia and Alzheimer‘s disease,Peptic Ulcer, Inflammatory bowel diseases, jaundice, hepatitis (A,B,C,D,E,F) alcoholic liver disease.

Unit IV: Disease of bones and joints, Principles of cancer
Rheumatoid arthritis, osteoporosis and gout details
classification, etiology and pathogenesis of cancer
Unit IV :Infectious diseases,Sexually transmitted diseases
Definition,Categories and pathophysiology of Meningitis, Typhoid, Leprosy, Tuberculosis Urinary tract infections AIDS, Syphilis and Gonorrhea

Sample Questions

Unit I:Basic principles of cell injury and Adaptation **Basic mechanism involved in the process of inflammation and repair**
Explain Causes, Pathogenesis and morphology of cell injury
Describe Components and Types of Feedback systems
Define Cell swelling, What is Intra cellular accumulation, explain Calcification, Describe Enzyme leakage and Cell Death
List out Causes of cellular injury, Explain Pathogenesis (Cell membrane damage, Mitochondrial damage,Ribosome damage, Nuclear damage)
Explain Pathogenesis of acute inflammation, Describe about Chemical mediators in inflammation
Define and explain chronic inflammation, Repairs of wounds in the skin, factorsinfluencing healing of wounds
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Describe Rheumatoid arthritis, Pathophysiology of osteoporosis and Define and describe gout in detail
Define and Describe etiology and pathogenesis of cancer
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4. Best, Charles Herbert 1899-1978; Taylor, Norman Burke 1885-1972; West, John B (John Burnard); Best and Taylor's Physiological basis of medical practice; 12th ed; united states;
5. William and Wilkins, Baltimore;1991 [1990 printing].
6. Nicki R. Colledge, Brian R. Walker, Stuart H. Ralston;Davidson's Principles and Practice of Medicine; 21st edition; London; ELBS/Churchill Livingstone; 2010.
7. Guyton A, John .E Hall; Textbook of Medical Physiology; 12 th edition; WB Saunders Company; 2010.
8. Joseph DiPiro, Robert L. Talbert, Gary Yee, Barbara Wells, L. Michael Posey; Pharmacotherapy: A Pathophysiological Approach; 9 th edition; London; McGraw-Hill Medical; 2014.
9. V. Kumar, R. S. Cotran and S. L. Robbins; Basic Pathology; 6 th edition; Philadelphia; WB Saunders Company; 1997.
10. Roger Walker, Clive Edwards; Clinical Pharmacy and Therapeutics; 3 rd edition; London; Churchill Livingstone publication; 2003.

Institute of Pharmacy & Technology, Salipur **LESSON PLAN**			
Programme:	B.PHARM	Sem.:	2
Name of Course: (*Subject*)	ENVIRONMENTAL SCIENCE	Course Code:	BP 206 T
Teaching faculty of the course	DR. SUSANTA KUMAR BEHERA		

Summary of the Lecture Plan

Topic	Lectures	Hours
EnvironmentalPollution Water Pollution	Introductions, definition, Effect of Water pollution	1hr.
	Source of Water Pollution, Water Pollutant	1hr.
	Types of water pollutant	1hr.
	Types of water, Effect of pollutants on health	1hr.
	Water treatment process	1hr.
	Water treatment process	1hr.
	Water treatment process	1hr.
Air Pollution	Introduction, Definition, Effect of Air pollution	1hr.
	Source of Air pollution, Air pollutant	1hr.
	Difference between Primary pollutant and secondary pollutant with examples	1hr.
	Acid Rain, Greenhouse Effect	1hr.
	Ozone Hole, El Nino Effect, Air quality standards	1hr.
Soil Pollution	Introduction, Definition and Effect of Soil pollution	1hr.
	Source of soil pollution, Soil pollutant	1hr.
	Classification of pollutant	1hr.
	Control of Soil pollution	1hr.
	Waste Treatment, Waste classification and disposals, solid waste disposals	1hr.
Ecosystem Concept of an Ecosystem	Introductions, Historical background, Aspects of ecosystem	1hr.

Structure and Function of an Ecosystem	Structure of ecosystem, Function of ecosystem	1hr.
Forest Ecosystem	Introduction, types, characteristic features, structure and the function of the ecosystem.	1hr.
	Introduction, types, characteristic features, structure and the function of the ecosystem.	1hr.
Grassland Ecosystem	Introduction, types, characteristic features, structure and the function of the ecosystem.	1hr.
	Introduction, types, characteristic features, structure and the function of the ecosystem.	1hr.
Desert Ecosystem	Introduction, types, characteristic features, structure and the function of the ecosystem.	1hr.
	Introduction, types, characteristic features, structure and the function of the ecosystem.	1hr.
Aquatic Ecosystem Ponds	Introduction, types, characteristic features, structure and the function of the ecosystem.	1hr.
Streams	Introduction, types, characteristic features, structure and the function of the ecosystem.	1hr.
Lakes	Introduction, types, characteristic features, structure and the function of the ecosystem.	1hr.
Oceans	Introduction, types, characteristic features, structure and the function of the ecosystem.	1hr.
Estuaries	Introduction, types, characteristic features, structure and the function of the ecosystem.	1hr.
Review Class	Previous Questions Discussion	1hr.

Major issues or Core aspects to be addressed/ covered:

Topic Title – Ecosystem
Concept of Ecosystem
Structure and function of Ecosystem
Biotic and Abiotic Types
Historical Background

Topic Title - Forest Ecosystem
Structure and Function

Characteristic feature
Topic Title - Grassland Ecosystem
Structure and Function
Characteristic feature
Topic Title – Desert Ecosystem
Structure and Function
Characteristic feature
Topic Title – Aquatic Ecosystem
Structure and Function
Characteristic feature

Reference Book list:

1. Y.K. Sing, Environmental Science, New Age International Pvt, Publishers, Bangalore
2. Agarwal, K.C. 2001 Environmental Biology, Nidi Publ. Ltd. Bikaner.
3. Bharucha Erach, The Biodiversity of India, Mapin Pu blishing Pvt. Ltd., Ahmedabad – 380 013, India,
4. Brunner R.C., 1989, Hazardous Waste Incineration, McGraw Hill Inc. 480p
5. Clark R.S., Marine Pollution, Clanderson Press Oxford
6. Cunningham, W.P. Cooper, T.H. Gorhani, E & Hepworth, M.T. 2001, Environmental Encyclopedia, Jaico Publ. House, Mumbai, 1196p
7. De A.K., Environmental Chemistry, Wiley Eastern Ltd.
8. Down of Earth, Centre for Science and Environment

Institute of Pharmacy & Technology, Salipur **LESSON PLAN**			
Programme:	B.PHARM	Sem.:	2
Name of Course: (*Subject*)	ENVIRONMENTAL SCIENCE	CourseCode:	BP 206 T
Teaching faculty of the course	DR. SWALIN PARIJA		

Summary of the Lecture Plan

Topic	Lectures	Hours
The Multidisciplinary nature of environmental studies	Natural Resources	1hr.
	Renewable and non-renewable resources	1hr.
	Natural resources and associated problems	1hr.
	Chief Natural Resources	1hr.
Forest Resources	Benefits of Forests	1hr.
	Deforestation causes & effects	1hr.
	Controlling Deforestation	1hr.
Water Resources (Hydrosphere)	Source of water,Use and Over Exploitation of Surface and Ground water	1hr.
	Water Calamities: Floods and Droughts	1hr.
	Dams: Benefits and Problems What do dams provide?	1hr.
Mineral Resources	Types of Minerals	1hr.
	Environmental Effect of Extraction or Mining	1hr.
	Mine safety & Mine effect on environment	1hr.
Food Resources	Types of Food, World Food Problems (Food security act 1999)	1hr.
	Food Problems causes & solution	1hr.
	Environmental Effects of Modern Agriculture-Green revolution	1hr.
Land Resources	Causes Of Soil Erosion & its Conservation	1hr.

Major issues or Core aspects to be addressed/ covered:

Topic Title - The Multidisciplinary nature of environmental studies
Natural Resources
Renewable and non-renewable resources
Natural resources and associated problems
Chief Natural Resources

Topic Title - Forest Resources
Benefits of Forests
Deforestation causes & effects
Controlling Deforestation
Topic Title - Water Resources (Hydrosphere)
Source of water, Use and Over Exploitation of Surface and Ground water
Water Calamities: Floods and Droughts
Dams: Benefits and Problems What do dams provide?
Topic Title - Mineral Resources
Types of Minerals
Environmental Effect of Extraction or Mining
Mine safety & Mine effect on environment
Topic Title - Food Resources & Land Resources
Types of Food, World Food Problems (Food security act 1999)
Food Problems causes & solution
Environmental Effects of Modern Agriculture-Green revolution
Causes Of Soil Erosion & its Conservation

Sample Questions

Topic Title - The Multidisciplinary nature of environmental studies
What are Natural Resources?
Describe about various Renewable and non-renewable resources with examples.
What are the problems associated with Natural resources?
Topic Title - Forest Resources
What are the Benefits of Forests?
What is Deforestation? Write about its causes & effects.
What are the processes of Controlling Deforestation?
Topic Title - Water Resources (Hydrosphere)
What are the various Sources of water? Mention its Use and Over Exploitation of Surface and Ground water.
What are Water Calamities? Describe about Floods and Droughts.
Describe about Dams, their Benefits and Problems.
Topic Title - Mineral Resources
What are the types of Minerals?
What is the Environmental Effect of Extraction or Mining?
What is Mine safety & Mine effect on environment?
Topic Title - Food Resources & Land Resources
What are the types of Food and mention about World Food Problems (Food security act 1999)?
What are Food Problems causes & solution?
What are Environmental Effects of Modern Agriculture-Green revolution?
What are the Causes Of Soil Erosion & its Conservation?

Reference Book list:

1. Y.K. Sing, Environmental Science, New Age International Pvt, Publishers, Bangalore
2. Agarwal, K.C. 2001 Environmental Biology, Nidi Publ. Ltd. Bikaner.
3. Bharucha Erach, The Biodiversity of India, Mapin Pu blishing Pvt. Ltd., Ahmedabad – 380 013, India,
4. Brunner R.C., 1989, Hazardous Waste Incineration, McGraw Hill Inc. 480p
5. Clark R.S., Marine Pollution, Clanderson Press Oxford
6. Cunningham, W.P. Cooper, T.H. Gorhani, E & Hepworth, M.T. 2001, Environmental Encyclopedia, Jaico Publ. House, Mumbai, 1196p
7. De A.K., Environmental Chemistry, Wiley Eastern Ltd.
8. Down of Earth, Centre for Science and Environment

Institute of Pharmacy & Technology, Salipur **LESSON PLAN**			
Programme:	B.Pharm	Sem.:	IV th
Name of Course:(*Subject*)	Pharmaceutical Organic Chemistry-III (Theory)	Course Code:	BP401T
Teaching faculty of the course	Dr. H K Sundeep Kumar		

Summary of the Lecture Plan

Topic	Lectures	Hours
UNIT- III Nomenclature and classification Synthesis, reactions and medicinal uses of following compounds/derivatives Pyrrole, Furan, and Thiophene Relative aromaticity and reactivity of Pyrrole, Furan and Thiophene	Nomenclature and classification of heterocyclic compounds	02
	Nomenclature and classification of heterocyclic compounds	02
	Synthesis, reactions and medicinal uses of following compounds Pyrrole	02
	Synthesis, reactions and medicinal uses of following compounds Furan	02
	Synthesis, reactions and medicinal uses of following compounds Thiophene	02
	Relative aromaticity and reactivity of Pyrrole, Furan and Thiophene	02
UNIT- IV Synthesis, reactions and medicinal uses of following compounds/derivatives Pyrazole, Imidazole, Oxazole and Thiazole. Pyridine, Quinoline, Isoquinoline, Acridine and Indole. Basicity of pyridine Synthesis and medicinal uses of Pyrimidine, Purine, azepines and their derivatives	Synthesis, reactions and medicinal uses of following compounds/derivatives Pyrazole, Imidazole	02
	Synthesis, reactions and medicinal uses of following compounds/derivatives Oxazole, Thiazole	02
	Synthesis, reactions and medicinal uses of following compounds/derivatives Pyridine and basicity of pyridine.	02
	Synthesis, reactions and medicinal uses of following compounds/derivatives Quinoline and Isoquinoline	02
	Synthesis, reactions and medicinal uses of following compounds/derivatives Acridine	02
	Synthesis, reactions and medicinal uses of following compounds/derivatives Indole	02
	Synthesis, reactions and medicinal uses of following compounds/derivatives	02
	Synthesis and medicinal uses of Pyrimidine, Purine, azepines and their derivatives	02
UNIT-II Geometrical isomerism Nomenclature of geometrical isomers (Cis Trans, EZ, Syn Anti systems) Methods of determination of configuration of geometrical isomers. Conformational isomerism in Ethane, n-Butane and	Geometrical isomerism Nomenclature of geometrical isomers (Cis Trans, EZ, Syn Anti systems)	02
	Methods of determination of configuration of geometrical isomers	02
	Conformational isomerism in Ethane, n-Butane and Cyclohexane.	02
	Stereo isomerism in biphenyl compounds (Atropisomerism) and conditions for optical activity.	02

Cyclohexane. Stereo isomerism in biphenyl compounds (Atropisomerism) and conditions for optical activity. Stereospecific and stereoselective reactions		
	Stereospecific and stereoselective reactions	02
	Stereospecific and stereoselective reactions	02

Institute of Pharmacy & Technology, Salipur **LESSON PLAN**			
Programme:		Sem.:	4th
Name of Course: (*Subject*)	MEDICINAL CHEMISTRY – I (Theory)	CourseCode:	BP402T
Teaching facultyof the course	Dr. Sunil Kumar Kanungo		

Summary of the Lecture Plan

Topic	Lectures	Hours
Drugs acting on Central Nervous System	Sedatives and Hypnotics: Benzodiazepines: SAR of Benzodiazepines,	2
	Diazepam*, Chlordiazepoxide,	2
	Oxazepam, Chlorazepate, Lorazepam, Alprazolam, Zolpidem	2
	Barbiturtes: SAR of barbiturates, Barbital*	2
	Phenobarbital, Mephobarbital, Amobarbital, Butabarbital,	2
	Amides & imides: Glutethmide. Alcohol & their carbamate derivatives: Pentobarbital, Secobarbital	2
	Meprobomate, Ethchlorvynol. Aldehyde & their derivatives: Triclofos sodium, Paraldehyde.	2
	Anticonvulsants: SAR of Anticonvulsants, mechanism of anticonvulsant action	2
	Barbiturates: Phenobarbitone, Methabarbital. Hydantoins: Phenytoin*, Mephenytoin, Ethotoin	2
	Oxazolidine diones: Trimethadione, Paramethadione	2
	Succinimides: Phensuximide, Methsuximide, Ethosuximide*	2
	Urea and monoacylureas: Phenacemide, Carbamazepine*	2
	Benzodiazepines: Clonazepam Miscellaneous: Primidone, Valproic acid , Gabapentin, Felbamate	2
	General anesthetics: Inhalation anesthetics: Halothane*, Methoxyflurane, Enflurane, Sevoflurane, Isoflurane, Desflurane.	2
	Ultra short acting barbitutrates: Methohexital sodium*, Thiamylal sodium, Thiopental sodium.	2

	Dissociative anesthetics: Ketamine hydrochloride.*	2
	Narcotic and non-narcotic analgesics Morphine and related drugs:	2
	SAR of Morphine analogues, Morphine sulphate,Codeine,	2
	.Diphenoxylate hydrochloride, Meperidine hydrochloride, Anilerdine hydrochloride,	2
	Fentanyl citrate*, Loperamide hydrochloride, Methadone hydrochloride*,	2
	Propoxyphene hydrochloride, Pentazocine, Levorphanol tartarate.	2
	Narcotic antagonists: Nalorphine hydrochloride, Levallorphan tartarate, Naloxone hydrochloride	2
	Anti-inflammatory agents: Sodium salicylate,	2
	Aspirin, Mefenamic acid*,	2
	Meclofenamate, Indomethacin, Sulindac,	2
	Tolmetin, Zomepriac, Diclofenac, Ketorolac, Ibuprofen*,	2
	Naproxen, Piroxicam, Phenacetin, .	2
	Acetaminophen, Antipyrine, Phenylbutazone	2

Institute of Pharmacy & Technology, Salipur

LESSON PLAN

Programme:		Sem.:	4th
Name of Course:(*Subject*)	**MEDICINAL CHEMISTRY – I (Theory)**	CourseCode:	**BP402T.**
Teaching facultyofthecourse	Dr. Sujit Kumar Sahu		

Summary of the Lecture Plan

Topic	Lectures	Hours
Physicochemical properties in relation to biological action	Introduction to Medicinal Chemistry History and development of medicinal chemistry	2
	Ionization, Solubility, Partition Coefficient, Hydrogen bonding,	2
	Protein binding, Chelation, Optical and Geometrical isomerism.	2
	Bioisosterism	2
Drug metabolism	Bioisosterism,	2
	Drug metabolism principles- Phase I	2
	Drug metabolism principles- Phase II	2
	Factors affecting drug metabolism including stereo chemical aspects.	2
Drugs acting on Autonomic Nervous System	Adrenergic Neurotransmitters: Biosynthesis and catabolism of catecholamine. Adrenergic receptors (Alpha & Beta) and their distribution.	2
	Sympathomimetic agents: SAR of Sympathomimetic agents	2
	Direct acting: Nor-epinephrine, Epinephrine, Phenylephrine*, Dopamine,	2
	Methyldopa, Clonidine, Dobutamine, Isoproterenol, Terbutaline, Salbutamol*, Bitolterol,	2
	Naphazoline, Oxymetazoline and Xylometazoline. Indirect acting agents: Hydroxyamphetamine, Pseudoephedrine, Propylhexedrine. Agents with mixed mechanism: Ephedrine, Metaraminol.	2
Adrenergic Antagonists:	Alpha adrenergic blockers: Tolazoline*, Phentolamine, Phenoxybenzamine, Prazosin, Dihydroergotamine, Methysergide.	2
	Beta adrenergic blockers: SAR of beta blockers, Propranolol*,Metibranolol, Atenolol,	2
	Betazolol, Bisoprolol, Esmolol, Metoprolol, Labetolol, Carvedilol.	2
	Cholinergic neurotransmitters: Biosynthesis and catabolism of acetylcholine. Cholinergic receptors (Muscarinic & Nicotinic) and their distribution.	2
Parasympathetic agents	Parasympathomimetic agents: SAR of Parasympathomimetic agents	2
	Direct acting agents: Acetylcholine, Carbachol*, Bethanechol,Methacholine, Pilocarpine.	2
	Indirect acting/ Cholinesterase inhibitors (Reversible & Irreversible): Physostigmine, Neostigmine*, Pyridostigmine, Edrophonium	2

	chloride, Tacrine hydrochloride,	
	Ambenonium chloride, Isofluorphate, Echothiophate iodide, Parathione, Malathion. Cholinesterase reactivator: Pralidoxime chloride.	2
	Cholinergic Blocking agents: SAR of cholinolytic agentsSolanaceous alkaloids and analogues: Atropine sulphate, Hyoscyamine sulphate,	2
	Scopolamine hydrobromide, Homatropine hydrobromide, Ipratropium bromide*.Synthetic cholinergic blocking agents: Tropicamide, Cyclopentolatehydrochloride	2
	, Clidinium bromide, Dicyclomine hydrochloride*, Orphenadrine citrate, Biperidine hydrochloride,Glycopyrrolate, Methantheline bromide,	2
	Propantheline bromide,Procyclidine hydrochloride*, Tridihexethyl chloride, Isopropamide iodide, Ethopropazine hydrochloride.	2

Institute of Pharmacy & Technology, Salipur **LESSON PLAN**			
Programme:	B. Pharma	Sem.:	4th (Both section)
Name of Course: (*Subject*)	Physical Pharmaceutics - II	CourseCode:	BP 403 T
Teaching faculty of the course	Dr. Bibaswan Mishra		

Summary of the Lecture Plan

Topic	Lectures	Hours
UNIT-IV, Micromeritics	Introduction of micromeritics, Particle size and particle size distribution	1
	Various types of mean particle size	1
	Number and weight distribution, particle number	1
	Methods for determining particle size by Sieving method and optical microscopy	1
	Methods for determining particle size by conductivity and separation method	1
	Particle shape, specific surface	1
	Methods for determining surface area by permeability method	1
	Methods for determining surface area by adsorption method	1
	Derived properties of powders: porosity, packing arrangement,	1
	Determination of bulk and true densities	1
	Powder bulkiness & determination of flow properties: Angle of Repose	1
	Determination of flow properties: Carr's index and Hausener's ratio.	1
UNIT-V Drug stability	Reaction kinetics: zero, pseudo-zero order process	1
	Reaction kinetics: first & second order process	1
	Units of basic rate constants, determination of reaction order	1
	Physical and chemical factors influencing the chemical degradation of pharmaceutical product: temperature, solvent	1
	Physical and chemical factors influencing the chemical degradation of pharmaceutical product: ionic strength, dielectric constant, specific & general acid base catalysis	1
	Simple numerical problems	1
	Stabilization of medicinal agents against common reactions like hydrolysis	1
	Stabilization of medicinal agents against common reactions like oxidation	1
	Accelerated stability testing in expiration dating of pharmaceutical dosage forms	1
	Photolytic degradation and its prevention	1
Unit-III Coarse Dispersion	Stability of emulsions, preservation of emulsions	1
	Rheological properties of emulsions	1
	Rmulsion formulation by HLB method	1
	Revision	1
	Revision	1

Major issues or Core aspects to be addressed/ covered:

Topic Title - **Micromeritics**
Various physical and physicochemical properties, and principle involved in dosage forms/formulations.

Topic Title - **Drug stability**
Know the principles of chemical kinetics & to use them for stability testing nad determination of expiry date of formulations.
Stability studies of pharmaceutical dosage forms.

Topic Title - **Coarse Dispersion**
Theory and practical components of emulsion to get a better insight into various areas of formulation research and development of emulsion.

Sample Questions

Topic Title - **Micromeritics**
Describe the size distribution using various frequency distribution curve.
Discuss the sieving method of determining particle size and size distribution.
Topic Title - **Drug stability**
Describe the factors affecting the drug stability.
How can the shelf life of a drug substance be determined by accelerated stability study?
Topic Title - **Coarse Dispersion**
Write down the stability testing and identification of Emulsion.

Reference Book list

1. Physical Pharmacy by Alfred Martin, Sixth edition
2. Experimental pharmaceutics by Eugene, Parott.
3. Tutorial pharmacy by Cooper and Gunn.
4. Stocklosam J. Pharmaceutical calculations, Lea & Febiger, Philadelphia.
5. Liberman H.A, Lachman C., Pharmaceutical Dosage forms, Tablets, Volume-1 to 3, Marcel Dekkar Inc.
6. Liberman H.A, Lachman C, Pharmaceutical dosage forms. Disperse systems, volume 1, 2, 3. Marcel Dekkar Inc.
7. Physical Pharmaceutics by Ramasamy C, and Manavalan R.

Institute of Pharmacy & Technology, Salipur **LESSON PLAN**			
Programme:	B. Pharma	Sem.:	4th (Both section)
Name of Course: (*Subject*)	Physical Pharmaceutics - II	CourseCode:	BP 403 T
Teaching faculty of the course	Dr. Prabhat Kumar Sahoo		

Summary of the Lecture Plan

Topic	Lectures	Hours	Date
UNIT-II, Rheology	Definition and Newtonian systems,	1	06-07-23
	Law of flow, kinematic viscosity	1	07-07-23
	Factors affecting on viscosity	1	13-07-23
	Non-Newtonian systems Plastic flow	1	14-07-23
	Pseudoplastic and Dilatant flow	1	20-07-23
	Thixotropy & Thixotropy in formulation	1	21-07-23
	Negative thixotropy, Bulges and spur etc	1	27-07-23
	Determination of viscosity, capillary, falling Sphere	1	28-07-23
	Rotational viscometers	1	03-08-23
	Plastic and elastic deformation	1	04-08-23
	Heckel equation	1	17-08-23
	Elastic Modulus Stress, Strain	1	18-08-23
UNIT-III Coarse dispersion	Suspension, advantage and disadvantage	1	24-08-23
	Interfacial properties of suspended particles,	1	25-08-23
	Settling in suspensions	1	31-08-23
	Physical stability of suspension	1	01-09-23
	Formulation of deflocculated suspensions	1	07-09-23
	Formulation of flocculated suspensions	1	08-09-23
	Emulsions Advantage and disadvantage	1	14-09-23
	Theories of emulsification	1	15-09-23
	Theories of emulsification	1	21-09-23
	Microemulsion and multiple emulsions;	1	22-09-23
UNIT-I Colloidal dispersions:	Classification of dispersed systems & their general characteristics, size & shapes of colloidal particles,	1	28-09-23
	classification of colloids &comparative account of their general properties	1	29-09-23
	Optical Properties	1	05-10-23
	Kinetic Properties	1	06-10-23
	Electrical properties. Effect of electrolytes, coacervation, peptization& protective action.	1	12-10-23
	Effect of electrolytes, coacervation, peptization& protective action.	1	13-10-23

Reference Book list

1. Physical Pharmacy by Alfred Martin, Sixth edition
2. Experimental pharmaceutics by Eugene, Parott.
3. Tutorial pharmacy by Cooper and Gunn.
4. Stocklosam J. Pharmaceutical calculations, Lea & Febiger, Philadelphia.
5. Liberman H.A, Lachman C., Pharmaceutical Dosage forms, Tablets, Volume-1 to 3, Marcel Dekkar Inc.
6. Liberman H.A, Lachman C, Pharmaceutical dosage forms. Disperse systems, volume 1, 2, 3. Marcel Dekkar Inc.
7. Physical Pharmaceutics by Ramasamy C, and Manavalan R.

INSTITUTE OF PHARMACY & TECHNOLOGY, SALIPUR, CUTTACK, ODISHA			
Programme:	B.PHARM	Sem.:	IV
Name of Course: (*Subject*)	BP 404 T. PHARMACOLOGY-I	Course Code:	BP404T
Teaching faculty of the course	ASWINI KUMAR SENAPATI, ASST. PROFESSOR, DEPT. OF PHARMACOLOGY		

Summary of the Lecture Plan

Sl. No.	Unit	Topic
1	I	Introduction, Definition, historical landmarks and scope of pharmacology
2	I	Nature and source of drugs, essential drugs concept and routes of drug administration
3	I	Routes of administration
4	I	Mechanism of absorption of drug
5	I	Factors affecting drug absorption
6	I	Factors affecting drug absorption
7	I	Distribution of drugs
8	I	Excretion of drugs, kinetics of elimination
9	II	Principles and mechanisms of drug action
10	II	Receptor theories and classification of receptor
11	II	Regulation of receptors. drug receptors interactions signal transduction mechanism, G-protein–coupled receptors, ion channel receptor, transmembrane enzyme linked receptors,
12	II	Transmembrane JAK-STAT binding receptor and receptors that regulate transcription factors nsmembrane JAK-STAT binding receptor and receptors that regulate transcription factors
13	II	Dose response relationship, therapeutic index, combined effects of drugs
14	II	Factors modifyingdrug action.
15	II	
16	II	Drug interactions (pharmacokinetic and pharmacodynamic)
17	II	Drug discovery and clinical evaluation of new drugs -Drug discovery phase, preclinical evaluation phase, clinical trial phase, phases of clinical trials.
18	II	Pharmacovigilance
19	II	Organization and function of ANS, Neurohumoral transmission, co transmission, classification of neurotransmitters
20	III	Neurohumoral transmission of cholinergic system
21	III	Parasympathomimetics
22	III	Parasympatholytics
23	III	Neurohumoral Transmission of Adrenergic system
24	III	Sympathomimetics
25	III	Sympathomimetics

26	III	Sympatholytics (α adrenergic blockers)
27	III	Sympatholytics (β adrenergic blockers)
28	IV	Drugs used in myasthenia gravis and glaucoma
29	IV	Local anesthetic agents.
30	IV	Neurohumoral transmission in the C.N.S.special emphasis on importance of various neurotransmitters like with GABA, Glutamate, Glycine, serotonin, dopamine
31	IV	Sedatives, hypnotics
32	IV	Sedatives, hypnotics
33	IV	Anti-epileptics
34	IV	Anti-epileptics
35	IV	General anesthetics and pre-anesthetics
36	IV	Alcohols and disulfiram
37	V	Opioid analgesics
38	V	Opioid analgesics and antagonists
39	V	Antidepressants
40	V	Antidepressants
41		Question Discussion

Major issues or Core aspects to be addressed/ covered:

I. **General Pharmacology**
Introduction to Pharmacology, historical landmarks and scope of pharmacology
Nature and source of drugs, essential drugs concept
Routes of drug administration
Agonists, antagonists (competitive and noncompetitive), spare receptors, addiction, tolerance, dependence, tachyphylaxis, idiosyncrasy, allergy
Pharmacokinetics- absorption, distribution, metabolism and excretion, and its factors
Enzyme induction, enzyme inhibition, kinetics of elimination
II. **General Pharmacology**
Types of receptors including G-protien, jak stat, DRC, therapeutic index and parameters
Adverse drug reactions: different types and mechanism
pharmacokinetic and pharmacodynamic Drug interactions
Drug discovery and clinical evaluation of new drugs -Drug discovery phase
preclinical evaluation phase, phases of clinical trials & pharmacovigilance
III. Pharmacology of peripheral nervous system
Organization and function of ANS, Neurohumoral transmission,co-transmission and classification of neurotransmitters.
Parasympathomimetics, Parasympatholytics, Sympathomimetics, sympatholytics classifications, pharmacology of acetyl choline, atropine, adrenaline, beta and alpha blockers, cholinergic and adrenergic recptors.
Neuromuscular blocking agents and skeletal muscle relaxants (peripheral) classification and pharmacology of succinyl choline
Local anesthetic agents classification, uses of LA
Drugs used in myasthenia gravis

Glaucoma- types and drugs used in both conditions
Mydriatic and miotic agents
IV. Pharmacology of central nervous
Neurohumoral transmission in the C.N.S like with GABA, Glutamate, Glycine, serotonin, dopamine.
General anesthetics and pharmacology of lignocaine, drugs used as preanaesthetics
Sedatives& hypnotics – classification, pharmacology of barbiturates and benzodiazepines, mechanism of action of other drugs, barbiturate poisoning, centrally acting muscle relaxants and their actions
Anti-epileptic classification, pharmacology of phenytoin
Methanol, ethanol and flumazenil, disulfiram
V. Pharmacology of central nervous system
Psychopharmacological aspects of antidepressants, pharmacology.
Opioid analgesics and antagonists, opioid receptors, treatment in poisoning
Drug addiction, drug abuse, tolerance and dependence.

Sample Questions

I. **General Pharmacology**
Different routes of administrations with advantages and disadvantages
Scope of pharmacology
Metabolism reactions with examples
Enzyme induction and inhibition with examples
Factors affecting absorption
Note on spare receptors
II. **General Pharmacology**
Note on types and mechanisms of ADR
Pharmacokinetic drug interactions with examples
Phases of drug discovery and clinical trials
Pharmacovigilance
III. Pharmacology of peripheral nervous system
Cholinergic and adrenergic neurotransmission with diagram
Beta blocker classification, its pharmacology and uses
Skeletal muscle relaxant classification and write down the pharmacology of succinyl choline
Uses of local anaesthetics
Myasthenia gravis
Mydriatics and miotics
IV. Pharmacology of central nervous
Note on preanaesthetic medications
Pharmacology of barbiturates

Pharmacology of benzodiazepines
Ethanol poisoning and its treatment
V. Pharmacology of central nervous system
Opioid receptors
Mechanism of action and uses of lithium

INSTITUTE OF PHARMACY & TECHNOLOGY, SALIPUR, CUTTACK, ODISHA			
Programme:	B.PHARM	Sem.:	IV
Name of Course: (*Subject*)	BP 404 T. PHARMACOLOGY-I	Course Code:	BP404T
Teaching faculty of the course	DR. BISHWANATH MISHRA, ASST. PROFESSOR, DEPT. OF PHARMACOLOGY		

Summary of the Lecture Plan

Sl. No.	Unit	Topic
1	I	Metabolism
2	I	Enzyme induction, enzyme inhibition
3	I	Adverse drug reactions
4	I	Adverse drug reactions
5	II	Neurohumoral transmission of cholinergic system
6	II	Parasympathomimetics
7	II	Parasympatholytics
8	II	Neuromuscular blocking agents and skeletal muscle relaxants (peripheral)
9	III	Centrally acting muscle relaxants
10	V	Antipsychotics
11	V	Anti-anxiety agents
12	V	Anti-manics and hallucinogens
13	V	Drugs used in Parkinson's disease and Alzheimer's disease
14	V	CNS stimulants and nootropics
15	I	Drug addiction, drug abuse, tolerance and dependence

Major issues or Core aspects to be addressed/ covered:

I. **General Pharmacology**
Pharmacokinetics- absorption, distribution, metabolism and excretion, and its factors
Enzyme induction, enzyme inhibition, kinetics of elimination
II. **General Pharmacology**
Adverse drug reactions: different types and mechanism
III. Pharmacology of peripheral nervous system
Organization and function of ANS, Neurohumoral transmission, co-transmission andclassification of neurotransmitters.
Parasympathomimetics, Parasympatholytics, classifications, pharmacology of acetyl choline, atropine.
Neuromuscular blocking agents and skeletal muscle relaxants (peripheral) classification and pharmacology of succinyl choline
Local anesthetic agents classification, uses of LA
Drugs used in myasthenia gravis
Glaucoma- types and drugs used in both conditions
Mydriatic and miotic agents
IV. Pharmacology of central nervous

Skeletal muscle relaxants
V. Pharmacology of central nervous system
Psychopharmacological aspects of Antipsychotics, anti-anxiety agents, anti-manics and hallucinogens and pharmacology.
Parkinsons and Alzheimer's disease- classification of drus and its pharmacology
Drug addiction, drug abuse, tolerance and dependence.

Sample Questions

I. **General Pharmacology**
Enzyme induction and inhibition with examples
II. **General Pharmacology**
Note on types and mechanisms of ADR
Pharmacokinetic drug interactions with examples
III. Pharmacology of peripheral nervous system
Cholinergic and adrenergic neurotransmission with diagram
Skeletal muscle relaxant classification and write down the pharmacology of succinyl choline
Uses of local anaesthetics
Myasthenia gravis
Mydriatics and miotics
IV. Pharmacology of central nervous
Note on preanaesthetic medications
V. Pharmacology of central nervous system
Examples of centrally acting muscle relaxants

INSTITUTE OF PHARMACY & TECHNOLOGY, SALIPUR,
CUTTACK, ODISHA

Programme:	B.PHARM	Sem.:	IV
Name of Course: (*Subject*)	**Pharmacognosy and phyto chemistry -1**	Course Code:	**BP405T**
Teaching faculty of the course	**Dr. Sujit Dash**		

	Topic to be covered	**Hours**
1.	Traditional systems of medicine namely homeopathy	1+1 hrs
2.	Traditional systems of medicine namely Ayurveda	1+1 hrs
3.	Traditional systems of medicine namely Siddha	1+1 hrs
4.	Traditional systems of medicine namely Unani	1+1 hrs
5.	Role of Pharmacognosy in allopathy and Chinese systems of medicine	1+1 hrs
6.	Definition classification properties and test for identification of Alkaloids	1+1 hrs
7.	Definition classification properties and test for identification of Glycosides	1+1 hrs
8.	Definition classification properties and test for identification of Flavonoids	1+1 hrs
9.	Definition classification properties and test for identification of Tannins	1+1 hrs
10.	Definition classification properties and test for identification of Terpeness and terpenoids	1+1 hrs
11.	Definition classification properties and test for identification of Volatile oil	1+1 hrs
12.	Definition classification properties and test for identification of Resins	1+1 hrs
13.	Study of biological source chemical nature and uses of drugs of natural origin containing following drugs **Plant Products** Fibers Cotton Jute Hemp	1+1 hrs
14.	Natural allergens	1+1 hrs
15.	**Primary metabolites:** General introduction, detailed study with respect to chemistry sources preparation evaluation preservation storage therapeutic used and commercial utility as Pharmaceutical Aids andor Medicines for the following Primary metabolites **Carbohydrates** Acacia Agar	1+1 hrs
16.	**Carbohydrates** Tragacanth Honey	1+1 hrs
17.	**Proteins and Enzymes** Gelatin casein	1+1 hrs

18.	**Proteins and Enzymes** proteolytic enzymes Papain Bromelain	1+1 hrs
19.	**Proteins and Enzymes** Serratiopeptidase urokinase	1+1 hrs
20.	**Proteins and Enzymes** streptokinase pepsin	1+1 hrs
21.	**Lipids Waxes fats fixed oils** Castor oil Chaulmoogra oil	1+1 hrs
22.	**Lipids Waxes fats fixed oils** Wool Fat Bees Wax	1+1 hrs
23.	**Marine Drugs** Novel medicinal agents from marine sources	1+1 hrs
24.	**Marine Drugs** Novel medicinal agents from marine sources Edible vaccines	1+1 hrs
25.	Edible vaccines	1+1 hrs
26.	Edible vaccines hybridization with reference to medicinal plants	1+1 hrs
27.	Hallucinogens Teratogens	1+1 hrs
28.	Conservation of medicinal plants	1+1 hrs

INSTITUTE OF PHARMACY & TECHNOLOGY, SALIPUR,
CUTTACK, ODISHA

Programme:	B.PHARM	Sem.:	IV
Name of Course: (*Subject*)	**Pharmacognosy and phyto chemistry -1**	Course Code:	**BP405T**
Teaching faculty of the course	**Mr. Deepak Kumar Hati**		

	Topic to be covered	**Hours**
1.	Definition history scope and development of Pharmacognosy	1+1 hrs
2.	Sources of Drugs Plants Animals Marine and Tissue culture	1+1 hrs
3.	Organized drugs	1+1 hrs
4.	unorganized drugs dried latex dried juices dried extracts gums and mucilages oleoresins and oleogum resins	1+1 hrs
5.	**Classification of drugs:** Alphabetical morphological taxonomical chemical pharmacological chemo and sero	1+1 hrs
6.	**Classification of drugs:** Alphabetical morphological taxonomical chemical pharmacological chemo and sero	1+1 hrs
7.	taxonomical classification of drugs	1+1 hrs
8.	**Quality control of Drugs of Natural Origin:** Adulteration of drugs of natural origin	1+1 hrs
9.	Evaluation by organoleptic microscopic	1+1 hrs
10.	Evaluation by organoleptic microscopic	1+1 hrs
11.	Evaluation by physical method	1+1 hrs
12.	Evaluation by chemical and biological methods and properties	1+1 hrs
13.	Quantitative microscopy of crude drugs including lycopodium spore method leaf constants camera lucida and diagrams of microscopic objects to scale with camera lucida	1+1 hrs
14.	**Cultivation, Collection, Processing and storage of drugs of natural origin:** Cultivation and Collection of drugs of natural origin	1+1 hrs
15.	**Processing and storage of drugs of natural origin**	1+1 hrs
16.	Factors influencing cultivation of medicinal plants	1+1 hrs
17.	Factors influencing cultivation of medicinal plants	1+1 hrs
18.	Plant hormones and their applications auxin gibberllin cytokinin abscisic acid	1+1 hrs
19.	Plant hormones and their applications salicylic acid ethylene jasmonates brassinosteroids and peptides.	1+1 hrs

20.	Polyploidy mutation with reference to medicinal plants	1+1 hrs
21.	hybridization with reference to medicinal plants	1+1 hrs
22.	**Plant tissue culture:** Historical development of plant tissue	1+1 hrs
23.	Tissue culture types of cultures	1+1 hrs
24.	Nutritional requirements growth and their maintenance PART I	1+1 hrs
25.	Nutritional requirements growth and their maintenance PART II	1+1 hrs
26.	Applications of plant tissue culture in pharmacognosy	1+1 hrs
27.	Definition history scope and development of Pharmacognosy	1+1 hrs
28.		

INSTITUTE OF PHARMACY & TECHNOLOGY, SALIPUR			
Programme:	B.Pharm	Sem.:	6th
Name of Course: (*Subject*)	Medicinal Chemistry -III	Course Code:	BP601T
Teaching faculty of the course	Dr. P.K.Sinhamahapatra & Dr. S.S.Kar		

Summary of the Lecture Plan

Unit	Topic	Hours
UNIT- I	**Antibiotics**	**10 hours**
	Historical background	1 hour
	β-Lactam antibiotics: Penicillin,	1 hour
	Penicillin,	1 hour
	Cepholosporins,	1 hour
	Cepholosporins,	1 hour
	β- Lactamase inhibitors	1 hour
	Monobactams	1 hour
	Aminoglycosides: Streptomycin, Neomycin & Kanamycin	1 hour
	Tetracyclines: Tetracycline, Oxytetracycline,	1 hour
	Tetracyclines: Chlortetracycline, Minocycline, Doxycycline	1 hour
UNIT- II	**Antibiotics**	**09 hours**
	Macrolide: Erythromycin Clarithromycin, Azithromycin.	1 hour
	Miscellaneous: Chloramphenicol*, Clindamycin	1 hour
	Prodrugs: Basic concepts and application of prodrugs design.	1 hour
	Prodrugs: Basic concepts and application of prodrugs design.	1 hour
	Antimalarials: Etiology of malaria.	1 hour
	Quinolines: SAR, Quinine sulphate, Chloroquine*, Amodiaquine,	1 hour
	Quinolines: Primaquine phosphate, Pamaquine*, Quinacrine hydrochloride, Mefloquine.	1 hour
	Biguanides and dihydro triazines: Cycloguanil pamoate, Proguanil.	1 hour
	Miscellaneous: Pyrimethamine, Artesunete, Artemether, Atovoquone.	1 hour
	Discussion, question & answer	1 hour

Unit	Topic	Hours
UNIT- III	**Anti-tubercular Agents** **Synthetic anti tubercular agents:** Isoniozid, Ethionamide, Ethambutol, Pyrazinamide, Para amino salicylic acid.	2 hours
	Anti tubercular antibiotics: Rifampicin, Rifabutin, Cycloserine Streptomycine, Capreomycin sulphate.	2 hours
	Urinary tract anti-infective agents **Quinolones:** SAR of quinolones, Nalidixic Acid,Norfloxacin, Enoxacin, Ciprofloxacin*, Ofloxacin, Lomefloxacin, Sparfloxacin, Gatifloxacin, Moxifloxacin	3 hours

	Miscellaneous: Furazolidine, Nitrofurantoin*, Methanamine.	1 hour
	Antiviral agents: Amantadine hydrochloride, Rimantadine hydrochloride, Idoxuridine trifluoride, Acyclovir*, Gancyclovir, Zidovudine, Didanosine, Zalcitabine, Lamivudine, Loviride, Delavirding, Ribavirin, Saquinavir, Indinavir, Ritonavir.	3 hours
UNIT- IV	**Antifungal agents:** **Antifungal antibiotics:** Amphotericin-B, Nystatin, Natamycin, Griseofulvin.	2 hours
	Synthetic Antifungal agents: Clotrimazole, Econazole, Butoconazole, Oxiconazole Tioconozole, Miconazole, Ketoconazole, Terconazole, Itraconazole, Fluconazole, Naftifine hydrochloride, Tolnaftate.	2 hours
	Anti-protozoal Agents: Metronidazole, Tinidazole, Ornidazole, Diloxanide, Iodoquinol, Pentamidine Isethionate, Atovaquone, Eflornithine.	2 hours
	Anthelmintics: Diethylcarbamazine citrate, Thiabendazole, Mebendazole, Albendazole, Niclosamide, Oxamniquine, Praziquantal, Ivermectin.	2 hours
	Sulphonamides and Sulfones Historical development, chemistry, classification and SAR of Sulfonamides:Sulphamethizole, Sulfisoxazole, Sulphamethizine, Sulfacetamide, Sulphapyridine, Sulfamethoxaole, Sulphadiazine, Mefenide acetate,Sulfasalazine	2 hours
	Folate reductase inhibitors: Trimethoprim, Cotrimoxazole. **Sulfones:** Dapsone.	1 hour
UNIT – V	**Introduction to Drug Design** Various approaches used in drug design.	1 hour
	Physicochemical parameters used in quantitative structure activity relationship (QSAR) such as partition coefficient, Hammet's electronic parameter, Tafts steric parameter and Hansch analysis.	2 hours
	Pharmacophore modeling and docking techniques.	2 hours
	Combinatorial Chemistry: Concept and applications chemistry: solid phase and solution phase synthesis.	2 hours

INSTITUTE OF PHARMACY & TECHNOLOGY, SALIPUR			
Programme:	B.Pharm	Sem.:	VITH
Name of Course: (*Subject*)	Pharmacology III	Course Code:	BP602T
Teaching faculty of the course	Dr. Ranjan Kumar Giri & Dr. Chandra Sekhar Barik		

Summary of the Lecture Plan

Unit	Topic	Hours
UNIT- I		
1	Anti -asthmatic drugs	1 hour
2	Drugs used in the management of COPD	1 hour
3	Expectorants and antitussives	1 hour
4	Nasal decongestants	1 hour
5	Respiratory stimulants	1 hour
6	Antiulcer agents	1 hour
7	Drugs for diarrhoea	1 hour
8	Drugs for constipation	1 hour
9	Appetite stimulants and suppressants	1 hour
10	Digestants and carminatives	1 hour
11	Emetics	1 hour
12	Anti-emetics	1 hour
UNIT- II		
1	General principles of chemotherapy.	1 hour
2	Sulfonamides and cotrimoxazole.	1 hour
3	Penicillins	1 hour
4	Cephalosporins	1 hour
5	chloramphenicol	1 hour
6	macrolides	1 hour
7	quinolones and fluoroquinolins	1 hour
8	tetracycline and aminoglycosides	1 hour
UNIT- III		
1	Antitubercular agents	1 hour
2	Antileprotic agents	1 hour
3	Antifungal agents	1 hour
4	Antiviral drugs	1 hour
5	Anthelmintics	1 hour
6	Antimalarial drugs	1 hour

	Antiamoebic agents	1 hour
UNIT- IV		
1	Urinary tract infections and sexually transmitted diseases	1 hour
2	Chemotherapy of malignancy.	1 hour
3	Immunostimulants	1 hour
4	Immunosuppressant	1 hour
UNIT- V		
1	Definition and basic knowledge of acute toxicity.	1 hour
2	subacute and chronic toxicity.	1 hour
3	Definition and basic knowledge of genotoxicity,	1 hour
4	carcinogenicity, teratogenicity and mutagenicity	1 hour
5	General principles of treatment of poisoning	1 hour
6	Clinical symptoms and management of barbiturates,	1 hour
7	Clinical symptoms and management of morphine poisoning	1 hour
8	Clinical symptoms and management of organophosphosphorus poisoning	1 hour
9	Clinical symptoms and management of lead poisoning	1 hour
10	Clinical symptoms and management of mercury poisoning	1 hour
11	Clinical symptoms and management of arsenic poisoning.	1 hour
12	Chronopharmacology a. Definition of rhythm and cycles.	1 hour
13	Biological clock and their significance leading to chronotherapy.	1 hour
14	Old question discussion	1 hour
15	Old question discussion	1 hour

INSTITUTE OF PHARMACY & TECHNOLOGY, SALIPUR			
Programme:	B.Pharm	Sem.:	6th
Name of Course: (*Subject*)	**HERBAL DRUG TECHNOLOGY**	Course Code:	BP603T
Teaching faculty of the course	Dr. Sujit Kumar Dash & Dr. Dipak Kumar Hati		

Lecture Plan

Unit	Topic	Hours
UNIT- I	**Evaluation of Drugs** WHO & ICH guidelines for the assessment of herbal drugs Stability testing of herbal drugs.	**1**
1	**Evaluation of Drugs** WHO & ICH guidelines for the assessment of herbal drugs Stability testing of herbal drugs.	1
2	**Evaluation of Drugs** WHO & ICH guidelines for the assessment of herbal drugs Stability testing of herbal drugs.	1
3	**Patenting and Regulatory requirements of natural products:** Definition of the terms: Patent, IPR, Farmers right, Breeder's right, Bioprospecting and Biopiracy	1
4	**Patenting and Regulatory requirements of natural products:** Definition of the terms: Patent, IPR, Farmers right, Breeder's right, Bioprospecting and Biopiracy	1
5	**Patenting and Regulatory requirements of natural products** Patenting aspects of Traditional Knowle31.1.20dge and Natural Products. Case study of Curcuma & Neem	1
6	**Regulatory Issues** Regulations in India ASU DTAB ASU DCC	1
7	**Regulatory Issues** Regulation of manufacture of ASU drugs Schedule Z of Drugs and Cosmetics Act for ASU drugs	1
8	**General Introduction to Herbal Industry** Herbal drugs industry Present scope and future prospects A brief account of plant based industries and institutions involved in work on medicinal and aromatic plants in India	1
9	**General Introduction to Herbal Industry** A brief account of plant based industries and institutions involved in work on medicinal and aromatic plants in India	1
10	S**chedule T GoodManufacturing Practice of Indian systems of medicine** Components of GMP Schedule T and its objectives Infrastructural requirements working space storage area machinery and equipments	1
11	S**chedule T GoodManufacturing Practice of Indian systems of medicine**	1

	Infrastructural requirements working space storage area machinery and equipments	
12	**Schedule T GoodManufacturing Practice of Indian systems of medicine** standard operating procedures health and hygiene documentation and records.	**1**
13	**Herbal Cosmetics** Sources and description of raw materials of herbal origin used via fixed oils waxes gums	1
14	**Herbal Cosmetics** Sources and description of raw materials of herbal origin used via colours perfumes protective agents	1
15	**Herbal Cosmetics** Sources and description of raw materials of herbal origin used via, bleaching agents, antioxidants in products such as skin Care hair care and oral hygiene products	1
16	**Herbal excipients** Herbal Excipients Significance of substances of natural origin as excipients colorants Sweeteners	1
17	**Herbal excipients** Herbal Excipients Significance of substances of natural origin as excipients binders diluents	1
18	**Herbal excipients** Herbal Excipients Significance of substances of natural origin as viscosity builders disintegrants	1
19	**Herbal excipients** Herbal Excipients Significance of substances of natural origin as flavors and perfumes	1
20	**Herbal formulations** Conventional herbal formulations like syrups mixtures phytosomes	1
21	**Herbal formulations :** Conventional herbal formulations like tablets and Novel dosage forms like phytosomes	1
22	**Herbs as raw materials** Definition of herb Herbal medicine, herbal medicinal product Herbal drug preparation Source of Herbs	1
23	**Herbs as raw materials** herbal medicinal product Herbal drug preparation Source of Herbs	1
24	**Herbs as raw materials** Selection, identification and authentication of herbal materials	1
25	**Herbs as raw materials** Processing of herbal raw material	1
26	**Biodynamic Agriculture** Good agricultural practices in cultivation of medicinal plants including Organic farming	1

27	**Biodynamic Agriculture** Pest and Pest management in medicinal plants: Biopesticides Bioinsecticides.	1
28	**Indian Systems of Medicine** Basic principles involved in Ayurveda Siddha	1
29	**Indian Systems of Medicine** Basic principles involved in Unani and Homeopathy	1
30	**Indian Systems of Medicine** Preparation and standardization of Ayurvedic formulations viz Aristas and Asawas	1
31	**Indian Systems of Medicine** Preparation and standardization of Ayurvedic formulations Ghutika and Churna	1
32	**Indian Systems of Medicine** Preparation and standardization of Ayurvedic formulations Bhasma	1
33	**Nutraceuticals** General aspects Market growth scope and types of products available in the market	1
34	**Nutraceuticals** Health benefits and role of Nutraceuticals in ailments like Diabetes CVS diseases	1
35	**Nutraceuticals** Health benefits and role of Nutraceuticals in ailments like Cancer Irritable bowel syndrome	1
36	**Nutraceuticals** Health benefits and role of Nutraceuticals in ailments like various Gastro intestinal diseases	1
37	**Nutraceuticals** Study of following herbs as health food Alfaalfa Chicory	1
38	**Nutraceuticals** Study of following herbs as health food Ginger Fenugreek	1
39	**Nutraceuticals** Study of following herbs as health food Garlic Honey	1
40	**Nutraceuticals** Study of following herbs as health food Amla Ginseng	1
41	**Nutraceuticals** Study of following herbs as health food Ashwagandha Spirulina	1
42	**Herbal Drug and Herb Food Interactions** General introduction to interaction and Classification Study of following drugs and their possible side effects and interactions Hypercium kavakava	1
43	**Herbal Drug and Herb Food Interactions** General introduction to interaction and classification Study of following drugs and their possible side effects and interactions Ginkobiloba Ginseng Garlic	1
44	**HerbalDrug and Herb Food Interactions** General introduction to interaction and classification Study of following drugs and their possible side effects and interactions	1

	Pepper and Ephedra	
45	**Doubt class**	1

INSTITUTE OF PHARMACY & TECHNOLOGY, SALIPUR			
Programme:	B. Pharm	Sem.:	VI
Name of Course: (*Subject*)	Biopharmaceutics and Pharmacokinetics	Course Code:	BP 604 T
Teaching faculty of the course	Dr. Bhabani Shankar Nayak and Dr. Amaresh Chandra Sahoo		

Summary of the Lecture Plan

Topic	Lectures	Hours
Introduction to Biopharmaceutics	Mechanisms of drug absorption through GIT	1
	Factors influencing drug absorption though GIT	3
	Absorption of drug from Non per oral extra-vascular routes	1
	Distribution of drugs Tissue permeability of drugsand binding of drugs	2
	Protein binding of drugs, factors affecting protein-drug binding and Kinetics of protein binding	2
	Clinical significance of protein binding of drugs, Apparent volume of drug distribution	1
Biotransformation	Phase I Bioransformaion	2
	Phase II Bioransformaion	2
	Renal excretion of drugs, factors affecting renal excretion of drugs	1
	Renal clearance and Non renal routes of drug excretion of drugs	1
	Objectives of bioavailability studies, absolute and relative bioavailability, measurement of bioavailability,	1
	In-vitro drug dissolution models, in- vitro, in-vivo correlations	1
	bioequivalence studies, methods to enhance the bioavailability	2
Pharmacokinetics	Introduction to Pharmacokinetics models ,Compartment model	2
	Non compartment models, physiological models	1
	One compartment open model Intravenous Injection (Bolus)	2
	One compartment open model Intravenous infusion	1
	One compartment open model extra vascular administrations	2

	calculations KE from plasma and urinary excretiondata	2
Multicompartment models	Two compartment open model. IV bolus	2
	Multiple – Dosage Regimens	2
	Repititive Intravenous injections – One Compartment Open Model	2
	Repititive Extravascular dosing – One Compartment Open model	2
Nonlinear Pharmacokinetics	Introduction	1
	Factors causing Non-linearity	3
	Michaelis-menton method of estimating parameters	3

INSTITUTE OF PHARMACY & TECHNOLOGY, SALIPUR			
Programme:	B. PHARM	Sem.:	VI semester
Name of Subject	PHARMACEUTICAL BIOTECHNOLOGY	Course Code:	BP606 T
Name of Faculty	Dr. A.K.Prusty		

Lecture Plan

Unit	Topic to be discussed	Hours
UNIT I	Brief introduction to Biotechnology with reference to Pharmaceutical Sciences.	1
	Enzyme Biotechnology	2
	Biosensors	2
	Brief introduction to Protein Engineering.	2
	Use of microbes in industry.	2
	Basic principles of genetic engineering	1
UNIT II	cloning vectors, restriction endonucleases and DNA ligase.	2

	Recombinant DNA technology	2
	Application of r DNA technology and genetic engineering	2
	PCR	2
	Types of immunity	2
UNIT III	Immunoglobulins	1
	MHC	1
	Hypersensitivity reactions, Immune stimulation and Immune suppressions.	2
	bacterial vaccines, toxoids, viral vaccines, antitoxins, serum-immuno blood derivatives and other products relative to immunity.	2
	official vaccines	2
	Hybridoma technology	2
UNIT IV	Immuno blotting techniques	2
	Microbial genetics	3
	Microbial biotransformation and applications.	3
	Mutation	1

UNIT V	Fermentation methods	1
	Large scale production fermenter design	1
	Blood products	2
	penicillins, citric acid, Vitamin B12, Glutamic acid, Griseofulvin	2

INSTITUTE OF PHARMACY & TECHNOLOGY, SALIPUR			
Programme:	B. PHARM	Sem.:	VI semester
Name of Subject	PHARMACEUTICAL QUALITY ASSURANCE	Course Code:	BP606 T
Name of Faculty	Dr. Biswaranjan Mohanty & Dr. Susant Kumar Behera		

Lecture Plan

Topic	Lectures	Hours
Quality Assurance and Quality Management concepts	Definition and concept of Quality control,	2
	Quality assurance and GMP	2
Total Quality Management (TQM)	Definition, elements, philosophies	3
ICH Guidelines, Quality by design (QbD), ISO 9000 & ISO 14000, NABL accreditation	purpose, participants, process of harmonization	3
	Brief overview of QSEM, with special emphasis on Q-series guidelines, ICH stability testing guidelines	3
	Definition, overview, elements of QbD program, tools	2
	Overview, Benefits, Elements, steps for registration Principles and procedures for NABL	3
Organization and personnel, Premises,	Personnel responsibilities, training, hygiene and personal records. Design, construction and plant layout, maintenance, sanitation, environmental control, utilities and maintenance of sterile areas, control of contamination.	6
Quality Control, Good Laboratory Practices	Quality control test for containers, rubber closures and secondary packing materials.	3
	General Provisions, Organization and Personnel, Facilities, Equipment, Testing Facilities Operation, Test and Control Articles, Protocol for Conduct of a Nonclinical Laboratory Study, Records and Reports, Disqualification of Testing Facilities	6
Complaints, Document maintenance in pharmaceutical industry	Complaints and evaluation of complaints	1
	Handling of return good, recalling and waste disposal.	2
Calibration and Validation	Introduction, definition and general principles of calibration, qualification and validation, importance and scope of validation	3
Equipment's and raw materials,	Equipment's selection, purchase specifications, maintenance, purchase specifications and maintenance of stores for raw materials.	4
Warehousing	Good warehousing practice, materials management	2

INSTITUTE OF PHARMACY & TECHNOLOGY, SALIPUR			
Programme:	B. PHARM	Sem.:	VIII semester
Name of Subject	**BIOSTATISITCS AND RESEARCH METHODOLOGY**	Course Code:	BP 801T
Name of Faculty	Dr. H.K.Sundeep Kumar ,Dr.satyajit Panda, Dr. Bhabani S Nayak		

Lecture Plan

Unit	Topic	Hours
Unit I		
1	**Introduction:** Statistics, Biostatistics, Frequency distribution	1 hour
2	**Measures of central tendency**: Mean, Median, Mode-Pharmaceutical examples	2 hour
3	**Measures of dispersion**: Dispersion, Range, standard deviation, Pharmaceutical problems	3 hour
4	**Correlation**: Definition, Karl Pearson's coefficient of correlation, Multiple correlation - Pharmaceuticals examples	5 hour
Unit-II		
1	Definition of probability, Binomial distribution properties and problems	1 hour
2	Normal distribution properties and problems	1 hour
3	Poisson's distribution properties and problems	1 hour
4	Sample, Population, large sample, small sample with pharmaceutical examples	1 hour
5	Null hypothesis, alternative hypothesis with pharmaceutical examples	1 hour
6	sampling, essence of sampling, types of sampling with pharmaceutical example	1 hour
7	Error-I type, Error-II type, Standard error of mean (SEM) with pharmaceutical examples.	1 hour
8	Parametric tests t-test(Sample, Pooled or Unpaired and Paired)	1 hour
9	ANOVA	1 hour
10	ANOVA	1 hour
11	Least Significance difference	1 hour
Unit III		1 hour
1	Non parametric tests- Wilcoxon Rank Sum Test with problems	1 hour
2	Mann-Whitney U test, Kruskal-Wallis test with problems	1 hour
3	Friedman Test with problems	1 hour
4	Need for research, Need for design of Experiments.	1 hour
5	Experiential Design Technique, plagiarism	1 hour
6	Histogram, Pie Chart, Cubic Graph	1 hour
7	response surface plot, Counter Plot graph	1 hour
8	Sample size determination and Power of a study	1 hour
9	Report writing and presentation of data.	1 hour
10	Protocol, Cohorts studies.	1 hour
11	Observational studies	1 hour
12	Experimental studies.	1 hour
13	Designing clinical trial, various phases.	1 hour
UNIT IV		
1	Introduction to Statistics and biostatistics	

2	Population, sample, Descriptive statistics, Inferential statistics	1 hour
3	Introduction to Design of Experiments	1 hour
4	Drawbacks of OFAT with example	1 hour
5	Advantages of experimental design	1 hour
6	Pin pointing an experimentation with pharmaceutical dosage form example	1 hour
7	Introduction to surface response methodology	1 hour
8	Use of surface response curve in Optimization Techniques with pharmaceutical example	1 hour
9	Introduction to central composite design	1 hour
10	Introduction to Historical design	1 hour
11	Introduction advantages of factorial design	1 hour
12	2 raise to 2 full factorial design used in optimization	1 hour
13	3 raise to 2 full factorial design used in optimization	1 hour
UNIT V		1 hour
		1 hour
1	Design and Analysis of experiments: Introduction	1 hour
2	**Factorial Design:** Definition, 2^2 , 3^2 Advantage of factorial design	3 hours
3	**Response Surface methodology**: Central composite design, Historical design, Optimization Techniques	4 hours

INSTITUTE OF PHARMACY & TECHNOLOGY, SALIPUR			
Programme:	B. PHARM	Sem.:	VIII semester
Name of Subject	**SOCIAL AND PREVENTIVE PHARMACY**	Course Code:	BP 802T
Name of Faculty	Dr. A.K.Senapati and Dr. C.S. Barik		

Lecture Plan

Unit	Topic	Hours
UNIT I	Definition concepts and evaluation of public health	1 Hour
1	Concept of prevention and control of disease	1 Hour
2	Concept of prevention and control of disease	1 Hour
3	Social causes of diseases and social problems of the sick	1 Hour
4	Food in relation to nutrition and health	1 Hour
5	Food in relation to nutrition and health Balanced diet Balanced diet	1 Hour
6	Nutritional deficiencies Vitamin deficiencies Malnutrition and its prevention	1 Hour
7	Socio cultural factors related to health and disease	1 Hour
8	Impact of urbanization on health and disease, Poverty and health	1 Hour
9	Impact of urbanization on health and disease Poverty and health	1 Hour
10	Personal hygiene and health care avoidable habits	1 Hour
UNIT-II		
11	**Preventive medicine:** General principles of prevention - Introduction	1 Hour
12	Control of diseases -cholera, SARS, Ebola virus	1 Hour
13	Control of diseases -Influenza, acute respiratory infections, malaria	1 Hour
14	Control of diseases – chicken guinea, dengue,	1 Hour
15	Control of diseases - lymphatic filariasis, pneumonia, hypertension	1 Hour
16	Control of diseases - diabetes mellitus	1 Hour
17	Control of diseases - cancer	1 Hour
18	Drug addiction-drug substance abuse	1 Hour
19	Drug addiction-drug substance abuse	1 Hour
UNIT-III	**National health programs, its objectives, functioning and outcome:**	
20	HIV AND AIDS control programme	1 Hour
21	TB, Integrated disease surveillance program (IDSP),	1 Hour
22	National leprosy control programme,	1 Hour
23	National mental health program	1 Hour
24	National programme for prevention and control of deafness	1 Hour
25	Universal immunization programme	1 Hour
26	National programme for control of blindness	1 Hour
27	Pulse polio programme	1 Hour
UNIT-IV		1 Hour
28	National health intervention programme for mother and child	1 Hour
29	National health intervention programme for mother and child	1 Hour
30	National family welfare programme	1 Hour
31	National tobacco control programme	1 Hour
32	National Malaria Prevention Program	1 Hour

33	National programme for the health care for the elderly	1 Hour
34	Social health programme	1 Hour
35	Role of WHO in Indian national program	1 Hour
UNIT-V		
36	Community services in rural, urban health	1 Hour
37	Community services in rural, urban health	1 Hour
39	Functions of PHC	1 Hour
40	Improvement in rural sanitation, national urban health mission	1 Hour
41	Community services school health	1 Hour
42	Community services school health	1 Hour
43	Health promotion and education in school	1 Hour
44	Question Discussion	1 Hour

INSTITUTE OF PHARMACY & TECHNOLOGY, SALIPUR			
Programme:	B. PHARM	Sem.:	VIII semester
Name of Subject	**PHARMA MARKETING MANAGEMENT**	Course Code:	BP 803ET
Name of Faculty	Dr. Bibaswan Mishra and Dr. S.K.Mahapatra		

Lecture Plan

Unit	Topic	Hours
Unit I		
1	Definition, general concepts and scope of marketing	1 hour
2	Distinction between marketing &selling; Marketing environment	1 hour
3	Industry and competitive analysis; Analyzing consumer buying behavior	1 hour
4	Industrial buying behavior	1 hour
5	Quantitative and qualitative aspects; size and composition of the market	1 hour
6	Demographic descriptions and socio-psychological characteristics of the consumer	1 hour
7	Market segmentation& targeting	1 hour
8	Consumer profile; Motivation and prescribing habits of the physician	1 hour
9	Patients' choice of physician and retail pharmacist	1 hour
10	Analyzing the Market, Role of market research	1 hour
11	Classification, product line	1 hour
12	Product mix decisions	1 hour
13	Product life cycle	1 hour
14	Product portfolio analysis	1 hour
15	New product decisions	1 hour
16	Product positioning	1 hour
17	Product branding, packaging, and labeling decisions	1 hour
18	Product management in the pharmaceutical industry	1 hour
19	Methods, determinants of promotional mix	1 hour
20	Determinants of promotional mix	1 hour
21	Promotional budget	1 hour
22	An overview advertising, direct mail, journals,	1 hour
23	An overview of personal selling,	1 hour
24	An overview of medical exhibition, public relations	1 hour
25	An overview of sampling, retailing,	1 hour
26	Online promotional techniques for OTC Products.	1 hour
27	Designing channel, channel members,	1 hour
28	Selecting the appropriate channel, conflict in channels,	1 hour
29	Physical distribution management:	1 hour
30	Strategic importance, tasks in physical distribution management.	1 hour
31	Duties of PSR, purpose of detailing,	1 hour
32	Selection and training of PSR	1 hour
33	Supervising, norms for customer calls, motivating,	1 hour
34	Evaluating, compensation and future prospects of the PSR.	1 hour

35	Meaning, importance, objectives, determinants of price	1 hour
36	Pricing methods and strategies	1 hour
37	Issues in price management in pharmaceutical industry	1 hour
38	An overview of DPCO (Drug Price Control Order)	1 hour
39	Retail price fixing calculation.	1 hour
40	NPPA (National Pharmaceutical Pricing Authority)	1 hour
41	Emerging concepts in marketing, Vertical Marketing)	1 hour
42	Horizontal marketing	1 hour
43	Rural Marketing; Consumerism	1 hour
44	Industrial Marketing	1 hour
45	Global Marketing.	1 hour

INSTITUTE OF PHARMACY & TECHNOLOGY, SALIPUR			
Programme:	B. PHARM	Sem.:	VIII semester
Name of Subject	**COSMETIC SCIENCE**	Course Code:	BP 809ET
Name of Faculty	Dr. Biswaranjan Mohanty , Dr. Swalin Parija and Dr. S.K.Behera		

Lecture Plan

No of Lect	Topic	Hours
1	Classification of cosmetic and cosmeceutical products	1 hour
2	Classification of cosmetic and cosmeceutical products	1 hour
3	Definition of cosmetics as per Indian and EU regulations	1 hour
4	Evolution of cosmeceuticals from cosmetics	1 hour
5	cosmetics as quasi and OTC drugs	1 hour
6	**Cosmetic excipients:** Surfactants	1 hour
7	Rheology modifiers, humectants, emollients, preservatives	1 hour
8	Classification and application of different excipients	1 hour
9	Basic structure and function of skin.	1 hour
10	Skin care product.	1 hour
11	Basic structure of hair. Hair growth cycle	1 hour
12	Hair care product	1 hour
13	Common problem associated with teeth and gums	1 hour
14	Different products for mouth cavity	1 hour
15	Principles of formulation and building blocks of skin care products:	1 hour
16	Face wash	1 hour
17	Moisturizing cream	1 hour
18	Cold Cream	1 hour
19	Vanishing cream	1 hour
20	Application of these products in formulation of cosmecuticals	1 hour
21	Antiperspants & deodorants	1 hour
22	Actives & mechanism of action	1 hour
23	Principles of formulation and building blocks of Hair care products	1 hour
24	Conditioning shampoo	1 hour
25	Hair conditioner	1 hour
26	Anti-dandruff shampoo	1 hour
27	Hair oils	1 hour
28	Chemistry and formulation of Para-phylene diamine based hair dye	1 hour
29	Principles of formulation and building blocks of oral care products	1 hour
30	Toothpaste for bleeding gums, sensitive teeth	1 hour
31	Teeth whitening, Mouthwash	1 hour
32	Oily and dry skin, causes leading to dry skin, skin moisturisation.	1 hour
33	Basic understanding of the terms Comedogenic, dermatitis	1 hour
34	Cosmetic problems associated with Hair and scalp: Dandruff, Hair fall causes	1 hour
35	Cosmetic problems associated with skin: blemishes, wrinkles, acne, prickly heat and body odor	1 hour

36	Antiperspirants and Deodorants- Actives and mechanism of action	1 hour
37	Sun protection, Classification of Sunscreens and SPF	1 hour
38	Role of herbs in cosmetics	1 hour
39	Skin Care: Aloe and turmeric, Hair care: Henna and amla.	1 hour
40	Oral care: Neem and clove	1 hour
41	**Analytical cosmetics:** BIS specification and analytical methods for shampoo, skin cream and toothpaste	1 hour
42	Principles of sebumeter, corneometer. Measurement of TEWL, Skin Color, Hair tensile strength, Hair combing properties	1 hour
43	Soaps,and syndet bars. Evolution and skin benfits.	1 hour
44	Question Paper	1 hour
45	Question Paper	1 hour

Institute of Pharmacy & Technology, Salipur

B.PHARM THESIS (ADMISSION BATCH-2019-2023)				
Sl.No	**Name**	**Regd.No**	**Project Title**	**Guide**
1	Abhijit Sahoo	1903257001	A Trial Comparison Study of Antioxidant Available in the Market	Dr. Sunil Kumar Kanungo
2	Abinash Swain	1903257003	A Trial Comparison Study of Antioxidant Available in the Market	Dr. Sunil Kumar Kanungo
3	Aditya Das	1903257004	Biosynthesis of Silver Nano Particles Using Millettia Pinnata L. Plant Extract and Its Antimicrobial Study	Dr.Sujit Kumar Sahu
4	Amrit Chatterjee	1903257005	Biosynthesis of Silver Nano Particles Using Millettia Pinnata L. Plant Extract and Its Antimicrobial Study	Dr.Sujit Kumar Sahu
5	Anil Kumar Moharana	1903257006	Formulation and Evaluation of Diclofenac Sodium Dispersible Tablets Using Different Super Disintegrants By Direct Compression Method	Dr.Sushant Kumar Behera
6	Ankita Mahanta	1903257007	Design and Development of Poorly Soluble Drug of Rosuvastatin Using Liquisolid Compact Technique	Dr.Prabhat Kumar Sahoo
7	Anup Kumar Satapathy	1903257008	Gymnanthemum amygdalinum: A Plant with Potent Antidiabetic Prop	Dr.Chandra Sekhar Barik
8	Aparna Mohanty	1903257009	Standardization of "Bilwadi Churna" An Ayurvedic polyherbal formul	Mr.Deepak Kumar Hati
9	Arpit Mohanty	1903257010	UV Spectrophotometric Estimation of Emtricitabine in Bulk and it's Capsule Dosage Form	Mrs.Bipasha Behera
10	Ashish Mohapatra	1903257011	Gymnanthemum amygdalinum: A Plant with Potent Antidiabetic Prop	Dr.Chandra Sekhar Barik
11	Avisek Rout	1903257012	Formulation and evaluation of Floating Tablet of Diclofenac Sodium	Dr.Biswaranjan Mohanty
12	Balaram Samantaray	1903257013	Development and Validation of New analytical Method for estimation of Ornidazole by Difference UV Spectrophotometer	Dr.Saroj Kumar Patro
13	Biawajit Mishra	1903257014	A Trial Comparison Study of Antioxidant Available in the Market	Dr. Sunil Kumar Kanungo
14	Bikash Rout	1903257016	In Silico study of some marketed Anthelmintics Agents	Dr.Mrityunjay Banerjee
15	Bikram Kesari Nanda	1903257017	A Trial Comparison Study of Antioxidant Available in the local marke	Dr.Aswini Kumar Senapati
16	Bindusmita Tripathy	1903257018	Formulation and evaluation of Floating Tablet of Diclofenac Sodium	Dr.Biswaranjan Mohanty
17	Bisakha Seksaria	1903257019	Gymnanthemum amygdalinum: A Plant with Potent Antidiabetic Prop	Dr.Chandra Sekhar Barik
18	Biswaranjan Chaudhury	1903257022	Formulation and Evaluation of Herbal Hair Oil	Dr.P.K.Sinha Mahapatra
19	Deepak Kumar Sethy	1903257023	A Trial Comparison Study of Antioxidant Available in the local marke	Dr.Aswini Kumar Senapati
20	Deepanjali Sahoo	1903257024	Formulation and Evaluation of Herbal Hair Oil	Dr.P.K.Sinha Mahapatra
21	Dharitri Dalai	1903257026	A Trial Comparison Study of Antioxidant Available in the local marke	Dr.Aswini Kumar Senapati
22	Dibyajyoti Prakash Sahoo	1903257027	Monitoring TLC Using TLC Visualization Reagents	Dr.Sidhartha Sankar Kar
23	Dipteemayee Sahoo	1903257028	Standardization of "Bilwadi Churna" An Ayurvedic polyherbal formul	Mr.Deepak Kumar Hati
24	Diptendu Sahoo	1903257029	Prepare Starch Based Biscuits Fortified With Capsaicin	Dr.Sujit Dash
25	Duttasai Bal	1903257030	Preliminary phytochemical studies of Clerodendrum infortunatum flov	Dr.Bishwanath Mishra

26	Jitendra Rout	1903257032	Formulation and Evaluation of Herbal Hair Oil	Dr.P.K.Sinha Mahapatra
27	Julee Kumari Kant	1903257033	Formulation and evaluation of oral fast dissolving tablets of Sildenafil	Dr.Minaketan Sahoo
28	Jyotimayee Singh	1903257034	Formulation and Evaluation of Mouth Dissolving Tablets of Venlafax	Dr.Satyajit Panda
29	Kiran Kumar Muduli	1903257036	UV Spectrophotometric Estimation of Emtricitabine in Bulk and it's Capsule Dosage Form	Mrs.Bipasha Behera
30	Kiran Mohapatra	1903257037	Formulation and Evaluation of Herbal Hair Oil	Dr.P.K.Sinha Mahapatra
31	Laxmipriya Sahoo	1903257039	Design and Development of Poorly Soluble Drug of Rosuvastatin Using Liquisolid Compact Technique	Dr.Prabhat Kumar Sahoo
32	Likhita Swain	1903257040	Formulation and evaluation of Floating Tablet of Diclofenac Sodium	Dr.Biswaranjan Mohanty
33	Lipika Jena	1903257041	Biosynthesis of Silver Nano Particles Using Millettia Pinnata L. Plant Extract and Its Antimicrobial Study	Dr.Sujit Kumar Sahu
34	Monalisha Naik	1903257042	Design and Development of Poorly Soluble Drug of Rosuvastatin Using Liquisolid Compact Technique	Dr.Prabhat Kumar Sahoo
35	Nazia Perween	1903257043	Formulation and evaluation of Floating Tablet of Diclofenac Sodium	Dr.Biswaranjan Mohanty
36	Om Prakash Parija	1903257044	UV Spectrophotometric Estimation of Emtricitabine in Bulk and it's Capsule Dosage Form	Mrs.Bipasha Behera
37	Pankaj Kumar Maharana	1903257045	Comparative Quality Control Test between Hospital, Janausadhi and Marketed Paracetomol Tablets	Dr.Bhabani Shankar Nayak
38	Partha Sarathi Praharaj	1903257046	Formulation and Evaluation of Diclofenac Sodium Dispersible Tablets Using Different Super Disintegrants By Direct Compression Method	Dr.Sushant Kumar Behera
39	Pooja Sharma	1903257047	Enhancement of Dissloluation of Glipizide by Using Solid Dispersion	Dr.Amaresh Chandra Sahoo
40	Prakash Kumar Panda	1903257048	Enhancement of Dissloluation of Glipizide by Using Solid Dispersion	Dr.Amaresh Chandra Sahoo
41	Prasanjit Sahoo	1903257049	Formulation and evaluation of Floating Tablet of Diclofenac Sodium	Dr.Biswaranjan Mohanty
42	Pratik Barma	1903257050	Formulation and Evaluation of Diclofenac Sodium Dispersible Tablets Using Different Super Disintegrants By Direct Compression Method	Dr.Sushant Kumar Behera
43	Pratik Dash	1903257051	Monitoring TLC Using TLC Visualization Reagents	Dr.Sidhartha Sankar Kar
44	Pravanjan Behera	1903257052	Enhancement of Dissloluation of Glipizide by Using Solid Dispersion	Dr.Amaresh Chandra Sahoo
45	Prayas Kumar Sethi	1903257053	Formulation and Evaluation of Mouth Dissolving Tablets of Venlafax	Dr.Satyajit Panda
46	Priyangini Behera	1903257054	Development and Validation of New analytical Method for estimation of Ornidazole by Difference UV Spectrophotometer	Dr.Saroj Kumar Patro
47	Pujarani Sahoo	1903257055	Design and Development of Poorly Soluble Drug of Rosuvastatin Using Liquisolid Compact Technique	Dr.Prabhat Kumar Sahoo
48	Pujarani Sarangi	1903257056	Development and Validation of New analytical Method for estimation of Ornidazole by Difference UV Spectrophotometer	Dr.Saroj Kumar Patro
49	Radhakanta Nanda	1903257057	Evaluation of Thrombolytic activity of leave extract of curcuma longa	Dr.Amiya Kumar Prusty

50	Rajesh Kumar Sahoo	1903257058	UV Spectrophotometric Estimation of Emtricitabine in Bulk and it's Capsule Dosage Form	Mrs.Bipasha Behera
51	Rusiraj Swain	1903257059	Formulation and Evaluation of Herbal Hair Oil	Dr.P.K.Sinha Mahapatra
52	Safalya Das	1903257060	Studies on Polyalthia suberosa Leaves Mucilage: Evaluation of Suspending Properties	Dr.Bibaswan Mishra
53	Safina Salim	1903257061	Development and Validation of New analytical Method for estimation of Ornidazole by Difference UV Spectrophotometer	Dr.Saroj Kumar Patro
54	Sagarkanta Mohanty	1903257062	Development and Validation of New analytical Method for estimation of Ornidazole by Difference UV Spectrophotometer	Dr.Saroj Kumar Patro
55	Saisritam Kar	1903257063	In Silico study of some marketed Anthelmintics Agents	Dr.Mrityunjay Banerjee
56	Samrat Swain	1903257064	Formulation and Evaluation of Diclofenac Sodium Dispersible Tablets Using Different Super Disintegrants By Direct Compression Method	Dr.Sushant Kumar Behera
57	Sanket Kumar Rout	1903257065	Prepare Starch Based Biscuits Fortified With Capsaicin	Dr.Sujit Dash
58	Sarada Prasad Barik	1903257066	Monitoring TLC Using TLC Visualization Reagents	Dr.Sidhartha Sankar Kar
59	Sasmita Mallik	1903257068	Standardization of "Bilwadi Churna" An Ayurvedic polyherbal formul	Mr.Deepak Kumar Hati
60	Satya Prakash Dash	1903257069	Preliminary phytochemical studies of Clerodendrum infortunatum flov	Dr.Bishwanath Mishra
61	Saurava Ranjan Debata	1903257070	Studies on Polyalthia suberosa Leaves Mucilage: Evaluation of Suspending Properties	Dr.Bibaswan Mishra
62	Sayed Tafzil Hassan	1903257071	Evaluation of Thrombolytic activity of leave extract of curcuma longa	Dr.Amiya Kumar Prusty
63	Shahil Mishra	1903257072	Evaluation of Thrombolytic activity of leave extract of curcuma longa	Dr.Amiya Kumar Prusty
64	Shyama Sabarni	1903257073	Gymnanthemum amygdalinum: A Plant with Potent Antidiabetic Prop	Dr.Chandra Sekhar Barik
65	Simalin Biswal	1903257075	Comparative Quality Control Test between Hospital, Janausadhi and Marketed Paracetomol Tablets	Dr.Bhabani Shankar Nayak
66	Sk Aftab Hussain	1903257076	Studies on Polyalthia suberosa Leaves Mucilage: Evaluation of Suspending Properties	Dr.Bibaswan Mishra
67	Sk Akbar Alli	1903257077	A Trial Comparison Study of Antioxidant Available in the local marke	Dr.Aswini Kumar Senapati
68	Sk Awab Wasim	1903257078	Evaluation of Thrombolytic activity of leave extract of curcuma longa	Dr.Amiya Kumar Prusty
69	Smruti Ranjan Roul	1903257080	In Silico study of some marketed Anthelmintics Agents	Dr.Mrityunjay Banerjee
70	Snehasish Nayak	1903257081	Design and Development of Poorly Soluble Drug of Rosuvastatin Using Liquisolid Compact Technique	Dr.Prabhat Kumar Sahoo
71	Sonali Monalisha	1903257082	Standardization of "Bilwadi Churna" An Ayurvedic polyherbal formul	Mr.Deepak Kumar Hati
72	Soumya Ranjan Nayak	1903257083	UV Spectrophotometric Estimation of Emtricitabine in Bulk and it's Capsule Dosage Form	Mrs.Bipasha Behera
73	Soumya Ranjan Nayak	1903257084	Studies on Polyalthia suberosa Leaves Mucilage Evaluation of Suspen	Dr.Minaketan Sahoo
74	Soumya Ranjan Swain	1903257085	A Trial Comparison Study of Antioxidant Available in the local marke	Dr.Aswini Kumar Senapati

75	Soumya Ranjan Tripathy	1903257086	Prepare Starch Based Biscuits Fortified With Capsaicin	Dr.Sujit Dash
76	Soumyadeep Mishra	1903257087	Preliminary phytochemical studies of Clerodendrum infortunatum flov	Dr.Bishwanath Mishra
77	Subham Mohapatra	1903257088	Evaluation of Thrombolytic activity of leave extract of curcuma longa	Dr.Amiya Kumar Prusty
78	Subham Priyadarshi Ghadei	1903257089	Studies on Polyalthia suberosa Leaves Mucilage: Evaluation of Suspending Properties	Dr.Bibaswan Mishra
79	Subhra Prateek Puspalak	1903257091	Formulation and Evaluation of Mouth Dissolving Tablets of Venlafax	Dr.Satyajit Panda
80	Suprangya Subhadarsini	1903257092	Formulation and evaluation of oral fast dissolving tablets of Sildenafil	Dr.Minaketan Sahoo
81	Suryakanta Sahoo	1903257093	Formulation and Evaluation of Diclofenac Sodium Dispersible Tablets Using Different Super Disintegrants By Direct Compression Method	Dr.Sushant Kumar Behera
82	Swapnashree Mohanty	1903257094	Formulation and Evaluation of Oral Colon Targeted Tablet of Diclofer	Dr. Swalin Parija
83	Swastik Kar	1903257095	Standardization of "Bilwadi Churna" An Ayurvedic polyherbal formul	Mr.Deepak Kumar Hati
84	Swoyamprava Sahoo	1903257096	Formulation and Evaluation of Mouth Dissolving Tablets of Venlafax	Dr.Satyajit Panda
85	Tarini Ashish Sahoo	1903257097	Comparative Quality Control Test between Hospital, Janausadhi and Marketed Paracetomol Tablets	Dr.Bhabani Shankar Nayak
86	Tarini Prasad Mishra	1903257098	Formulation and Evaluation of Mouth Dissolving Tablets of Venlafax	Dr.Satyajit Panda
87	Toofan Orjeet Pati	1903257099	Comparative Quality Control Test between Hospital, Janausadhi and Marketed Paracetomol Tablets	Dr.Bhabani Shankar Nayak
88	Udaya Kiran Sahoo	1903257100	Comparative Quality Control Test between Hospital, Janausadhi and Marketed Paracetomol Tablets	Dr.Bhabani Shankar Nayak
89	Ankit Pandey	1903257101	Gymnanthemum amygdalinum: A Plant with Potent Antidiabetic Prop	Dr.Chandra Sekhar Barik
90	Kanhu Charan Das	1903257102	In Silico study of some marketed Anthelmintics Agents	Dr.Mrityunjay Banerjee
91	Satyabrat Biswal	1903257103	In Silico study of some marketed Anthelmintics Agents	Dr.Mrityunjay Banerjee
92	Sauman Das	1903257104	Enhancement of Dissloluation of Glipizide by Using Solid Dispersion	Dr.Amaresh Chandra Sahoo
93	Debaprakash Nayak	2023257001	Studies on Polyalthia suberosa Leaves Mucilage: Evaluation of Suspending Properties	Dr.Bibaswan Mishra
94	Bhagyashree Rout	2023257004	Formulation and evaluation of oral fast dissolving tablets of Sildenafil	Dr.Minaketan Sahoo
95	Binayak Nayak	2023257006	Prepare Starch Based Biscuits Fortified With Capsaicin	Dr.Sujit Dash
96	Gitanjali Muduli	2023257007	Formulation and Evaluation of Oral Colon Targeted Tablet of Diclofer	Dr. Swalin Parija
97	Krishna Kalpita Kar	2023257008	Biosynthesis of Silver Nano Particles Using Millettia Pinnata L. Plant Extract and Its Antimicrobial Study	Dr.Sujit Kumar Sahu
98	Manas Ranjan Maharana	2023257009	Prepare Starch Based Biscuits Fortified With Capsaicin	Dr.Sujit Dash
99	Md Fayaz	2023257010	Preliminary phytochemical studies of Clerodendrum infortunatum flov	Dr.Bishwanath Mishra
100	Smruti Pragyan Nath	2023257012	Formulation and Evaluation of Oral Colon Targeted Tablet of Diclofer	Dr. Swalin Parija
101	Sk Anwar Ali	2023257013	Formulation and evaluation of oral fast dissolving tablets of Sildenafil	Dr.Minaketan Sahoo

The Project entitled

FORMULATION AND EVALUATION OF FLOATING TABLET DICLOFENAC SODIUM

Submitted to Biju Patnaik University of Technology, Odisha

For the partial fulfilment of Bachelor degree in Pharmacy

By

Regd No. 1903257012	Avisek Rout
Regd No. 1903257018	Bindusmita Tripathy
Regd No. 1903257040	Likhita Swain
Regd No. 1903257043	Nazia Perween
Regd No. 1903257049	Prasanjit Sahoo

Under the supervision of

Dr. Biswaranjan Mohanty,

Professor and Head,

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Institute of Pharmacy and Technology, Salipur.

Cuttack, Odisha-754202

2023

CERTIFICATE

This is to certify that the thesis entitled "Formulation and evaluation of Floating Tablet of Diclofenac Sodium" pertain to the bonafide project work carried out by Avisek Rout, Bindusmita Tripathy, Likhita Swain, Nazia Perween, and Prasanjit Sahoo for the award of degree of Bachelor of Pharmacy was carried out in the Department of Pharmaceutics, Institute of Pharmacy and Technology, Salipur, affiliated to Biju Patnaik University Technology, Orissa, under my supervision

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CERTIFICATE

This is to certify that the thesis entitled "Formulation and evaluation of Floating Tablet of Diclofenac Sodium" submitted in the partial fulfillment for the award of degree of Bachelor of Pharmacy was carried out in the Laboratories of Institute of Pharmacy and Technology, Salipur by Avisek Rout, Bindusmita Tripathy, Likhita Swain, Nazia Perween, and Prasanjit Sahoo under the supervision of Prof. Biswaranjan Mohanty.

14/08/23

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"COMPARATIVEQUALITYCONTROL TEST BETWEEN HOSPITAL, JANAUSADHI, AND MARKETED PARACETAMOL TABLETS"

Project thesis submitted to Biju Patnaik University of Technologyforthe partialfulfillmentofDegreeinPharmacy

Submitted by:

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SIMALIN BISWAL	1903257075
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CERTIFICATEFROMSUPERVISORS

Thisiscertifyingthatresearchprojectofentitled"COMPARATIVEQUALITYCONTROL TEST BETWEEN HOSPITAL, JANAUSADHI, AND MARKETED PARACETAMOL TABLETS" is a bonafide and original researchwork carried out by TOOFAN ORJEET PATI,SIMALIN BISWAL,UDAYA KIRAN SAHOO,TARINI ASHISH SAHOOPANKAJ KUMARMOHARANA,bearingUniversityregistrationnumber **1903257099,1903257075,1903257100,1903257097,1903257045** under the supervision of **Dr. Bhabani Shankar Nayak (Associate Professor)**.He has incorporated his findings into this project of the same title, being submitted by his, inconsonance with the regulation of **Biju Patnaik University of Technology (BPUT)** for thepartialfulfillment of the **Degree in BachelorofPharmacy inthe session 2022-23**.

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CERTIFICATE FROMPRINCIPAL

Thisiscertifyingthatresearchprojectofentitled**"COMPARATIVEQUALITYCONTROL TEST BETWEEN HOSPITAL, JANAUSADHI, AND MARKETED PARACETAMOL TABLETS"** is a bonafide and original researchwork carried out by TOOFAN ORJEET PATI,SIMALIN BISWAL,UDAYA KIRAN SAHOO,TARINI ASHISH SAHOOPANKAJ KUMARMOHARANA ,bearing University registration number**1903257099,1903257075,1903257100,1903257097,1903257045,** under the supervision of **Dr. Bhabani Shankar Nayak (Associate Professor)**.She has incorporated his findings into this project of the same title, being submitted by his, inconsonance with the regulation of **Biju Patnaik University of Technology (BPUT)** for thepartialfulfilment of the **Degree in BachelorofPharmacy inthe session 2022-23**.

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FORMULATION AND EVALUATION OF DICLOFENAC SODIUM DISPERSIBLE TABLETS USING DISSERENT SUPER DISINTEGRANTS BY DIRECT COMPRESSION METHODE

DISSERTATION SUBMITTED TO BIJU PATTNAIK UNIVERSITY OF TECHNOLOGY
FOR THE PARTIAL FULFILLMENT OF THE AWARD OF THE DEGREE OF

BACHELOR OF PHARMACY

by

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PARTHA SARATHI PRAHARAJ	1903257046
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CERTIFICATE

This is to certify that the dissertation entitled " formulation and evaluation of diclofenac sodium dispersible tablets using disserent super disintegrants by direct compression method. **is a bonafide research work done by PRATIK BARMA,PARTHA SARATHI PRAHARAJ ,SAMRAT SWAIN,SURYAKANTA SAHOO ,ANIL KUMAR MOHARANA, the laboratories of Department of Pharmaceutical Technology, Institute of Pharmacy & Technology, for the award of degree of Bachelor of Pharmacy under my supervision.**

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This is to certify that the dissertation entitled" formulation and evaluation of diclofenac sodium dispersible tablets using disserent super disintegrants by direct compression method **is a bonafide research work done by PRATIK BARMA,PARTHA SARATHI PRAHARAJ,SAMRAT SWAIN,SURYAKANTA SAHOO,ANIL KUMAR MOHARANA ,under the guidance of** Dr.Sushant Kumar Behera **,Assistant Professor, Institute of Pharmacy& Technology, Salipur.**

DR. P.K. Sinhamahapatra

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ENHANCEMENT OF DISSLOLUATION OF GLIPIZIDE BY USING SOLID DISPERSION

DISSERTATION SUBMITTED TO BIJU PATTNAIK UNIVERSITY OF TECHNOLOGY FOR THE PARTIAL FULFILLMENT OF THE AWARD OF THE DEGREE OF

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This is to certify that the dissertation entitled " ENHANCEMENT OF DISSLOLUATION OF GLIPIZIDE BY USING SOLID DISPERSION

"is a bonafide research work done by PRAVANJAN BEHERA,SAUMAN DAS,PRAKASH KUMAR PANDA,POOJA SHARMA in the laboratories of Department of Pharmaceutical Technology, Institute of Pharmacy & Technology, for the award of degree of Bachelor of Pharmacy under my supervision.

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This is to certify that the dissertation entitled" ENHANCEMENT OF DISSLOLUATION OF GLIPIZIDE BY USING SOLID DISPERSION" is a bonafide research work done by PRAVANJAN BEHERA,SAUMAN DAS,PRAKASH KUMAR PANDA,POOJA SHARMA under the guidance of Dr.AMARESH CHANDRA SAHOO,Assistant Professor, Institute of Pharmacy& Technology, Salipur.

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Formulation and Evaluation of Mouth Dissolving Tablets of Venlafaxine HCl

DISSERTATION SUBMITTED TO BIJU PATTNAIK UNIVERSITY OF TECHNOLOGY
FOR THE PARTIAL FULFILLMENT OF THE AWARD OF THE DEGREE OF

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CERTIFICATE

This is to certify that the dissertation entitled "Formulation and Evaluation of Mouth Dissolving Tablets of Venlafaxine HCl"is a bonafide research work done bySUBHRA PRATEEK PUSPALAK, TARINI PRASAD MISHRA, PRAYAS KUMAR SETHI, SWOYAMPRAVA SAHOOJYOTIMAYEE SINGHin the laboratories of Department of Pharmaceutical Technology, Institute of Pharmacy & Technology, for the award of degree of Bachelor of Pharmacy under my supervision.

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ENDORSEMENT

This is to certify that the dissertation entitled"Formulation and Evaluation of Mouth Dissolving Tablets of Venlafaxine HCl**" is a bonafide research work done by SUBHRA PRATEEK PUSPALAK, TARINI PRASAD MISHRA, PRAYAS KUMAR SETHI, SWOYAMPRAVA SAHOO|YOTIMAYEE SINGHunder the guidance of** Dr.Satyajit Panda**,Assistant Professor, Institute of Pharmacy& Technology, Salipur.**

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PRACTICE SCHOOL REPORT

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(Estd. 1982, Regd. No. 5226/371/1987-88 of societies act XXI of 1860)
(Approved by All India Council for Technical Education, Pharmacy Council of India, Govt. of Orissa, Affiliated to Biju Patnaik University of Technology, NAAC (B+), NBA (B.Pharm) accredited and ISO 9001:2015 certified Institution)

CERTIFICATE

This is to certify that Mr. ABHIJIT SAHOO Reg.No-1903257001 in the partial fulfillment of the requirement for the award of the Degree of Bachelor of Pharmacy has satisfactorily completed 150 hours of practice school under my direct supervision in Pharmaceutical Chemistry. Department in the academic session 2022-2023. I certify that she/he has carried out this practice school assignments with upmost precision. I hereby recommend the practice school report to be accepted in partial fulfillment of requirement for the Degree of Bachelor of Pharmacy.

Date: 25.02.2023

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CERTIFICATE

This is to certify that Mr. ABHIRAM ROUT Reg. No. 1903257002in the partial fulfillment of the requirement for the award of the Degree of Bachelor of Pharmacy has satisfactorily completed 150 hours of practice school under my direct supervision in Pharmaceutical Chemistry Department in the academic session 2022-2023. I certify that she/he has carried out this practice school assignments with upmost precision. I hereby recommend the practice school report to be accepted in partial fulfillment of requirement for the Degree of Bachelor of Pharmacy.

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Department of – Pharmaceutical Chemistry
Institute of Pharmacy & Technology, Salipur
At / Po:- Salipur, Dist: Cuttack, Odisha - 754202

March 2023

INSTITUTE OF PHARMACY & TECHNOLOGY, SALIPUR

Dist.- Cuttack-754202, ODISHA

(Estd. 1982, Regd. No. 5226/371/1987-88 of societies act XXI of 1860)
(Approved by All India Council for Technical Education, Pharmacy Council of India, Govt. of Orissa, Affiliated to Biju Patnaik University of Technology, NAAC (B+), NBA (B.Pharm) accredited and ISO 9001:2015 certified Institution)

CERTIFICATE

This is to certify that Mr. ABINASH SWAIN Reg.No-1903257003 in the partial fulfillment of the requirement for the award of the Degree of Bachelor of Pharmacy has satisfactorily completed 150 hours of practice school under my direct supervision in Pharmaceutical Chemistry. Department in the academic session 2022-2023. I certify that she/he has carried out this practice school assignments with upmost precision. I hereby recommend the practice school report to be accepted in partial fulfillment of requirement for the Degree of Bachelor of Pharmacy.

Date: 25/02/23

Place: Salipur

Dr.Sunil Kumar Kanungo
Professor
Department of Pharmaceutical Chemistry
Institute of Pharmacy andTechnology,
Salipur, Cuttack-754202

PRACTICE SCHOOL REPORT

Subject Code: BP706 PS

Submitted to

BIJU PATNAIK UNIVERSITY OF TECHNOLOGY, ODISHA
ROURKELA

In partial fulfillment of requirement for
Award of Degree of Bachelor of Pharmacy
(Session- 2022-23)

Submitted by
ADITYA DAS
B. Pharm 7thSemester
Roll/Regd. No.:1903257004

Institute of Pharmacy and Technology,
At /Po:- Salipur, Dist: Cuttack, Odisha - 754202

Under the Supervision of
Dr. SUJIT KUMAR SAHU
Assistant Professor
Department of – Pharmaceutical Chemistry
Institute of Pharmacy & Technology, Salipur
At / Po:- Salipur, Dist: Cuttack, Odisha - 754202

March 2023

INSTITUTE OF PHARMACY & TECHNOLOGY, SALIPUR

Dist.- Cuttack-754202, ODISHA

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(Approved by All India Council for Technical Education, Pharmacy Council of India, Govt. of Orissa, Affiliated to Biju Patnaik University of Technology, NAAC (B+), NBA (B.Pharm) accredited and ISO 9001:2015 certified Institution)

CERTIFICATE

This is to certify that Mr/Ms.ADITYA DAS Reg. No. 1903257004in the partial fulfillment of the requirement for the award of the Degree of Bachelor of Pharmacy has satisfactorily completed 150 hours of practice school under my direct supervision in Pharmaceutical Chemistry Department in the academic session 2022-2023. I certify that she/he has carried out this practice school assignments with upmost precision. I hereby recommend the practice school report to be accepted in partial fulfillment of requirement for the Degree of Bachelor of Pharmacy.

Sujit Kumar Sahu

Date: 24/2/23

Place: Salipur

Dr. SUJIT KUMAR SAHU
Asst.Professor
Department of Pharmaceutical Chemistry
Institute of Pharmacy and Technology,
Salipur, Cuttack-754202

PRACTICE SCHOOL REPORT

Subject Code: BP706 PS

Submitted to

BIJU PATNAIK UNIVERSITY OF TECHNOLOGY, ODISHA
ROURKELA

In partial fulfillment of requirement for
Award of Degree of Bachelor of Pharmacy
(Session- 2022-23)

Submitted by
AMRIT CHATTERJEE
B. Pharm 7thSemester
Roll/Regd. No.:1903257005

Institute of Pharmacy and Technology,
At /Po:- Salipur, Dist: Cuttack, Odisha - 754202

Under the Supervision of
Dr. SUJIT KUMAR SAHU
Asst.Professor
Department of Pharmaceutics
Institute of Pharmacy & Technology, Salipur
At / Po:- Salipur, Dist: Cuttack, Odisha - 754202

March 2023

Dist.- Cuttack-754202, ODISHA

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(Approved by All India Council for Technical Education, Pharmacy Council of India, Govt. of Orissa, Affiliated to Biju Patnaik University of Technology, NAAC (B+), NBA (B.Pharm) accredited and ISO 9001:2015 certified Institution)

CERTIFICATE

This is to certify that Mr. AMRIT CHATTERJEE Reg. No. 1903257005 in the partial fulfillment of the requirement for the award of the Degree of Bachelor of Pharmacy has satisfactorily completed 150 hours of practice school under my direct supervision in Pharmaceutical Chemistry in the academic session 2022-2023. I certify that she/he has carried out this practice school assignments with upmost precision. I hereby recommend the practice school report to be accepted in partial fulfillment of requirement for the Degree of Bachelor of Pharmacy.

Date: 25/2/23

Place: Salipur

Dr.Sujit Kumar Sahu
Department of Pharmaceutical Chemistry
Institute of Pharmacy and Technology,
Salipur, Cuttack-754202

PRACTICE SCHOOL REPORT

Subject Code: BP706 PS

Submitted to

BIJU PATNAIK UNIVERSITY OF TECHNOLOGY, ODISHA
ROURKELA

In partial fulfillment of requirement for
Award of Degree of Bachelor of Pharmacy
(Session- 2022-23)

Submitted by
ANKITA MAHANTA
B. Pharm 7th Semester
Roll/Regd. No.: 1903257007

Institute of Pharmacy and Technology,
At /Po:- Salipur, Dist: Cuttack, Odisha - 754202

Under the Supervision of
DR. PRAVAT KUMAR SAHOO
Asst.Professor
Department of pharmaceutics
Institute of Pharmacy & Technology, Salipur
At / Po:- Salipur, Dist: Cuttack, Odisha - 754202

March 2023

INSTITUTE OF PHARMACY & TECHNOLOGY, SALIPUR

Dist.- Cuttack-754202, ODISHA

(Estd. 1982, Regd. No. 5226/371/1987-88 of societies act XXI of 1860)
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CERTIFICATE

This is to certify that Ms ANKITA MAHANTA Reg. No. 1903257007 in the partial fulfillment of the requirement for the award of the Degree of Bachelor of Pharmacy has satisfactorily completed 150 hours of practice school under my direct supervision in Pharmaceutices Department in the academic session 2022-2023. I certify that she/he has carried out this practice school assignments with upmost precision. I hereby recommend the practice school report to be accepted in partial fulfillment of requirement for the Degree of Bachelor of Pharmacy.

Pravat Kumar Sahoo
25.2.2023

Date:

Place:

Dr. Pravat Kumar Sahoo
Assistant Professor
Department of Pharmaceutics
Institute of Pharmacy and Technology,
Salipur, Cuttack-754202

PRACTICE SCHOOL REPORT

Subject Code: BP706 PS

Submitted to

BIJU PATNAIK UNIVERSITY OF TECHNOLOGY, ODISHA
ROURKELA

In partial fulfillment of requirement for
Award of Degree of Bachelor of Pharmacy
(Session- 2022-23)

Submitted by
ANUP KUMAR SATAPATHY
B. Pharm 7th Semester
Roll/Regd. No.: 1903257008

Institute of Pharmacy and Technology,
At /Po:- Salipur, Dist: Cuttack, Odisha - 754202

Under the Supervision of
DR. CHANDRA SEKHAR BARIK
Assistant Professor
Department of Pharmacology
Institute of Pharmacy & Technology, Salipur
At / Po:- Salipur, Dist: Cuttack, Odisha – 754202

INSTITUTE OF PHARMACY & TECHNOLOGY, SALIPUR

Dist.- Cuttack-754202, ODISHA

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CERTIFICATE

This is to certify that Mr. ANUP KUMAR SATAPATHY Reg. No. 1903257008 in the partial fulfillment of the requirement for the award of the Degree of Bachelor of Pharmacy has satisfactorily completed 150 hours of practice school under my direct supervision in pharmacology Department in the academic session 2022-2023. I certify that she/he has carried out this practice school assignments with upmost precision. I hereby recommend the practice school report to be accepted in partial fulfillment of requirement for the Degree of Bachelor of Pharmacy.

Date:

Place:

Dr. Chandra Sekhar Barik

.....Professor

Department of .....,

Institute of Pharmacy and Technology, Salipur, Cuttack-754202

PRACTICE SCHOOL REPORT

Subject Code: BP706 PS

Submitted to

BIJU PATNAIK UNIVERSITY OF TECHNOLOGY, ODISHA
ROURKELA

In partial fulfillment of requirement for
Award of Degree of Bachelor of Pharmacy
(Session- 2022-23)

Submitted by
Aparna Mohanty
B. Pharm 7th Semester
Roll/Regd. No.:1903257009

Institute of Pharmacy and Technology,
At /Po:- Salipur, Dist: Cuttack, Odisha - 754202

Under the Supervision of
Mr.DEEPAK KUMAR HATI
Assistant Professor
Department of - Pharmacognosy
Institute of Pharmacy & Technology, Salipur
At / Po:- Salipur, Dist: Cuttack, Odisha - 754202

March 2023

INSTITUTE OF PHARMACY & TECHNOLOGY, SALIPUR

Dist.- Cuttack-754202, ODISHA

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(Approved by All India Council for Technical Education, Pharmacy Council of India, Govt. of Orissa, Affiliated to Biju Patnaik University of Technology, NAAC (B+), NBA (B.Pharm) accredited and ISO 9001:2015 certified Institution)

CERTIFICATE

This is to certify that Mr/Ms Aparna Mohanty Reg.No. 1903257009 in the partial fulfillment of the requirement for the award of the Degree of Bachelor of Pharmacy has satisfactorily completed 150 hours of practice school under my direct supervision in Pharmacognocy Department in the academic session 2022-2023. I certify that she/he has carried out this practice school assignments with upmost precision. I hereby recommend the practice school report to be accepted in partial fulfillment of requirement for the Degree of Bachelor of Pharmacy.

Date:

Place:

Mr.Deepak Kumar Hati
Assistant.Professor
Department of Pharmacognocy
Institute of Pharmacy andTechnology,
Salipur, Cuttack-754202

PRACTICE SCHOOL REPORT

Subject Code: BP706 PS

Submitted to

BIJU PATNAIK UNIVERSITY OF TECHNOLOGY, ODISHA
ROURKELA

In partial fulfillment of requirement for
Award of Degree of Bachelor of Pharmacy
(Session- 2022-23)

Submitted by
Arpit Mohanty
B. Pharm 7th Semester
Roll/Regd. No.: 1903257010

Institute of Pharmacy and Technology,
At /Po:- Salipur, Dist: Cuttack, Odisha - 754202

Under the Supervision of
Mrs. Bipasha Behera
Assistant Professor
Institute of Pharmacy & Technology, Salipur
At / Po:- Salipur, Dist: Cuttack, Odisha - 754202

March 2023

INSTITUTE OF PHARMACY & TECHNOLOGY, SALIPUR

Dist.- Cuttack-754202, ODISHA

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CERTIFICATE

This is to certify that Mr. ARPIT MOHANTY Reg.No-1903257010 in the partial fulfillment of the requirement for the award of the Degree of Bachelor of Pharmacy has satisfactorily completed 150 hours of practice school under my direct supervision in Pharmaceutical Analysis. Department in the academic session 2022-2023. I certify that she/he has carried out this practice school assignments with upmost precision. I hereby recommend the practice school report to be accepted in partial fulfillment of requirement for the Degree of Bachelor of Pharmacy.

B Behera 25/09/23

Date:

Place:

Mrs. Bipasha Behera
Assistant Professor
Department of Pharmaceutical Analysis
Institute of Pharmacy andTechnology,
Salipur, Cuttack-754202

PRACTICE SCHOOL REPORT

Subject Code: BP706 PS

Submitted to

BIJU PATNAIK UNIVERSITY OF TECHNOLOGY, ODISHA
ROURKELA

In partial fulfilment of requirement for
Award of Degree of Bachelor of Pharmacy
(Session- 2022-23)

Submitted by
Avisek Rout
B. Pharm 7th Semester
Roll/Regd. No.:1903257012

Institute of Pharmacy and Technology,
At /Po:- Salipur, Dist: Cuttack, Odisha - 754202

Under the Supervision of
Name of the Supervisor
Dr. Biswaranjan Mohanty
Professor
Department of Pharmaceutics
Institute of Pharmacy & Technology, Salipur
At / Po:- Salipur, Dist: Cuttack, Odisha - 754202

March 2023

INSTITUTE OF PHARMACY & TECHNOLOGY, SALIPUR

Dist.- Cuttack-754202, ODISHA

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CERTIFICATE

This is to certify that **Sri Avisek Rout** Regd.No. **1903257012** in the partial fulfillment of the requirement for the award of the Degree of Bachelor of Pharmacy has satisfactorily completed 150 hours of practice school under my direct supervision in Pharmaceutics Department in the academic session 2022-2023. I certify that he has carried out this practice school assignments with upmost precision. I hereby recommend the practice school report to be accepted in partial fulfillment of requirement for the Degree of Bachelor of Pharmacy.

Date:

Place:

Dr. Biswaranjan Mohanty
Professor
Department of Pharmaceutics
Institute of Pharmacy andTechnology,
Salipur, Cuttack-754202

PRACTICE SCHOOL REPORT

Subject Code: BP706 PS

Submitted to

BIJU PATNAIK UNIVERSITY OF TECHNOLOGY, ODISHA
ROURKELA

In partial fulfillment of requirement for
Award of Degree of Bachelor of Pharmacy
(Session- 2022-23)

Submitted by
BALARAM SAMANTARAY
B. Pharm 7th Semester
Roll/Regd. No.:1903257013

Institute of Pharmacy and Technology,
At /Po:- Salipur, Dist: Cuttack, Odisha - 754202

Under the Supervision of
Dr. SAROJ KUMAR PATRO
Associate Professor
Department of - Pharmacognosy
Institute of Pharmacy & Technology, Salipur
At / Po:- Salipur, Dist: Cuttack, Odisha - 754202

March 2023

INSTITUTE OF PHARMACY & TECHNOLOGY, SALIPUR

Dist.- Cuttack-754202, ODISHA

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CERTIFICATE

This is to certify that Mr. BALARAM SAMANTRAY Reg.No-1903257013 in the partial fulfillment of the requirement for the award of the Degree of Bachelor of Pharmacy has satisfactorily completed 150 hours of practice school under my direct supervision in Pharmaceutical Analysis. Department in the academic session 2022-2023. I certify that she/he has carried out this practice school assignments with upmost precision. I hereby recommend the practice school report to be accepted in partial fulfillment of requirement for the Degree of Bachelor of Pharmacy.

Date: 24/2/23

Place: Salipur

Dr.SAROJ KUMAR PATRO
Associate Professor
Department of Pharmaceutical Analysis
Institute of Pharmacy andTechnology,
Salipur, Cuttack-754202

PRACTICE SCHOOL REPORT

Subject Code: BP706 PS

Submitted to

BIJU PATNAIK UNIVERSITY OF TECHNOLOGY, ODISHA
ROURKELA

In partial fulfillment of requirement for
Award of Degree of Bachelor of Pharmacy
(Session- 2022-23)

Submitted by
BISWAJIT MISHRA
B. Pharm 7th Semester
Roll/Regd. No.:1903257014

Institute of Pharmacy and Technology,
At /Po:- Salipur, Dist: Cuttack, Odisha - 754202

Under the Supervision of
Dr. SUNIL KUMAR KANUNGO
Professor
Department of – Pharmaceutical Chemistry
Institute of Pharmacy & Technology, Salipur
At / Po:- Salipur, Dist: Cuttack, Odisha - 754202

March 2023

INSTITUTE OF PHARMACY & TECHNOLOGY, SALIPUR

Dist.- Cuttack-754202, ODISHA

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CERTIFICATE

This is to certify that Mr/Ms.BISWAJIT MISHRA Reg.No. 1903257014 in the partial fulfillment of the requirement for the award of the Degree of Bachelor of Pharmacy has satisfactorily completed 150 hours of practice school under my direct supervision in Pharmaceutical Chemistry Department in the academic session 2022-2023. I certify that he/he has carried out this practice school assignments with upmost precision. I hereby recommend the practice school report to be accepted in partial fulfillment of requirement for the Degree of Bachelor of Pharmacy.

Date:

Place:

Dr. Sunil Kumar Kanungo
Professor
Department of pharmaceutical Chemistry.,
Institute of Pharmacy andTechnology,
Salipur, Cuttack-754202

PRACTICE SCHOOL REPORT

Subject Code: BP706 PS

Submitted to

BIJU PATNAIK UNIVERSITY OF TECHNOLOGY, ODISHA
ROURKELA

In partial fulfillment of requirement for
Award of Degree of Bachelor of Pharmacy
(Session- 2022-23)

Submitted by
BIKASH KUMAR DAS
B. Pharm 7th Semester
Roll/Regd. No.:~ 1903257015

Institute of Pharmacy and Technology,
At /Po:- Salipur, Dist: Cuttack, Odisha - 754202

Under the Supervision of
DR. RANJAN KUMAR GIRI
Assistant Professor
Department of pharmacology
Institute of Pharmacy & Technology, Salipur
At / Po:- Salipur, Dist: Cuttack, Odisha - 754202

March 2023

INSTITUTE OF PHARMACY & TECHNOLOGY, SALIPUR

Dist.- Cuttack-754202, ODISHA

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CERTIFICATE

This is to certify that Mr. **Bikash Kumar Das** Reg. No. **1903257015** in the partial fulfillment of the requirement for the award of the Degree of Bachelor of Pharmacy has satisfactorily completed 150 hours of practice school under my direct supervision Pharmacology Department in the academic session 2022-2023. I certify that she/he has carried out this practice school assignments with upmost precision. I hereby recommend the practice school report to be accepted in partial fulfillment of requirement for the Degree of Bachelor of Pharmacy.

Date: 25/02/23
Place: Salepur

Dr. Ranjan Kumar Giri
Assistant Professor
Department of Pharmacology,
Institute of Pharmacy and Technology,
Salipur, Cuttack-754202

PRACTICE SCHOOL REPORT

Subject Code: BP706 PS

Submitted to

BIJU PATNAIK UNIVERSITY OF TECHNOLOGY, ODISHA
ROURKELA

In partial fulfillment of requirement for
Award of Degree of Bachelor of Pharmacy
(Session- 2022-23)

Submitted by
BIKASH ROUT
B. Pharm 7th Semester
Roll/Regd. No.: 1903257016

Institute of Pharmacy and Technology,
At /Po:- Salipur, Dist: Cuttack, Odisha - 754202

Under the Supervision of
DR. MRITYUNJAY BANERJEE
Asst.Professor
Department of pharmacology
Institute of Pharmacy & Technology, Salipur
At / Po:- Salipur, Dist: Cuttack, Odisha - 754202

March 2023

INSTITUTE OF PHARMACY & TECHNOLOGY, SALIPUR

Dist.- Cuttack-754202, ODISHA

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CERTIFICATE

This is to certify that Mr. BIKASH ROUT Reg. No. 1903257016 in the partial fulfillment of the requirement for the award of the Degree of Bachelor of Pharmacy has satisfactorily completed 150 hours of practice school under my direct supervision in Pharmaceutical Chemistry .Department in the academic session 2022-2023. I certify that he has carried out this practice school assignments with upmost precision. I hereby recommend the practice school report to be accepted in partial fulfillment of requirement for the Degree of Bachelor of Pharmacy.

MBanerjee 24/2/23

Date:

Place:

Dr. MRITYUNJAY BANERJEE
.Professor
Department of Pharmaceutical Chemistry,
Institute of Pharmacy and Technology,
Salipur, Cuttack-754202

PRACTICE SCHOOL REPORT

Subject Code: BP706 PS

Submitted to

BIJU PATNAIK UNIVERSITY OF TECHNOLOGY, ODISHA
ROURKELA

In partial fulfillment of requirement for
Award of Degree of Bachelor of Pharmacy
(Session- 2022-23)

Submitted by
Bikram Kesari Nanda
B. Pharm 7thSemester
Roll/Regd. No.: 1903257017

Institute of Pharmacy and Technology,
At /Po:- Salipur, Dist: Cuttack, Odisha - 754202

Under the Supervision of
Dr. Aswini Kumar Senapati
Asst.Professor
Department of pharmacology
Institute of Pharmacy & Technology, Salipur
At / Po:- Salipur, Dist: Cuttack, Odisha - 754202

March 2023

INSTITUTE OF PHARMACY & TECHNOLOGY, SALIPUR

Dist.- Cuttack-754202, ODISHA

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CERTIFICATE

s to certify that Mr/Ms. Bikram Kesari Nanda Reg.No. 1903257017 in the partial ...ment of the requirement for the award of the Degree of Bachelor of Pharmacy has ...factorily completed 150 hours of practice school under my direct supervision in ...macology Department in the academic session 2022-2023. I certify that she/he has ...d out this practice school assignments with upmost precision. I hereby recommend ...actice school report to be accepted in partial fulfillment of requirement for the ...e of Bachelor of Pharmacy.

25/07/23

Dr. Aswini Kumar Senapati
Asst. Professor
Department of pharmacology.,
Institute of Pharmacy andTechnology,
Salipur, Cuttack-754202

PRACTICE SCHOOL REPORT

Subject Code: BP706 PS

Submitted to

BIJU PATNAIK UNIVERSITY OF TECHNOLOGY, ODISHA
ROURKELA

In partial fulfilment of requirement for
Award of Degree of Bachelor of Pharmacy
(Session- 2022-23)

Submitted by
Bindusmita Tripathy
B. Pharm 7th Semester
Roll/Regd. No.:1903257018

Institute of Pharmacy and Technology,
At /Po:- Salipur, Dist: Cuttack, Odisha - 754202

Under the Supervision of
Name of the Supervisor
Dr. Biswaranjan Mohanty
Professor
Department of Pharmaceutics
Institute of Pharmacy & Technology, Salipur
At / Po:- Salipur, Dist: Cuttack, Odisha - 754202

March 2023

INSTITUTE OF PHARMACY & TECHNOLOGY, SALIPUR

Dist.- Cuttack-754202, ODISHA

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CERTIFICATE

This is to certify that **Miss. Bindusmita Tripathy** Regd. No. **1903257018**in the partial fulfillment of the requirement for the award of the Degree of Bachelor of Pharmacy has satisfactorily completed 150 hours of practice school under my direct supervision in Pharmaceutics Department in the academic session 2022-2023. I certify that she has carried out this practice school assignments with upmost precision. I hereby recommend the practice school report to be accepted in partial fulfillment of requirement for the Degree of Bachelor of Pharmacy.

Date:

Place:

Dr. Biswaranjan Mohanty
Professor
Department of Pharmaceutics
Institute of Pharmacy andTechnology,
Salipur, Cuttack-754202

PRACTICE SCHOOL REPORT

Subject Code: BP706 PS

Submitted to

BIJU PATNAIK UNIVERSITY OF TECHNOLOGY, ODISHA
ROURKELA

In partial fulfillment of requirement for
Award of Degree of Bachelor of Pharmacy
(Session- 2022-23)

Submitted by
BISAKHA SEKSARIA
B. Pharm 7th Semester
Roll/Regd. No.: 1903257019

Institute of Pharmacy and Technology,
At /Po:- Salipur, Dist: Cuttack, Odisha - 754202

Under the Supervision of
DR. CHANDRA SEKHAR BARIK
Assistant Professor
Department of Pharmacology
Institute of Pharmacy & Technology, Salipur
At / Po:- Salipur, Dist: Cuttack, Odisha – 754202

INSTITUTE OF PHARMACY & TECHNOLOGY, SALIPUR

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CERTIFICATE

This is to certify that Ms. BISAKHA SEKSARIA Reg. No. 1903257019 in the partial fulfillment of the requirement for the award of the Degree of Bachelor of Pharmacy has satisfactorily completed 150 hours of practice school under my direct supervision in pharmacology Department in the academic session 2022-2023. I certify that she/he has carried out this practice school assignments with upmost precision. I hereby recommend the practice school report to be accepted in partial fulfillment of requirement for the Degree of Bachelor of Pharmacy.

Date:

Place:

Dr. Chandra Sekhar Behera

.....Professor

Department of .....,

Institute of Pharmacy and Technology, Salipur, Cuttack-754202

PRACTICE SCHOOL REPORT

Subject Code: BP706 PS

Submitted to

BIJU PATNAIK UNIVERSITY OF TECHNOLOGY, ODISHA
ROURKELA

In partial fulfillment of requirement for
Award of Degree of Bachelor of Pharmacy
(Session- 2022-23)

Submitted by
BISWARANJAN CHAUDHURY
B. Pharm 7th Semester
Roll/Regd. No.: 1903257022

Institute of Pharmacy and Technology,
At /Po:- Salipur, Dist: Cuttack, Odisha - 754202

Under the Supervision of
DR. P.K SINHA MAHAPATRA
Associate.Professor
Department of pharmaceutics
Institute of Pharmacy & Technology, Salipur
At / Po:- Salipur, Dist: Cuttack, Odisha - 754202

March 2023

INSTITUTE OF PHARMACY & TECHNOLOGY, SALIPUR

Dist.- Cuttack-754202, ODISHA

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CERTIFICATE

This is to certify that Mr. BISWARANJAN CHAUDHURY Reg.No-1903257022 in the partial fulfillment of the requirement for the award of the Degree of Bachelor of Pharmacy has satisfactorily completed 150 hours of practice school under my direct supervision in Pharmaceutical Chemistry.Department in the academic session 2022-2023. I certify that she/he has carried out this practice school assignments with upmost precision. I hereby recommend the practice school report to be accepted in partial fulfillment of requirement for the Degree of Bachelor of Pharmacy.

Date:

Place:

Dr. P.K Sinha Mahapatra
Assistant Professor
Department of Pharmacognosy
Institute of Pharmacy andTechnology,
Salipur, Cuttack-754202

PRACTICE SCHOOL REPORT

Subject Code: BP706 PS

Submitted to

BIJU PATNAIK UNIVERSITY OF TECHNOLOGY, ODISHA
ROURKELA

In partial fulfillment of requirement for
Award of Degree of Bachelor of Pharmacy
(Session- 2022-23)

Submitted by
DEEPAK KUMAR SETHY
B. Pharm 7th Semester
Roll/Regd. No.:1903257023

Institute of Pharmacy and Technology,
At /Po:- Salipur, Dist: Cuttack, Odisha - 754202

Under the Supervision of
Dr. ASWINI KUMAR SENAPATI
Assistant Professor
Department of - Pharmacology
Institute of Pharmacy & Technology, Salipur
At / Po:- Salipur, Dist: Cuttack, Odisha - 754202

March 2023

INSTITUTE OF PHARMACY & TECHNOLOGY, SALIPUR

Dist.- Cuttack-754202, ODISHA

(Estd. 1982, Regd. No. 5226/371/1987-88 of societies act XXI of 1860)
(Approved by All India Council for Technical Education, Pharmacy Council of India, Govt. of Orissa, Affiliated to Biju Patnaik University of Technology, NAAC (B+), NBA (B.Pharm) accredited and ISO 9001:2015 certified Institution)

CERTIFICATE

This is to certify that Mr. DEEPAK KUMAR SETHY Reg.No-1903257023 in the partial fulfillment of the requirement for the award of the Degree of Bachelor of Pharmacy has satisfactorily completed 150 hours of practice school under my direct supervision in Pharmacology. Department in the academic session 2022-2023. I certify that she/he has carried out this practice school assignments with upmost precision. I hereby recommend the practice school report to be accepted in partial fulfillment of requirement for the Degree of Bachelor of Pharmacy.

25/02/23

Dr.Aswini Kumar Senapati
Associate Professor
Department of Pharmacology
Institute of Pharmacy andTechnology,
Salipur, Cuttack-754202

Date:

Place:

PRACTICE SCHOOL REPORT

Subject Code: BP706 PS

Submitted to

BIJU PATNAIK UNIVERSITY OF TECHNOLOGY, ODISHA
ROURKELA

In partial fulfillment of requirement for
Award of Degree of Bachelor of Pharmacy
(Session- 2022-23)

Submitted by
DEEPANJALI SAHOO
B. Pharm 7thSemester
Roll/Regd. No.: 1903257024

Institute of Pharmacy and Technology,
At /Po:- Salipur, Dist: Cuttack, Odisha - 754202

Under the Supervision of
DR. P.K SINHA MAHAPATRA
Associate.Professor
Department of pharmaceutics
Institute of Pharmacy & Technology, Salipur
At / Po:- Salipur, Dist: Cuttack, Odisha - 754202

March 2023

INSTITUTE OF PHARMACY & TECHNOLOGY, SALIPUR

Dist.- Cuttack-754202, ODISHA

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CERTIFICATE

This is to certify that Mrs. DEEPANJALI SAHOO Reg.No-1903257024 in the partial fulfillment of the requirement for the award of the Degree of Bachelor of Pharmacy has satisfactorily completed 150 hours of practice school under my direct supervision in Pharmaceutical Chemistry.Department in the academic session 2022-2023. I certify that she/he has carried out this practice school assignments with upmost precision. I hereby recommend the practice school report to be accepted in partial fulfillment of requirement for the Degree of Bachelor of Pharmacy.

25/2/23

Date:

Place:

Dr. P.K Sinha Mahapatra
Assistant Professor
Department of Pharmacognosy
Institute of Pharmacy andTechnology,
Salipur, Cuttack-754202

PRACTICE SCHOOL REPORT

Subject Code: BP706 PS

Submitted to

BIJU PATNAIK UNIVERSITY OF TECHNOLOGY, ODISHA
ROURKELA

In partial fulfillment of requirement for
Award of Degree of Bachelor of Pharmacy
(Session- 2022-23)

Submitted by
[DEVI PRASAD MANDAL]
B. Pharm 7th Semester
Roll/Regd. No.:1903257025

Institute of Pharmacy and Technology,
At /Po:- Salipur, Dist: Cuttack, Odisha - 754202

Under the Supervision of

Dr. Sidhartha Sankar Kar
Assistant Professor
Department of Pharmaceutical Chemistry
Institute of Pharmacy & Technology, Salipur
At / Po:- Salipur, Dist: Cuttack, Odisha - 754202

February 2023

INSTITUTE OF PHARMACY & TECHNOLOGY, SALIPUR

Dist.- Cuttack-754202, ODISHA

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CERTIFICATE

This is to certify that Mr. DEVI PRASAD MANDAL Reg. No. 1903257025 in the partial fulfillment of the requirement for the award of the Degree of Bachelor of Pharmacy has satisfactorily completed 150 hours of practice school under my direct supervision in Pharmaceutical Chemistry Department in the academic session 2022-2023. I certify that she/he has carried out this practice school assignments with upmost precision. I hereby recommend the practice school report to be accepted in partial fulfillment of requirement for the Degree of Bachelor of Pharmacy.

Date: Salipur 25.02.2023

Place: Salipur

Dr. Sidhartha Sankar Kar
Asst.Professor
Department of Pharmaceutical Chemistry
Institute of Pharmacy and Technology,
Salipur, Cuttack-754202

PRACTICE SCHOOL REPORT

Subject Code: BP706 PS

Submitted to

BIJU PATNAIK UNIVERSITY OF TECHNOLOGY, ODISHA
ROURKELA

In partial fulfillment of requirement for
Award of Degree of Bachelor of Pharmacy
(Session- 2022-23)

Submitted by

Dharitri Dalai

B. Pharm 7th Semester

Regd. No.: 1903257026

INSTITUTE OF PHARMACY AND TECHNOLOGY,
At /Po:- Salipur, Dist: Cuttack, Odisha - 754202

Under the Supervision of

Name of the Supervisor

Dr. Aswini Kumar Senapati, Asst. Professor
Department of Pharmacology
Institute of Pharmacy & Technology, Salipur
At / Po:- Salipur, Dist: Cuttack, Odisha - 754202

March 2023

INSTITUTE OF PHARMACY & TECHNOLOGY, SALIPUR

Dist.- Cuttack-754202, ODISHA

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CERTIFICATE

is is to certify that **Ms. Dharitri Dalai**. Reg. No: **1903257026** in the partial fillment of the requirement for the award of the Degree of Bachelor of Pharmacy has sfactorily completed 150 hours of practice school under my direct supervision in **rmacology** Department in the academic session 2022-2023. I certify that she/he has ried out this practice school assignments with upmost precision. I hereby recommend practice school report to be accepted in partial fulfillment of requirement for the ree of Bachelor of Pharmacy.

e: 24.02.2023

e: IPT Salipur

Dr. Aswini Kumar Senapati
Assistant Professor
Department of Pharmacology
Institute of Pharmacy and Technology,
Salipur, Cuttack-754202

PRACTICE SCHOOL REPORT

Subject Code: BP706 PS

Submitted to

BIJU PATNAIK UNIVERSITY OF TECHNOLOGY, ODISHA
ROURKELA

In partial fulfillment of requirement for
Award of Degree of Bachelor of Pharmacy
(Session- 2022-23)

Submitted by
[DIBYA JYOTI PRAKASH SAHOO]
B. Pharm 7th Semester
Roll/Regd. No.:1903257027

Institute of Pharmacy and Technology,
At /Po:- Salipur, Dist: Cuttack, Odisha - 754202

Under the Supervision of
Dr. Sidhartha Sankar Kar
Assistant Professor
Department of Pharmaceutical Chemistry
Institute of Pharmacy & Technology, Salipur
At / Po:- Salipur, Dist: Cuttack, Odisha - 754202

February 2023

INSTITUTE OF PHARMACY & TECHNOLOGY, SALIPUR

Dist.- Cuttack-754202, ODISHA

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CERTIFICATE

This is to certify that Mr. DIBYA JYOTI PRAKASH SAHOO Reg. No. 1903257027 in the partial fulfillment of the requirement for the award of the Degree of Bachelor of Pharmacy has satisfactorily completed 150 hours of practice school under my direct supervision in Pharmaceutical Chemistry Department in the academic session 2022-2023. I certify that she/he has carried out this practice school assignments with upmost precision. I hereby recommend the practice school report to be accepted in partial fulfillment of requirement for the Degree of Bachelor of Pharmacy.

Date: 25.02.2023

Place: Salipur

Dr. Sidhartha Sankar Kar
Asst.Professor
Department of Pharmaceutical Chemistry
Institute of Pharmacy and Technology,
Salipur, Cuttack-754202

PRACTICE SCHOOL REPORT

Subject Code: BP706 PS

Submitted to

BIJU PATNAIK UNIVERSITY OF TECHNOLOGY, ODISHA
ROURKELA

In partial fulfillment of requirement for
Award of Degree of Bachelor of Pharmacy
(Session- 2022-23)

Submitted by
DIPTEEMAYEE SAHOO
B. Pharm 7th Semester
Roll/Regd. No.:1903257028

Institute of Pharmacy and Technology,
At /Po:- Salipur, Dist: Cuttack, Odisha - 754202

Under the Supervision of
Mr.DEEPAK KUMAR HATI
Assistant Professor
Department of - Pharmacognosy
Institute of Pharmacy & Technology, Salipur
At / Po:- Salipur, Dist: Cuttack, Odisha - 754202

March 2023

INSTITUTE OF PHARMACY & TECHNOLOGY, SALIPUR

Dist.- Cuttack-754202, ODISHA

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CERTIFICATE

This is to certify that Ms.Dipteemayee Sahoo....Reg.No-1903257028 in the partial fulfillment of the requirement for the award of the Degree of Bachelor of Pharmacy has satisfactorily completed 150 hours of practice school under my direct supervision in Pharmacognosy.Department in the academic session 2022-2023. I certify that she/he has carried out this practice school assignments with upmost precision. I hereby recommend the practice school report to be accepted in partial fulfillment of requirement for the Degree of Bachelor of Pharmacy.

Date:

Place:

Dr. Deepak Kumar Hati
Assistant Professor
Department of Pharmacognosy
Institute of Pharmacy andTechnology,
Salipur, Cuttack-754202

PRACTICE SCHOOL REPORT

Subject Code: BP706 PS

Submitted to

BIJU PATNAIK UNIVERSITY OF TECHNOLOGY, ODISHA
ROURKELA

In partial fulfillment of requirement for
Award of Degree of Bachelor of Pharmacy
(Session- 2022-23)

Submitted by
DUTTA SAI BAL
B. Pharm 7th Semester
Roll/Regd. No.:1903257030

Institute of Pharmacy and Technology,
At /Po:- Salipur, Dist: Cuttack, Odisha - 754202

Under the Supervision of
Dr.BISHWANATH MISHRA
Assistant Professor
Department of - Pharmacology
Institute of Pharmacy & Technology, Salipur
At / Po:- Salipur, Dist: Cuttack, Odisha - 754202

March 2023

INSTITUTE OF PHARMACY & TECHNOLOGY, SALIPUR

Dist.- Cuttack-754202, ODISHA

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CERTIFICATE

This is to certify that Mr/Ms. DUTTA SAI BAL Reg. No. 1903257030 in the partial fulfillment of the requirement for the award of the Degree of Bachelor of Pharmacy has satisfactorily completed 150 hours of practice school under my direct supervision in Pharmacology Department in the academic session 2022-2023. I certify that she/he has carried out this practice school assignments with upmost precision. I hereby recommend the practice school report to be accepted in partial fulfillment of requirement for the Degree of Bachelor of Pharmacy.

Date:

Place:

Dr.Bishwanath Mishra
Asst.Professor
Department of Pharmacology
Institute of Pharmacy and Technology,
Salipur, Cuttack-754202

PRACTICE SCHOOL REPORT

Subject Code: BP706 PS

Submitted to

BIJU PATNAIK UNIVERSITY OF TECHNOLOGY, ODISHA
ROURKELA

In partial fulfilment of requirement for
Award of Degree of Bachelor of Pharmacy
(Session- 2022-23)

Submitted by
HIMANSHU ACHARYA
B. Pharm 7th Semester
Roll/Regd. No.:~ 1903257031

Institute of Pharmacy and Technology,
At /Po:- Salipur, Dist: Cuttack, Odisha - 754202

Under the Supervision of

DR. RANJAN KUMAR GIRI
Assistant Professor
Department of Pharmacology
Institute of Pharmacy & Technology, Salipur
At / Po:- Salipur, Dist: Cuttack, Odisha - 754202

March 2023

INSTITUTE OF PHARMACY & TECHNOLOGY, SALIPUR

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CERTIFICATE

This is to certify that Mr. **Himanshu Acharya** Reg.No. **1903257031** in the partial fulfillment of the requirement for the award of the Degree of Bachelor of Pharmacy has satisfactorily completed 150 hours of practice school under my direct supervision in Pharmacology Department in the academic session 2022-2023. I certify that she/he has carried out this practice school assignments with upmost precision. I hereby recommend the practice school report to be accepted in partial fulfillment of requirement for the Degree of Bachelor of Pharmacy.

Date: 25/02/23
Place: Salepur

Dr. Ranjan Kumar Giri
Assistant Professor
Department of Pharmacology,
Institute of Pharmacy & Technology,
Salipur, Cuttack-754202

PRACTICE SCHOOL REPORT

Subject Code: BP706 PS

Submitted to

BIJU PATNAIK UNIVERSITY OF TECHNOLOGY, ODISHA
ROURKELA

In partial fulfillment of requirement for
Award of Degree of Bachelor of Pharmacy
(Session- 2022-23)

Submitted by
JITENDRA ROUT
B. Pharm 7th Semester

Roll/Regd. No.: 1903257032

Institute of Pharmacy and Technology,
At /Po:- Salipur, Dist: Cuttack, Odisha - 754202

Under the Supervision of
DR. P.K SINHA MAHAPATRA
Associate.Professor
Department of pharmaceutics
Institute of Pharmacy & Technology, Salipur
At / Po:- Salipur, Dist: Cuttack, Odisha - 754202

March 2023

INSTITUTE OF PHARMACY & TECHNOLOGY, SALIPUR

Dist.- Cuttack-754202, ODISHA

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CERTIFICATE

This is to certify that Mr. JITENDRA ROUT Reg.No-1903257032 in the partial fulfillment of the requirement for the award of the Degree of Bachelor of Pharmacy has satisfactorily completed 150 hours of practice school under my direct supervision in Pharmaceutical Chemistry.Department in the academic session 2022-2023. I certify that she/he has carried out this practice school assignments with upmost precision. I hereby recommend the practice school report to be accepted in partial fulfillment of requirement for the Degree of Bachelor of Pharmacy.

Date: 25/02/23

Place:

Dr. P.K Sinha Mahapatra
Assistant Professor
Department of Pharmacognosy
Institute of Pharmacy andTechnology,
Salipur, Cuttack-754202

PRACTICE SCHOOL REPORT

Subject Code: BP706 PS

Submitted to

BIJU PATNAIK UNIVERSITY OF TECHNOLOGY, ODISHA
ROURKELA

In partial fulfillment of requirement for
Award of Degree of Bachelor of Pharmacy
(Session- 2022-23)

Submitted by
JULEE KUMARI KANT
B. Pharm 7th Semester
Roll/Regd. No.:1903257033

Institute of Pharmacy and Technology,
At /Po:- Salipur, Dist: Cuttack, Odisha - 754202

Under the Supervision of
Dr. MINAKETAN SAHOO
Asst.Professor
Department of Pharmaceutics Analysis
Institute of Pharmacy & Technology, Salipur
At / Po:- Salipur, Dist: Cuttack, Odisha - 754202

March 2023

INSTITUTE OF PHARMACY & TECHNOLOGY, SALIPUR

Dist.- Cuttack-754202, ODISHA

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CERTIFICATE

This is to certify that Ms.Julee Kumari Kant .Reg. No. 1903257033 in the partial fulfillment of the requirement for the award of the Degree of Bachelor of Pharmacy has satisfactorily completed 150 hours of practice school under my direct supervision in Pharma. Analysis Department in the academic session 2022-2023. I certify that she/he has carried out this practice school assignments with upmost precision. I hereby recommend the practice school report to be accepted in partial fulfillment of requirement for the Degree of Bachelor of Pharmacy.

Sahoo 25.2.23

Date: 25/2/2023

Place: IPT Salipur

Dr. Minaketan Sahoo
Assistant Professor
Department of Pharma. Analysis,
Institute of Pharmacy and Technology,
Salipur, Cuttack-754202

PRACTICE SCHOOL REPORT

Subject Code: BP706 PS

Submitted to

BIJU PATNAIK UNIVERSITY OF TECHNOLOGY, ODISHA
ROURKELA

In partial fulfillment of requirement for
Award of Degree of Bachelor of Pharmacy
(Session- 2022-23)

Submitted by
Kiran Kumar Muduli
B. Pharm 7th Semester
Roll/Regd. No.: 1903257036

Institute of Pharmacy and Technology,
At /Po:- Salipur, Dist: Cuttack, Odisha - 754202

Under the Supervision of
Mrs. Bipasha Behera
Assistant Professor
Institute of Pharmacy & Technology, Salipur
At / Po:- Salipur, Dist: Cuttack, Odisha - 754202

March 2023

INSTITUTE OF PHARMACY & TECHNOLOGY, SALIPUR

Dist.- Cuttack-754202, ODISHA

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CERTIFICATE

This is to certify that Mr. KIRAN KUMAR MUDULI Reg.No-1903257036 in the partial fulfillment of the requirement for the award of the Degree of Bachelor of Pharmacy has satisfactorily completed 150 hours of practice school under my direct supervision in Pharmaceutical Analysis. Department in the academic session 2022-2023. I certify that she/he has carried out this practice school assignments with upmost precision. I hereby recommend the practice school report to be accepted in partial fulfillment of requirement for the Degree of Bachelor of Pharmacy.

Bbehera 25/02/23

Date:

Place:

Mrs. Bipasha Behera
Assistant Professor
Department of Pharmaceutical Analysis
Institute of Pharmacy andTechnology,
Salipur, Cuttack-754202

PRACTICE SCHOOL REPORT

Subject Code: BP706 PS

Submitted to

BIJU PATNAIK UNIVERSITY OF TECHNOLOGY, ODISHA
ROURKELA

In partial fulfillment of requirement for
Award of Degree of Bachelor of Pharmacy
(Session- 2022-23)

Submitted by
KIRAN MOHAPATRA
B. Pharm 7th Semester
Roll/Regd. No.: 1903257037

Institute of Pharmacy and Technology,
At /Po:- Salipur, Dist: Cuttack, Odisha - 754202

Under the Supervision of
DR. P.K SINHA MAHAPATRA
Associate.Professor
Department of pharmaceutics
Institute of Pharmacy & Technology, Salipur
At / Po:- Salipur, Dist: Cuttack, Odisha - 754202

March 2023

INSTITUTE OF PHARMACY & TECHNOLOGY, SALIPUR

Dist.- Cuttack-754202, ODISHA

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CERTIFICATE

This is to certify that Mr. KIRAN MOHAPATRA Reg.No-1903257037 in the partial fulfillment of the requirement for the award of the Degree of Bachelor of Pharmacy has satisfactorily completed 150 hours of practice school under my direct supervision in Pharmaceutical Chemistry.Department in the academic session 2022-2023. I certify that she/he has carried out this practice school assignments with upmost precision. I hereby recommend the practice school report to be accepted in partial fulfillment of requirement for the Degree of Bachelor of Pharmacy.

Date: 25/4/23

Place:

Dr. P.K Sinha Mahapatra
Assistant Professor
Department of Pharmacognosy
Institute of Pharmacy andTechnology,
Salipur, Cuttack-754202

PRACTICE SCHOOL REPORT

Subject Code: BP706 PS

Submitted to

BIJU PATNAIK UNIVERSITY OF TECHNOLOGY, ODISHA
ROURKELA

In partial fulfillment of requirement for
Award of Degree of Bachelor of Pharmacy
(Session- 2022-23)

Submitted by
Laxmipriya sahoo
B. Pharm 7th Semester
Roll/Regd. No.: 1903257039

Institute of Pharmacy and Technology,
At /Po:- Salipur, Dist: Cuttack, Odisha - 754202

Under the Supervision of
DR. PRAVAT KUMAR SAHOO
Asst.Professor
Department of pharmaceutics
Institute of Pharmacy & Technology, Salipur
At / Po:- Salipur, Dist: Cuttack, Odisha - 754202

March 2023

INSTITUTE OF PHARMACY & TECHNOLOGY, SALIPUR

Dist.- Cuttack-754202, ODISHA

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CERTIFICATE

This is to certify that Ms .LAXMIPRIYA SAHOO Reg. No. 1903257039 in the partial fulfillment of the requirement for the award of the Degree of Bachelor of Pharmacy has satisfactorily completed 150 hours of practice school under my direct supervision in Pharmaceutics in the academic session 2022-2023. I certify that she/he has carried out this practice school assignments with upmost precision. I hereby recommend the practice school report to be accepted in partial fulfillment of requirement for the Degree of Bachelor of Pharmacy.

Pravat Kumar Sahoo
26.9.2023

Date:

Place:

Dr.PRAVAT KUMAR SAHOO
Department of Pharmaceutics
Institute of Pharmacy and Technology,
Salipur, Cuttack-754202

PRACTICE SCHOOL REPORT

Subject Code: BP706 PS

Submitted to

BIJU PATNAIK UNIVERSITY OF TECHNOLOGY, ODISHA
ROURKELA

In partial fulfilment of requirement for
Award of Degree of Bachelor of Pharmacy
(Session- 2022-23)

Submitted by
Likhita Swain
B. Pharm 7th Semester
Roll/Regd. No.:1903257040

Institute of Pharmacy and Technology,
At /Po:- Salipur, Dist: Cuttack, Odisha - 754202

Under the Supervision of
Name of the Supervisor
Dr. Biswaranjan Mohanty
Professor
Department of Pharmaceutics
Institute of Pharmacy & Technology, Salipur
At / Po:- Salipur, Dist: Cuttack, Odisha - 754202

March 2023

INSTITUTE OF PHARMACY & TECHNOLOGY, SALIPUR

Dist.- Cuttack-754202, ODISHA

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CERTIFICATE

This is to certify that **Miss Likhita Swain**Regd.No. **1903257040**in the partial fulfillment of the requirement for the award of the Degree of Bachelor of Pharmacy has satisfactorily completed 150 hours of practice school under my direct supervision in Pharmaceutics Department in the academic session 2022-2023. I certify that she has carried out this practice school assignments with upmost precision. I hereby recommend the practice school report to be accepted in partial fulfillment of requirement for the Degree of Bachelor of Pharmacy.

Date:

Place:

Dr. Biswaranjan Mohanty
Professor
Department of Pharmaceutics
Institute of Pharmacy andTechnology,
Salipur, Cuttack-754202

PRACTICE SCHOOL REPORT

Subject Code: BP706 PS

Submitted to

BIJU PATNAIK UNIVERSITY OF TECHNOLOGY, ODISHA
ROURKELA

In partial fulfillment of requirement for
Award of Degree of Bachelor of Pharmacy
(Session- 2022-23)

Submitted by
LIPIKA JENA
B. Pharm 7th Semester
Roll/Regd. No.:1903257041

Institute of Pharmacy and Technology,
At /Po:- Salipur, Dist: Cuttack, Odisha - 754202

Under the Supervision of
Dr. SUJIT KUMAR SAHU
Asst.Professor
Department of Pharmaceutics
Institute of Pharmacy & Technology, Salipur
At / Po:- Salipur, Dist: Cuttack, Odisha - 754202

March 2023

Dist.- Cuttack-754202, ODISHA

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CERTIFICATE

This is to certify that Ms. LIPIKA JENA Reg. No. 1903257041 in the partial fulfillment of the requirement for the award of the Degree of Bachelor of Pharmacy has satisfactorily completed 150 hours of practice school under my direct supervision in Pharmaceutical Chemistry in the academic session 2022-2023. I certify that she/he has carried out this practice school assignments with upmost precision. I hereby recommend the practice school report to be accepted in partial fulfillment of requirement for the Degree of Bachelor of Pharmacy.

Date: 25/2/23

Place: Salipur

Dr.Sujit Kumar Sahu
Department of Pharmaceutical Chemistry
Institute of Pharmacy and Technology,
Salipur, Cuttack-754202

PRACTICE SCHOOL REPORT

Subject Code: BP706 PS

Submitted to

BIJU PATNAIK UNIVERSITY OF TECHNOLOGY, ODISHA
ROURKELA

In partial fulfillment of requirement for
Award of Degree of Bachelor of Pharmacy
(Session- 2022-23)

Submitted by
MONALISHA NAIK
B. Pharm 7thSemester
Roll/Regd. No.:1903257042

Institute of Pharmacy and Technology,
At /Po:- Salipur, Dist: Cuttack, Odisha - 754202

Under the Supervision of
Dr. PRAVAT KUMAR SAHOO
Assistant Professor
Department of - Pharmaceutics
Institute of Pharmacy & Technology, Salipur
At / Po:- Salipur, Dist: Cuttack, Odisha - 754202

March 2023

INSTITUTE OF PHARMACY & TECHNOLOGY, SALIPUR

Dist.- Cuttack-754202, ODISHA

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(Approved by All India Council for Technical Education, Pharmacy Council of India, Govt. of Orissa, Affiliated to Biju Patnaik University of Technology, NAAC (B+), NBA (B Pharm) accredited and ISO 9001:2015 certified Institution)

CERTIFICATE

This is to certify that Ms MONALISHA NAIK Reg. No. 1903257042 in the partial fulfillment of the requirement for the award of the Degree of Bachelor of Pharmacy has satisfactorily completed 150 hours of practice school under my direct supervision in Pharmaceutices Department in the academic session 2022-2023. I certify that she/he has carried out this practice school assignments with upmost precision. I hereby recommend the practice school report to be accepted in partial fulfillment of requirement for the Degree of Bachelor of Pharmacy.

Pravat Kumar Sahoo
25-2-2023

Date:

Place:

Dr. Pravat Kumar Sahoo
Assistant Professor
Department of Pharmaceutics
Institute of Pharmacy and Technology,
Salipur, Cuttack-754202

PRACTICE SCHOOL REPORT

Subject Code: BP706 PS

Submitted to

BIJU PATNAIK UNIVERSITY OF TECHNOLOGY, ODISHA
ROURKELA

In partial fulfillment of requirement for
Award of Degree of Bachelor of Pharmacy
(Session- 2022-23)

Submitted by
Om Prakash Parija
B. Pharm 7th Semester
Roll/Regd. No.: 1903257044

Institute of Pharmacy and Technology,
At /Po:- Salipur, Dist: Cuttack, Odisha - 754202

Under the Supervision of
Mrs. Bipasha Behera
Assistant Professor
Institute of Pharmacy & Technology, Salipur
At / Po:- Salipur, Dist: Cuttack, Odisha - 754202

March 2023

INSTITUTE OF PHARMACY & TECHNOLOGY, SALIPUR

Dist.- Cuttack-754202, ODISHA

(Estd. 1982, Regd. No. 5226/371/1987-88 of societies act XXI of 1860)
(Approved by All India Council for Technical Education, Pharmacy Council of India, Govt. of Orissa, Affiliated to Biju Patnaik University of Technology, NAAC (B+), NBA (B.Pharm) accredited and ISO 9001:2015 certified Institution)

CERTIFICATE

This is to certify that Mr. OM PRAKASH PARIJA Reg.No-1903257044 in the partial fulfillment of the requirement for the award of the Degree of Bachelor of Pharmacy has satisfactorily completed 150 hours of practice school under my direct supervision in Pharmaceutical Analysis. Department in the academic session 2022-2023. I certify that she/he has carried out this practice school assignments with upmost precision. I hereby recommend the practice school report to be accepted in partial fulfillment of requirement for the Degree of Bachelor of Pharmacy.

B Behera 25/02/23

Date:

Place:

Mrs. Bipasha Behera
Assistant Professor
Department of Pharmaceutical Analysis
Institute of Pharmacy andTechnology,
Salipur, Cuttack-754202

PRACTICE SCHOOL REPORT

Subject Code: BP706 PS

Submitted to

BIJU PATNAIK UNIVERSITY OF TECHNOLOGY, ODISHA
ROURKELA

In partial fulfillment of requirement for
Award of Degree of Bachelor of Pharmacy
(Session- 2022-23)

Submitted by
PANKAJ KUMAR MAHARANA
B. Pharm 7thSemester
Roll/Regd. No.:1903257045

Institute of Pharmacy and Technology,
At /Po:- Salipur, Dist: Cuttack, Odisha - 754202

Under the Supervision of
Dr.BHABANI SHANKAR NAYAK
Associatew Professor
Department of - Pharmaceutics
Institute of Pharmacy & Technology, Salipur
At / Po:- Salipur, Dist: Cuttack, Odisha - 754202

2023

INSTITUTE OF PHARMACY & TECHNOLOGY, SALIPUR

Dist.- Cuttack-754202, ODISHA

(Estd. 1982, Regd. No. 5226/371/1987-88 of societies act XXI of 1860)
(Approved by All India Council for Technical Education, Pharmacy Council of India, Govt. of Orissa. Affiliated to Biju Patnaik University of Technology, NAAC (B+), NBA (B.Pharm) accredited and ISO 9001:2015 certified Institution)

CERTIFICATE

This is to certify that Mr. PANKAJ KUMAR MAHARANA Reg. No. 1903257045 in the partial fulfillment of the requirement for the award of the Degree of Bachelor of Pharmacy has satisfactorily completed 150 hours of practice school under my direct supervision in pharmaceutics Department in the academic session 2022-2023. I certify that she/he has carried out this practice school assignments with upmost precision. I hereby recommend the practice school report to be accepted in partial fulfillment of requirement for the Degree of Bachelor of Pharmacy.

25/2/2023

Dr. BHABANI SHANKAR NAYAK
Professor
Department of pharmaceutics.,
Institute of Pharmacy andTechnology,
Salipur, Cuttack-754202

Date:25/02/23

Place:IPT, SALIPUR

PRACTICE SCHOOL REPORT

Subject Code: BP706 PS

Submitted to

BIJU PATNAIK UNIVERSITY OF TECHNOLOGY, ODISHA
ROURKELA

In partial fulfillment of requirement for
Award of Degree of Bachelor of Pharmacy
(Session- 2022-23)

Submitted by
POOJA SHARMA
B. Pharm 7th Semester
Roll/Regd. No.:1903257047

Institute of Pharmacy and Technology,
At /Po:- Salipur, Dist: Cuttack, Odisha - 754202

Under the Supervision of
Dr. AMARESH CHANDRA SAHOO
Professor
Department of Pharmaceutics
Institute of Pharmacy & Technology, Salipur
At / Po:- Salipur, Dist: Cuttack, Odisha - 754202

March 2023

INSTITUTE OF PHARMACY & TECHNOLOGY, SALIPUR

Dist.- Cuttack-754202, ODISHA

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(Approved by All India Council for Technical Education, Pharmacy Council of India, Govt. of Orissa, Affiliated to Biju Patnaik University of Technology, NAAC (B+), NBA (B.Pharm) accredited and ISO 9001:2015 certified Institution)

CERTIFICATE

This is to certify that Mr. POOJA SHARMA Reg. No. 1903257047 in the partial fulfillment of the requirement for the award of the Degree of Bachelor of Pharmacy has satisfactorily completed 150 hours of practice school under my direct supervision in Pharmaceutics in the academic session 2022-2023. I certify that she/he has carried out this practice school assignments with upmost precision. I hereby recommend the practice school report to be accepted in partial fulfillment of requirement for the Degree of Bachelor of Pharmacy.

Date:

Place:

Dr.Amaresh Chandra Sahoo
Department of Pharmaceutics
Institute of Pharmacy and Technology,
Salipur, Cuttack-754202

PRACTICE SCHOOL REPORT

Subject Code: BP706 PS

Submitted to

BIJU PATNAIK UNIVERSITY OF TECHNOLOGY, ODISHA
ROURKELA

In partial fulfillment of requirement for
Award of Degree of Bachelor of Pharmacy
(Session- 2022-23)

Submitted by
PRAKASH KUMAR PANDA
B. Pharm 7th Semester
Roll/Regd. No.:1903257048

Institute of Pharmacy and Technology,
At /Po:- Salipur, Dist: Cuttack, Odisha - 754202

Under the Supervision of
Dr. AMARESH CHANDRA SAHOO
Professor
Department of Pharmaceutics
Institute of Pharmacy & Technology, Salipur
At / Po:- Salipur, Dist: Cuttack, Odisha - 754202

March 2023

INSTITUTE OF PHARMACY & TECHNOLOGY, SALIPUR

Dist.- Cuttack-754202, ODISHA

(Estd. 1982, Regd. No. 5226/371/1987-88 of societies act XXI of 1860)
(Approved by All India Council for Technical Education, Pharmacy Council of India, Govt. of Orissa, Affiliated to Biju Patnaik University of Technology, NAAC (B+), NBA (B.Pharm) accredited and ISO 9001:2015 certified Institution)

CERTIFICATE

This is to certify that Mr. PRAKASH KUMAR PANDA Reg. No. 1903257048 in the partial fulfillment of the requirement for the award of the Degree of Bachelor of Pharmacy has satisfactorily completed 150 hours of practice school under my direct supervision in Pharmaceutics in the academic session 2022-2023. I certify that she/he has carried out this practice school assignments with upmost precision. I hereby recommend the practice school report to be accepted in partial fulfillment of requirement for the Degree of Bachelor of Pharmacy.

Date:

Place:

Dr.Amaresh Chandra Sahoo
Department of Pharmaceutics
Institute of Pharmacy and Technology,
Salipur, Cuttack-754202

PRACTICE SCHOOL REPORT

Subject Code: BP706 PS

Submitted to

BIJU PATNAIK UNIVERSITY OF TECHNOLOGY, ODISHA
ROURKELA

In partial fulfillment of requirement for
Award of Degree of Bachelor of Pharmacy
(Session- 2022-23)

Submitted by
PRASANJIT SAHOO
B. Pharm 7th Semester
Roll/Regd. No.:1903257049

Institute of Pharmacy and Technology,
At /Po:- Salipur, Dist: Cuttack, Odisha - 754202

Under the Supervision of
Name of the Supervisor
Dr. Biswaranjan Mohanty
Professor
Department of Pharmaceutics
Institute of Pharmacy & Technology, Salipur
At / Po:- Salipur, Dist: Cuttack, Odisha - 754202

March 2023

INSTITUTE OF PHARMACY & TECHNOLOGY, SALIPUR

Dist.- Cuttack-754202, ODISHA

(Estd. 1982, Regd. No. 5226/371/1987-88 of societies act XXI of 1860)
(Approved by All India Council for Technical Education, Pharmacy Council of India, Govt. of Orissa, Affiliated to Biju Patnaik University of Technology, NAAC (B+), NBA (B.Pharm) accredited and ISO 9001:2015 certified Institution)

CERTIFICATE

This is to certify that **Sri Prasanjit Sahoo**Regd.No. **1903257049**in the partial fulfillment of the requirement for the award of the Degree of Bachelor of Pharmacy has satisfactorily completed 150 hours of practice school under my direct supervision in Pharmaceutics Department in the academic session 2022-2023. I certify that he has carried out this practice school assignments with upmost precision. I hereby recommend the practice school report to be accepted in partial fulfillment of requirement for the Degree of Bachelor of Pharmacy.

Date:

Place:

Dr. Biswaranjan Mohanty
Professor
Department of Pharmaceutics
Institute of Pharmacy andTechnology,
Salipur, Cuttack-754202

PRACTICE SCHOOL REPORT

Subject Code: BP706 PS

Submitted to

BIJU PATNAIK UNIVERSITY OF TECHNOLOGY, ODISHA
ROURKELA

In partial fulfillment of requirement for
Award of Degree of Bachelor of Pharmacy
(Session- 2022-23)

Submitted by
[PRATIK DASH]
B. Pharm 7th Semester

Roll/Regd. No.:1903257051

Institute of Pharmacy and Technology,
At /Po:- Salipur, Dist: Cuttack, Odisha - 754202

Under the Supervision of
Dr. Sidhartha Sankar Kar
Assistant Professor
Department of Pharmaceutical Chemistry
Institute of Pharmacy & Technology, Salipur
At / Po:- Salipur, Dist: Cuttack, Odisha - 754202

February 2023

INSTITUTE OF PHARMACY & TECHNOLOGY, SALIPUR

Dist.- Cuttack-754202, ODISHA

(Estd. 1982, Regd. No. 5226/371/1987-88 of societies act XXI of 1860)
(Approved by All India Council for Technical Education, Pharmacy Council of India, Govt. of Orissa, Affiliated to Biju Patnaik University of Technology, NAAC (B+), NBA (B Pharm) accredited and ISO 9001:2015 certified Institution)

CERTIFICATE

This is to certify that Mr. PRATIK DASH Reg. No. 1903257051in the partial fulfillment of the requirement for the award of the Degree of Bachelor of Pharmacy has satisfactorily completed 150 hours of practice school under my direct supervision in Pharmaceutical Chemistry Department in the academic session 2022-2023. I certify that she/he has carried out this practice school assignments with upmost precision. I hereby recommend the practice school report to be accepted in partial fulfillment of requirement for the Degree of Bachelor of Pharmacy.

Date: 25.02.23

Place: Salipur

Dr. Sidhartha Sankar Kar
Asst.Professor
Department of Pharmaceutical Chemistry
Institute of Pharmacy and Technology,
Salipur, Cuttack-754202

PRACTICE SCHOOL REPORT

Subject Code: BP706 PS

Submitted to

BIJU PATNAIK UNIVERSITY OF TECHNOLOGY, ODISHA
ROURKELA

In partial fulfillment of requirement for
Award of Degree of Bachelor of Pharmacy
(Session- 2022-23)

Submitted by
PRAVANJAN BEHERA
B. Pharm 7th Semester
Roll/Regd. No.:1903257052

Institute of Pharmacy and Technology,
At /Po:- Salipur, Dist: Cuttack, Odisha - 754202

Under the Supervision of
Dr. AMARESH CHANDRA SAHOO
Professor
Department of Pharmaceutics
Institute of Pharmacy & Technology, Salipur
At / Po:- Salipur, Dist: Cuttack, Odisha - 754202

March 2023

INSTITUTE OF PHARMACY & TECHNOLOGY, SALIPUR

Dist.- Cuttack-754202, ODISHA

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CERTIFICATE

This is to certify that Mr. PRAVANJAN BEHERA Reg. No. 1903257052 in the partial fulfillment of the requirement for the award of the Degree of Bachelor of Pharmacy has satisfactorily completed 150 hours of practice school under my direct supervision in Pharmaceutics in the academic session 2022-2023. I certify that she/he has carried out this practice school assignments with upmost precision. I hereby recommend the practice school report to be accepted in partial fulfillment of requirement for the Degree of Bachelor of Pharmacy.

Date:

Place:

Dr.Amaresh Chandra Sahoo
Department of Pharmaceutics
Institute of Pharmacy and Technology,
Salipur, Cuttack-754202

PRACTICE SCHOOL REPORT

Subject Code: BP706 PS

Submitted to

BIJU PATNAIK UNIVERSITY OF TECHNOLOGY, ODISHA
ROURKELA

In partial fulfillment of requirement for
Award of Degree of Bachelor of Pharmacy
(Session- 2022-23)

Submitted by
PRIYANGINI BEHERA
B. Pharm 7th Semester
Roll/Regd. No.:1903257054

Institute of Pharmacy and Technology,
At /Po:- Salipur, Dist: Cuttack, Odisha - 754202

Under the Supervision of
Dr. SAROJ KUMAR PATRO
Associate Professor
Department of - Pharmacognosy
Institute of Pharmacy & Technology, Salipur
At / Po:- Salipur, Dist: Cuttack, Odisha - 754202

March 2023

INSTITUTE OF PHARMACY & TECHNOLOGY, SALIPUR

Dist.- Cuttack-754202, ODISHA

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CERTIFICATE

This is to certify that Ms. PRIYANGINI BEHERA Reg.No-1903257054 in the partial fulfillment of the requirement for the award of the Degree of Bachelor of Pharmacy has satisfactorily completed 150 hours of practice school under my direct supervision in Pharmaceutical Analysis. Department in the academic session 2022-2023. I certify that she/he has carried out this practice school assignments with upmost precision. I hereby recommend the practice school report to be accepted in partial fulfillment of requirement for the Degree of Bachelor of Pharmacy.

Date: 24/2/23

Place: Salipur.

Dr.SAROJ KUMAR PATRO
Associate Professor
Department of Pharmaceutical Analysis
Institute of Pharmacy andTechnology,
Salipur, Cuttack-754202

PRACTICE SCHOOL REPORT

Subject Code: BP706 PS

Submitted to

BIJU PATNAIK UNIVERSITY OF TECHNOLOGY, ODISHA
ROURKELA

In partial fulfillment of requirement for
Award of Degree of Bachelor of Pharmacy
(Session- 2022-23)

Submitted by
PUJARANI SAHOO
B. Pharm 7th Semester
Roll/Regd. No.: 1903257055

Institute of Pharmacy and Technology,
At /Po:- Salipur, Dist: Cuttack, Odisha - 754202

Under the Supervision of
DR. PRAVAT KUMAR SAHOO
Asst.Professor
Department of pharmaceutics
Institute of Pharmacy & Technology, Salipur
At / Po:- Salipur, Dist: Cuttack, Odisha - 754202

March 2023

INSTITUTE OF PHARMACY & TECHNOLOGY, SALIPUR

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CERTIFICATE

This is to certify that Ms PUJARANI SAHOO Reg. No. 1903257055 in the partial fulfillment of the requirement for the award of the Degree of Bachelor of Pharmacy has satisfactorily completed 150 hours of practice school under my direct supervision in Pharmaceutices Department in the academic session 2022-2023. I certify that she/he has carried out this practice school assignments with upmost precision. I hereby recommend the practice school report to be accepted in partial fulfillment of requirement for the Degree of Bachelor of Pharmacy.

Pravakar Kumar Sahoo
25.2.2023

Date:

Place:

Dr. Pravat Kumar Sahoo
Assistant Professor
Department of Pharmaceutics
Institute of Pharmacy and Technology,
Salipur, Cuttack-754202

PRACTICE SCHOOL REPORT

Subject Code: BP706 PS

Submitted to

BIJU PATNAIK UNIVERSITY OF TECHNOLOGY, ODISHA
ROURKELA

In partial fulfillment of requirement for
Award of Degree of Bachelor of Pharmacy
(Session- 2022-23)

Submitted by
PUJARANI SARANGI
B. Pharm 7th Semester
Roll/Regd. No.:1903257056

Institute of Pharmacy and Technology,
At /Po:- Salipur, Dist: Cuttack, Odisha - 754202

Under the Supervision of
Dr. SAROJ KUMAR PATRO
Associate Professor
Department of - Pharmacognosy
Institute of Pharmacy & Technology, Salipur
At / Po:- Salipur, Dist: Cuttack, Odisha - 754202

March 2023

INSTITUTE OF PHARMACY & TECHNOLOGY, SALIPUR

Dist.- Cuttack-754202, ODISHA

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CERTIFICATE

This is to certify that Ms. PUJARANI SARANGI Reg.No-190325705**6** in the partial fulfillment of the requirement for the award of the Degree of Bachelor of Pharmacy has satisfactorily completed 150 hours of practice school under my direct supervision in Pharmaceutical Analysis. Department in the academic session 2022-2023. I certify that she/he has carried out this practice school assignments with upmost precision. I hereby recommend the practice school report to be accepted in partial fulfillment of requirement for the Degree of Bachelor of Pharmacy.

Date:

Place:

Dr.SAROJ KUMAR PATRO
Associate Professor
Department of Pharmaceutical Analysis
Institute of Pharmacy andTechnology,
Salipur, Cuttack-754202

PRACTICE SCHOOL REPORT

Subject Code: BP706 PS

Submitted to

BIJU PATNAIK UNIVERSITY OF TECHNOLOGY, ODISHA
ROURKELA

In partial fulfillment of requirement for
Award of Degree of Bachelor of Pharmacy
(Session- 2022-23)

Submitted by
Rajesh Kumar Sahoo
B. Pharm 7th Semester
Roll/Regd. No.: 1903257058

Institute of Pharmacy and Technology,
At /Po:- Salipur, Dist: Cuttack, Odisha - 754202

Under the Supervision of
Mrs. Bipasha Behera
Assistant Professor
Institute of Pharmacy & Technology, Salipur
At / Po:- Salipur, Dist: Cuttack, Odisha - 754202

March 2023

INSTITUTE OF PHARMACY & TECHNOLOGY, SALIPUR

Dist.- Cuttack-754202, ODISHA

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CERTIFICATE

This is to certify that Mr. RAJESH KUMAR SAHOO Reg.No-1903257058 in the partial fulfillment of the requirement for the award of the Degree of Bachelor of Pharmacy has satisfactorily completed 150 hours of practice school under my direct supervision in Pharmaceutical Analysis. Department in the academic session 2022-2023. I certify that she/he has carried out this practice school assignments with upmost precision. I hereby recommend the practice school report to be accepted in partial fulfillment of requirement for the Degree of Bachelor of Pharmacy.

B Behera
25/02/23.

Date:

Place:

Mrs. Bipasha Behera
Assistant Professor
Department of Pharmaceutical Analysis
Institute of Pharmacy andTechnology,
Salipur, Cuttack-754202

PRACTICE SCHOOL REPORT

Subject Code: BP706 PS

Submitted to

BIJU PATNAIK UNIVERSITY OF TECHNOLOGY, ODISHA
ROURKELA

In partial fulfillment of requirement for
Award of Degree of Bachelor of Pharmacy
(Session- 2022-23)

Submitted by
RUSIRAJ SWAIN
B. Pharm 7th Semester

Roll/Regd. No.: 1903257059

Institute of Pharmacy and Technology,
At /Po:- Salipur, Dist: Cuttack, Odisha - 754202

Under the Supervision of
DR. P.K SINHA MAHAPATRA
Associate.Professor
Department of pharmaceutics
Institute of Pharmacy & Technology, Salipur
At / Po:- Salipur, Dist: Cuttack, Odisha - 754202

March 2023

INSTITUTE OF PHARMACY & TECHNOLOGY, SALIPUR

Dist.- Cuttack-754202, ODISHA

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CERTIFICATE

This is to certify that Mr.RUSIRAJ SWAIN Reg.No-1903257059 in the partial fulfillment of the requirement for the award of the Degree of Bachelor of Pharmacy has satisfactorily completed 150 hours of practice school under my direct supervision in Pharmaceutical Chemistry.Department in the academic session 2022-2023. I certify that she/he has carried out this practice school assignments with upmost precision. I hereby recommend the practice school report to be accepted in partial fulfillment of requirement for the Degree of Bachelor of Pharmacy.

Date:

Place:

Dr. P.K Sinha Mahapatra
Assistant Professor
Department of Pharmacognosy
Institute of Pharmacy andTechnology,
Salipur, Cuttack-754202

PRACTICE SCHOOL REPORT

Subject Code: BP706 PS

Submitted to

BIJU PATNAIK UNIVERSITY OF TECHNOLOGY, ODISHA
ROURKELA

In partial fulfillment of requirement for
Award of Degree of Bachelor of Pharmacy
(Session- 2022-23)

Submitted by
[SAFALYA DAS]
B. Pharm 7th Semester
Roll/Regd. No.: 1903257060

Institute of Pharmacy and Technology,
At /Po:- Salipur, Dist: Cuttack, Odisha - 754202

Under the Supervision of
Dr. BIBASWAN MISHRA
Asst. Professor
Department of Pharmaceutics
Institute of Pharmacy & Technology, Salipur
At / Po:- Salipur, Dist: Cuttack, Odisha - 754202

March 2023

INSTITUTE OF PHARMACY & TECHNOLOGY, SALIPUR

Dist.- Cuttack-754202, ODISHA

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CERTIFICATE

This is to certify that Mr/Ms SAFALYA DAS Reg.No. 1903257060 in the partial fulfillment of the requirement for the award of the Degree of Bachelor of Pharmacy has satisfactorily completed 150 hours of practice school under my direct supervision in Pharmaceutics Department in the academic session 2022-2023. I certify that she/he has carried out this practice school assignments with upmost precision. I hereby recommend the practice school report to be accepted in partial fulfillment of requirement for the Degree of Bachelor of Pharmacy.

24/02/23

Date:

Place:

Dr. BIBASWAN MISHRA
Asst.Professor
Department of Pharmaceutics,
Institute of Pharmacy and Technology,
Salipur, Cuttack-754202

PRACTICE SCHOOL REPORT

Subject Code: BP706 PS

Submitted to

BIJU PATNAIK UNIVERSITY OF TECHNOLOGY, ODISHA
ROURKELA

In partial fulfillment of requirement for
Award of Degree of Bachelor of Pharmacy
(Session- 2022-23)

Submitted by
SAFINA SALIM
B. Pharm 7th Semester
Roll/Regd. No.:1903257061

Institute of Pharmacy and Technology,
At /Po:- Salipur, Dist: Cuttack, Odisha - 754202

Under the Supervision of
Dr. SAROJ KUMAR PATRO
Associate Professor
Department of - Pharmacognosy
Institute of Pharmacy & Technology, Salipur
At / Po:- Salipur, Dist: Cuttack, Odisha - 754202

March 2023

INSTITUTE OF PHARMACY & TECHNOLOGY, SALIPUR

Dist.- Cuttack-754202, ODISHA

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CERTIFICATE

This is to certify that Ms. SAFINA SALIM Reg.No-1903257061 in the partial fulfillment of the requirement for the award of the Degree of Bachelor of Pharmacy has satisfactorily completed 150 hours of practice school under my direct supervision in Pharmaceutical Analysis. Department in the academic session 2022-2023. I certify that she/he has carried out this practice school assignments with upmost precision. I hereby recommend the practice school report to be accepted in partial fulfillment of requirement for the Degree of Bachelor of Pharmacy.

Date:

Place:

Dr.SAROJ KUMAR PATRO
Associate Professor
Department of Pharmaceutical Analysis
Institute of Pharmacy andTechnology,
Salipur, Cuttack-754202

PRACTICE SCHOOL REPORT

Subject Code: BP706 PS

Submitted to

BIJU PATNAIK UNIVERSITY OF TECHNOLOGY, ODISHA
ROURKELA

In partial fulfillment of requirement for
Award of Degree of Bachelor of Pharmacy
(Session- 2022-23)

Submitted by
SAGRAKANTA MOHANTY
B. Pharm 7th Semester
Roll/Regd. No.:1903257062

Institute of Pharmacy and Technology,
At /Po:- Salipur, Dist: Cuttack, Odisha - 754202

Under the Supervision of
Dr. SAROJ KUMAR PATRO
Associate Professor
Department of - Pharmacognosy
Institute of Pharmacy & Technology, Salipur
At / Po:- Salipur, Dist: Cuttack, Odisha - 754202

March 2023

INSTITUTE OF PHARMACY & TECHNOLOGY, SALIPUR

Dist.- Cuttack-754202, ODISHA

(Estd. 1982, Regd. No. 5226/371/1987-88 of societies act XXI of 1860)
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CERTIFICATE

This is to certify that Mr. SAGRAKANTA MOHANTY Reg.No-1903257062 in the partial fulfillment of the requirement for the award of the Degree of Bachelor of Pharmacy has satisfactorily completed 150 hours of practice school under my direct supervision in Pharmaceutical Analysis. Department in the academic session 2022-2023. I certify that she/he has carried out this practice school assignments with upmost precision. I hereby recommend the practice school report to be accepted in partial fulfillment of requirement for the Degree of Bachelor of Pharmacy.

Date: Salipur,
Place: 24/2/23.

Saroj Kumar Patro

Dr.SAROJ KUMAR PATRO
Associate Professor
Department of Pharmaceutical Analysis
Institute of Pharmacy andTechnology,
Salipur, Cuttack-754202

PRACTICE SCHOOL REPORT

Subject Code: BP706 PS

Submitted to

BIJU PATNAIK UNIVERSITY OF TECHNOLOGY, ODISHA
ROURKELA

In partial fulfillment of requirement for
Award of Degree of Bachelor of Pharmacy
(Session- 2022-23)

Submitted by
[SARADA PRASAD BARIK]
B. Pharm 7th Semester
Roll/Regd. No.:1903257066

Institute of Pharmacy and Technology,
At /Po:- Salipur, Dist: Cuttack, Odisha - 754202

Under the Supervision of
Dr. Sidhartha Sankar Kar
Assistant Professor
Department of Pharmaceutical Chemistry
Institute of Pharmacy & Technology, Salipur
At / Po:- Salipur, Dist: Cuttack, Odisha - 754202

February 2023

INSTITUTE OF PHARMACY & TECHNOLOGY, SALIPUR

Dist.- Cuttack-754202, ODISHA

(Estd. 1982, Regd. No. 5226/371/1987-88 of societies act XXI of 1860)
(Approved by All India Council for Technical Education, Pharmacy Council of India, Govt. of Orissa, Affiliated to Biju Patnaik University of Technology, NAAC (B+), NBA (B.Pharm) accredited and ISO 9001:2015 certified Institution)

CERTIFICATE

This is to certify that Mr. SARADA PRASAD BARIK Reg. No. 1903257066 in the partial fulfillment of the requirement for the award of the Degree of Bachelor of Pharmacy has satisfactorily completed 150 hours of practice school under my direct supervision in Pharmaceutical Chemistry Department in the academic session 2022-2023. I certify that she/he has carried out this practice school assignments with upmost precision. I hereby recommend the practice school report to be accepted in partial fulfillment of requirement for the Degree of Bachelor of Pharmacy.

Date: 25.02.2023

Place: Salipur

Dr. Sidhartha Sankar Kar
Asst.Professor
Department of Pharmaceutical Chemistry
Institute of Pharmacy and Technology,
Salipur, Cuttack-754202

PRACTICE SCHOOL REPORT

Subject Code: BP706 PS

Submitted to

BIJU PATNAIK UNIVERSITY OF TECHNOLOGY, ODISHA
ROURKELA

In partial fulfillment of requirement for
Award of Degree of Bachelor of Pharmacy
(Session- 2022-23)

Submitted by
[Sarada Prasad Sethy]
B. Pharm 7th Semester
Roll/Regd. No.: 1903257067

Institute of Pharmacy and Technology,
At /Po:-Salipur, Dist: Cuttack, Odisha - 754202

Under the Supervision of
Dr.SwalinParija
Assistant Professor
Department of Pharmaceitics
Institute of Pharmacy & Technology, Salipur
At / Po:-Salipur, Dist: Cuttack, Odisha - 754202

March 2023

INSTITUTE OF PHARMACY & TECHNOLOGY, SALIPUR

Dist.- Cuttack-754202, ODISHA

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CERTIFICATE

This is to certify that Mr. Sarada Prasad Sethy Reg. No. 1903257067 in the partial fulfillment of the requirement for the award of the Degree of Bachelor of Pharmacy has satisfactorily completed 150 hours of practice school under my direct supervision in Pharmaceutics Department in the academic session 2022-2023. I certify that he has carried out this practice school assignments with upmost precision. I hereby recommend the practice school report to be accepted in partial fulfillment of requirement for the Degree of Bachelor of Pharmacy.

24-02-23

Date: 24-02-23

Place: IPT, Salipur

Dr. Swalin Parija
Asst. Professor
Department of Pharmaceutics,
Institute of Pharmacy and Technology,
Salipur, Cuttack-754202

PRACTICE SCHOOL REPORT

Subject Code: BP706 PS

Submitted to

BIJU PATNAIK UNIVERSITY OF TECHNOLOGY, ODISHA
ROURKELA

In partial fulfillment of requirement for
Award of Degree of Bachelor of Pharmacy
(Session- 2022-23)

Submitted by
SATYA PRAKASH DASH
B. Pharm 7th Semester
Roll/Regd. No.:1903257069

Institute of Pharmacy and Technology,
At /Po:- Salipur, Dist: Cuttack, Odisha - 754202

Under the Supervision of
Dr.BISHWANATH MISHRA
Assistant Professor
Department of - Pharmacology
Institute of Pharmacy & Technology, Salipur
At / Po:- Salipur, Dist: Cuttack, Odisha - 754202

March 2023

INSTITUTE OF PHARMACY & TECHNOLOGY, SALIPUR

Dist.- Cuttack-754202, ODISHA

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CERTIFICATE

This is to certify that Mr/Ms. SATYA PRAKASH DASH Reg. No. 1903257069 in the partial fulfillment of the requirement for the award of the Degree of Bachelor of Pharmacy has satisfactorily completed 150 hours of practice school under my direct supervision in Pharmacology Department in the academic session 2022-2023. I certify that she/he has carried out this practice school assignments with upmost precision. I hereby recommend the practice school report to be accepted in partial fulfillment of requirement for the Degree of Bachelor of Pharmacy.

Date:

Place:

Dr.Bishwanath Mishra
Asst.Professor
Department of Pharmacology
Institute of Pharmacy and Technology,
Salipur, Cuttack-754202

PRACTICE SCHOOL REPORT

Subject Code: BP706 PS

Submitted to

BIJU PATNAIK UNIVERSITY OF TECHNOLOGY, ODISHA
ROURKELA

In partial fulfillment of requirement for
Award of Degree of Bachelor of Pharmacy
(Session- 2022-23)

Submitted by
SASMITA MALLIK
B. Pharm 7th Semester
Roll/Regd. No.:1903257068

Institute of Pharmacy and Technology,
At /Po:- Salipur, Dist: Cuttack, Odisha - 754202

Under the Supervision of
Mr.DEEPAK KUMAR HATI
Assistant Professor
Department of - Pharmacognosy
Institute of Pharmacy & Technology, Salipur
At / Po:- Salipur, Dist: Cuttack, Odisha - 754202

March 2023

INSTITUTE OF PHARMACY & TECHNOLOGY, SALIPUR

Dist.- Cuttack-754202, ODISHA

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CERTIFICATE

This is to certify that Ms.Sasmita Mallik ....Reg.No-1903257068.....in the partial fulfillment of the requirement for the award of the Degree of Bachelor of Pharmacy has satisfactorily completed 150 hours of practice school under my direct supervision in Pharmacognosy.Department in the academic session 2022-2023. I certify that she/he has carried out this practice school assignments with upmost precision. I hereby recommend the practice school report to be accepted in partial fulfillment of requirement for the Degree of Bachelor of Pharmacy.

Date:

Place:

Dr. Deepak Kumar Hati
Assistant Professor
Department of Pharmacognosy
Institute of Pharmacy andTechnology,
Salipur, Cuttack-754202

PRACTICE SCHOOL REPORT

Subject Code: BP706 PS

Submitted to

BIJU PATNAIK UNIVERSITY OF TECHNOLOGY, ODISHA
ROURKELA

In partial fulfillment of requirement for
Award of Degree of Bachelor of Pharmacy
(Session- 2022-23)

Submitted by
[SAURAYA RANJAN DEBATA]
B. Pharm 7th Semester

Roll/Regd. No.: 1903257070

Institute of Pharmacy and Technology,
At /Po:- Salipur, Dist: Cuttack, Odisha - 754202

Under the Supervision of
Dr. BIBASWAN MISHRA
Asst. Professor
Department of Pharmaceutics
Institute of Pharmacy & Technology, Salipur
At / Po:- Salipur, Dist: Cuttack, Odisha - 754202

March 2023

INSTITUTE OF PHARMACY & TECHNOLOGY, SALIPUR

Dist.- Cuttack-754202, ODISHA

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CERTIFICATE

This is to certify that Mr/Ms SAURAVA RANJAN DEBATA Reg.No. 1903257070 in the partial fulfillment of the requirement for the award of the Degree of Bachelor of Pharmacy has satisfactorily completed 150 hours of practice school under my direct supervision in Pharmaceutics Department in the academic session 2022-2023. I certify that she/he has carried out this practice school assignments with upmost precision. I hereby recommend the practice school report to be accepted in partial fulfillment of requirement for the Degree of Bachelor of Pharmacy.

24/02/23

Date:

Place:

Dr. BIBASWAN MISHRA
Asst.Professor
Department of Pharmaceutics,
Institute of Pharmacy andTechnology,
Salipur, Cuttack-754202

PRACTICE SCHOOL REPORT

Subject Code: BP706 PS

Submitted to

BIJU PATNAIK UNIVERSITY OF TECHNOLOGY, ODISHA
ROURKELA

In partial fulfilment of requirement for
Award of Degree of Bachelor of Pharmacy
(Session- 2022-23)

Submitted by
SIBA PRASAD DASH
B. Pharm 7th Semester
Roll/Regd. No.:~ 1903257074

Institute of Pharmacy and Technology,
At /Po:- Salipur, Dist: Cuttack, Odisha - 754202

Under the Supervision of
DR. RANJAN KUMAR GIRI
Assistant Professor
Department of Pharmacology
Institute of Pharmacy & Technology, Salipur
At / Po:- Salipur, Dist: Cuttack, Odisha - 754202

March 2023

INSTITUTE OF PHARMACY & TECHNOLOGY, SALIPUR

Dist.- Cuttack-754202, ODISHA

(Estd. 1982, Regd. No. 5226/371/1987-88 of societies act XXI of 1860)
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CERTIFICATE

This is to certify that Mr. **Siba Prasad Dash** Reg. No. **1903257074** in the partial fulfillment of the requirement for the award of the Degree of Bachelor of Pharmacy has satisfactorily completed 150 hours of practice school under my direct supervision Pharmacology Department in the academic session 2022-2023. I certify that she/he has carried out this practice school assignments with upmost precision. I hereby recommend the practice school report to be accepted in partial fulfillment of requirement for the Degree of Bachelor of Pharmacy.

Date: 25/02/23

Place: Salepur

Dr. Ranjan Kumar Giri
Assistant Professor
Department of Pharmacology,
Institute of Pharmacy and Technology,
Salipur, Cuttack-754202

PRACTICE SCHOOL REPORT

Subject Code: BP706 PS

Submitted to

BIJU PATNAIK UNIVERSITY OF TECHNOLOGY, ODISHA
ROURKELA

In partial fulfillment of requirement for
Award of Degree of Bachelor of Pharmacy
(Session- 2022-23)

Submitted by
SIMALIN BISWAL
B. Pharm 7th Semester
Roll/Regd. No.:1903257075

Institute of Pharmacy and Technology,
At /Po:- Salipur, Dist: Cuttack, Odisha - 754202

Under the Supervision of
Dr.BHABANI SHANKAR NAYAK
Associate. Professor
Department of - Pharmaceutics
Institute of Pharmacy & Technology, Salipur
At / Po:- Salipur, Dist: Cuttack, Odisha - 754202

2023

INSTITUTE OF PHARMACY & TECHNOLOGY, SALIPUR

Dist.- Cuttack-754202, ODISHA

(Estd. 1982, Regd. No. 5226/371/1987-88 of societies act XXI of 1860)
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CERTIFICATE

This is to certify that Mr. SIMALIN BISWAL Reg. No. 1903257075 in the partial fulfillment of the requirement for the award of the Degree of Bachelor of Pharmacy has satisfactorily completed 150 hours of practice school under my direct supervision in pharmaceutics Department in the academic session 2022-2023. I certify that she/he has carried out this practice school assignments with upmost precision. I hereby recommend the practice school report to be accepted in partial fulfillment of requirement for the Degree of Bachelor of Pharmacy.

25/2/2023

Date:25/02/23

Place:IPT, SALIPUR

Dr. BHABANI SHANKAR NAYAK
Professor
Department of pharmaceutics.,
Institute of Pharmacy andTechnology,
Salipur, Cuttack-754202

PRACTICE SCHOOL REPORT

Subject Code: BP706 PS

Submitted to

BIJU PATNAIK UNIVERSITY OF TECHNOLOGY, ODISHA
ROURKELA

In partial fulfillment of requirement for
Award of Degree of Bachelor of Pharmacy
(Session- 2022-23)

Submitted by
[SK AFTAB HUSSAIN]
B. Pharm 7th Semester

Roll/Regd. No.: 1903257076

Institute of Pharmacy and Technology,
At /Po:- Salipur, Dist: Cuttack, Odisha - 754202

Under the Supervision of

Dr. BIBASWAN MISHRA
Asst. Professor
Department of Pharmaceutics
Institute of Pharmacy & Technology, Salipur
At / Po:- Salipur, Dist: Cuttack, Odisha - 754202

March 2023

INSTITUTE OF PHARMACY & TECHNOLOGY, SALIPUR

Dist - Cuttack-754202, ODISHA

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CERTIFICATE

This is to certify that Mr/Ms SK AFTAB HUSSAIN .Reg.No. 1903257076 in the partial fulfillment of the requirement for the award of the Degree of Bachelor of Pharmacy has satisfactorily completed 150 hours of practice school under my direct supervision in Pharmaceutics Department in the academic session 2022-2023. I certify that she/he has carried out this practice school assignments with upmost precision. I hereby recommend the practice school report to be accepted in partial fulfillment of requirement for the Degree of Bachelor of Pharmacy.

24/5/23

Date:

Place:

Dr. BIBASWAN MISHRA
Asst.Professor
Department of Pharmaceutics,
Institute of Pharmacy and Technology,
Salipur, Cuttack-754202

PRACTICE SCHOOL REPORT

Subject Code: BP706 PS

Submitted to

BIJU PATNAIK UNIVERSITY OF TECHNOLOGY, ODISHA
ROURKELA

In partial fulfillment of requirement for
Award of Degree of Bachelor of Pharmacy
(Session- 2022-23)

Submitted by
SK AKBAR ALLI
B. Pharm 7th Semester
Roll/Regd. No.:1903257077

Institute of Pharmacy and Technology,
At /Po:- Salipur, Dist: Cuttack, Odisha - 754202

Under the Supervision of
Dr. ASWINI KUMAR SENAPATI
Assistant Professor
Department of – Pharmacology
Institute of Pharmacy & Technology, Salipur
At / Po:- Salipur, Dist: Cuttack, Odisha - 754202

March 2023

INSTITUTE OF PHARMACY & TECHNOLOGY, SALIPUR

Dist.- Cuttack-754202, ODISHA

(Estd. 1982, Regd. No. 5226/371/1987-88 of societies act XXI of 1860)
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CERTIFICATE

This is to certify that Mr/Ms. SK AKBAR ALLI Reg.No. 1903257077 in the partial fulfillment of the requirement for the award of the Degree of Bachelor of Pharmacy has satisfactorily completed 150 hours of practice school under my direct supervision in Pharmacology Department in the academic session 2022-2023. I certify that she/he has carried out this practice school assignments with upmost precision. I hereby recommend the practice school report to be accepted in partial fulfillment of requirement for the Degree of Bachelor of Pharmacy.

Date:

Place:

Dr. Aswini Kumar Senapati
Professor
Department of pharmacology.,
Institute of Pharmacy andTechnology,
Salipur, Cuttack-754202

PRACTICE SCHOOL REPORT

Subject Code: BP706 PS

Submitted to

BIJU PATNAIK UNIVERSITY OF TECHNOLOGY, ODISHA
ROURKELA

In partial fulfillment of requirement for
Award of Degree of Bachelor of Pharmacy
(Session- 2022-23)

Submitted by
SMRUTI RANJAN ROUL
B. Pharm 7th Semester
Roll/Regd. No.: 1903257080

Institute of Pharmacy and Technology,
At /Po:- Salipur, Dist: Cuttack, Odisha - 754202

Under the Supervision of
DR. MRITYUNJAY BANERJEE
Asst.Professor
Department of pharmacology
Institute of Pharmacy & Technology, Salipur
At / Po:- Salipur, Dist: Cuttack, Odisha - 754202

March 2023

INSTITUTE OF PHARMACY & TECHNOLOGY, SALIPUR

Dist.- Cuttack-754202, ODISHA

(Estd. 1982, Regd. No. 5226/371/1987-88 of societies act XXI of 1860)
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CERTIFICATE

This is to certify that Mr.Smruti Ranjan Roul Reg. No.1903257080 in the partial fulfillment of the requirement for the award of the Degree of Bachelor of Pharmacy has satisfactorily completed 150 hours of practice school under my direct supervision in Pharmaceutical Chemistry Department in the academic session 2022-2023. I certify that she/he has carried out this practice school assignments with upmost precision. I hereby recommend the practice school report to be accepted in partial fulfillment of requirement for the Degree of Bachelor of Pharmacy.

Banerjee 24/2/23

Date: 24-02-2023

Place:

Dr.Mrityunjay Banerjee
Professor
Department of
Pharmaceutical Chemistry
Institute of Pharmacy and Technology,
Salipur, Cuttack-754202

PRACTICE SCHOOL REPORT

Subject Code: BP706 PS

Submitted to

BIJU PATNAIK UNIVERSITY OF TECHNOLOGY, ODISHA
ROURKELA

In partial fulfillment of requirement for
Award of Degree of Bachelor of Pharmacy
(Session- 2022-23)

Submitted by
SNEHASISH NAYAK
B. Pharm 7th Semester

Roll/Regd. No.: 1903257081

Institute of Pharmacy and Technology,
At /Po:- Salipur, Dist: Cuttack, Odisha - 754202

Under the Supervision of
DR. PRAVAT KUMAR SAHOO
Asst.Professor
Department of pharmaceutics
Institute of Pharmacy & Technology, Salipur
At / Po:- Salipur, Dist: Cuttack, Odisha - 754202

March 2023

Dist.- Cuttack-754202, ODISHA

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CERTIFICATE

This is to certify that Mr. SNEHASISH NAYAK Reg. No. 1903257081 in the partial fulfillment of the requirement for the award of the Degree of Bachelor of Pharmacy has satisfactorily completed 150 hours of practice school under my direct supervision in Pharmaceutics in the academic session 2022-2023. I certify that she/he has carried out this practice school assignments with upmost precision. I hereby recommend the practice school report to be accepted in partial fulfillment of requirement for the Degree of Bachelor of Pharmacy.

Pravat Kumar Sahoo
25.2.2023

Dr.PRAVAT KUMAR SAHOO
Department of Pharmaceutics
Institute of Pharmacy and Technology,
Salipur, Cuttack-754202

Date:

Place:

PRACTICE SCHOOL REPORT

Subject Code: BP706 PS

Submitted to

BIJU PATNAIK UNIVERSITY OF TECHNOLOGY, ODISHA
ROURKELA

In partial fulfillment of requirement for
Award of Degree of Bachelor of Pharmacy
(Session- 2022-23)

Submitted by
SONALI MONALISHA
B. Pharm 7th Semester
Roll/Regd. No.:1903257082

Institute of Pharmacy and Technology,
At /Po:- Salipur, Dist: Cuttack, Odisha - 754202

Under the Supervision of
Mr.DEEPAK KUMAR HATI
Assistant Professor
Department of - Pharmacognosy
Institute of Pharmacy & Technology, Salipur
At / Po:- Salipur, Dist: Cuttack, Odisha - 754202

March 2023

INSTITUTE OF PHARMACY & TECHNOLOGY, SALIPUR

Dist.- Cuttack-754202, ODISHA

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CERTIFICATE

This is to certify that Mr/Ms:-SONALI MONALISHA Reg.No. 1903257082 in the partial fulfillment of the requirement for the award of the Degree of Bachelor of Pharmacy has satisfactorily completed 150 hours of practice school under my direct supervision of Mr.DEEPAK KUMAR HATI in Pharmaconosy Department in the academic session 2022-2023. I certify that she/he has carried out this practice school assignments with upmost precision. I hereby recommend the practice school report to be accepted in partial fulfillment of requirement for the Degree of Bachelor of Pharmacy.

Date:

Place:

DEEPAK KUMAR HATI
Asst.Professor
Department of Pharmaconosy
Institute of Pharmacy andTechnology,
Salipur, Cuttack-754202

PRACTICE SCHOOL REPORT

Subject Code: BP706 PS

Submitted to

BIJU PATNAIK UNIVERSITY OF TECHNOLOGY, ODISHA
ROURKELA

In partial fulfillment of requirement for
Award of Degree of Bachelor of Pharmacy
(Session- 2022-23)

Submitted by
Soumya Ranjan Nayak
B. Pharm 7th Semester
Roll/Regd. No.: 1903257083

Institute of Pharmacy and Technology,
At /Po:- Salipur, Dist: Cuttack, Odisha - 754202

Under the Supervision of
Mrs. Bipasha Behera
Assistant Professor
Institute of Pharmacy & Technology, Salipur
At / Po:- Salipur, Dist: Cuttack, Odisha - 754202

March 2023

INSTITUTE OF PHARMACY & TECHNOLOGY, SALIPUR

Dist.- Cuttack-754202, ODISHA

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CERTIFICATE

This is to certify that Mr.SOUMYA RANJAN NAYAK Reg.No-1903257083 in the partial fulfillment of the requirement for the award of the Degree of Bachelor of Pharmacy has satisfactorily completed 150 hours of practice school under my direct supervision in Pharmaceutical Analysis. Department in the academic session 2022-2023. I certify that she/he has carried out this practice school assignments with upmost precision. I hereby recommend the practice school report to be accepted in partial fulfillment of requirement for the Degree of Bachelor of Pharmacy.

B Behera 25/02/23

Date:

Place:

Mrs. Bipasha Behera
Assistant Professor
Department of Pharmaceutical Analysis
Institute of Pharmacy andTechnology,
Salipur, Cuttack-754202

PRACTICE SCHOOL REPORT

Subject Code: BP706 PS

Submitted to

BIJU PATNAIK UNIVERSITY OF TECHNOLOGY, ODISHA
ROURKELA

In partial fulfillment of requirement for
Award of Degree of Bachelor of Pharmacy
(Session- 2022-23)

Submitted by
[SOUMYA RANJAN NAYAK]
B. Pharm 7th Semester
Roll/Regd. No.: 1903257084

Institute of Pharmacy and Technology,
At /Po:- Salipur, Dist: Cuttack, Odisha - 754202

Under the Supervision of
Dr. MINAKETAN SAHOO
Asst. Professor
Department of Pharmaceutics
Institute of Pharmacy & Technology, Salipur
At / Po:- Salipur, Dist: Cuttack, Odisha - 754202

March 2023

INSTITUTE OF PHARMACY & TECHNOLOGY, SALIPUR

Dist.- Cuttack-754202, ODISHA

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CERTIFICATE

This is to certify that Mr/Ms SOUMYA RANJAN NAYAK Reg.No. 1903257084 in the partial fulfillment of the requirement for the award of the Degree of Bachelor of Pharmacy has satisfactorily completed 150 hours of practice school under my direct supervision in Pharmaceutics Department in the academic session 2022-2023. I certify that she/he has carried out this practice school assignments with upmost precision. I hereby recommend the practice school report to be accepted in partial fulfillment of requirement for the Degree of Bachelor of Pharmacy.

Sahoo 25.2.23

Date:

Place:

Dr. MINAKETAN SAHOO
Asst.Professor
Department of Pharmaceutics,
Institute of Pharmacy and Technology,
Salipur, Cuttack-754202

PRACTICE SCHOOL REPORT

Subject Code: BP706 PS

Submitted to

BIJU PATNAIK UNIVERSITY OF TECHNOLOGY, ODISHA
ROURKELA

In partial fulfillment of requirement for
Award of Degree of Bachelor of Pharmacy
(Session- 2022-23)

Submitted by
SOUMYA RANJAN SWAIN
B. Pharm 7th Semester
Roll/Regd. No.:1903257085

Institute of Pharmacy and Technology,
At /Po:- Salipur, Dist: Cuttack, Odisha - 754202

Under the Supervision of
Dr. ASWINI KUMAR SENAPATI
Assistant Professor
Department of - Pharmacology
Institute of Pharmacy & Technology, Salipur
At / Po:- Salipur, Dist: Cuttack, Odisha - 754202

March 2023

INSTITUTE OF PHARMACY & TECHNOLOGY, SALIPUR

Dist.- Cuttack-754202, ODISHA

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CERTIFICATE

This is to certify that Mr. SOUMYA RANJAN SWAIN Reg.No-1903257085 in the partial fulfillment of the requirement for the award of the Degree of Bachelor of Pharmacy has satisfactorily completed 150 hours of practice school under my direct supervision in Pharmacology. Department in the academic session 2022-2023. I certify that she/he has carried out this practice school assignments with upmost precision. I hereby recommend the practice school report to to be accepted in partial fulfillment of requirement for the Degree of Bachelor of Pharmacy.

Date: 25/07/23

Place:

Dr.Aswini Kumar Senapati
Associate Professor
Department of Pharmacology
Institute of Pharmacy andTechnology,
Salipur, Cuttack-754202

"DISPENSING AND PATIENT COUNSELLING"

Report submitted for practice school for the partial fulfillment for completion of B-Pharmacy 7th samester

Subject: Practice School

Subject code: BP706PS

Submitted by:

Soumyadeep Mishra

Regd No.1903257087

B Pharm 7th Semester

Under supervision:

Dr. Bishwanath Mishra
M. Pharm, PhD
Assistant Professor
Department of Pharmacology

Institute of Pharmacy & Technology
Salipur, Cuttack-754202, Odisha

2022-23

INSTITUTE OF PHARMACY & TECHNOLOGY, SALIPUR

Dist.- Cuttack-754202, ODISHA

(Estd. 1982, Regd. No. 5226/371/1987-88 of societies act XXI of 1860)
(Approved by All India Council for Technical Education, Pharmacy Council of India, Govt. of Orissa, Affiliated to Biju Patnaik University of Technology, NAAC (B+), NBA (B.Pharm) accredited and ISO 9001:2015 certified Institution)

CERTIFICATE

This is to certify that Mr/Ms. Soumyadeep Mishra Reg. No. 1903257087 in the partial fulfillment of the requirement for the award of the Degree of Bachelor of Pharmacy has satisfactorily completed 150 hours of practice school under my direct supervision in Phramcology Department in the academic session 2022-2023. I certify that she/he has carried out this practice school assignments with upmost precision. I hereby recommend the practice school report to be accepted in partial fulfillment of requirement for the Degree of Bachelor of Pharmacy.

Date:

Place:

Dr. Bishwanath Mishra
Asst. Professor
Department of Pharmacology
Institute of Pharmacy and Technology,
Salipur, Cuttack-754202

PRACTICE SCHOOL REPORT

Subject Code: BP706 PS

Submitted to

BIJU PATNAIK UNIVERSITY OF TECHNOLOGY, ODISHA
ROURKELA

In partial fulfillment of requirement for
Award of Degree of Bachelor of Pharmacy
(Session- 2022-23)

Submitted by
[SUBHAM PRIYADARSHI GHADEI]
B. Pharm 7th Semester
Roll/Regd. No.: 1903257089

Institute of Pharmacy and Technology,
At /Po:- Salipur, Dist: Cuttack, Odisha - 754202

Under the Supervision of
Dr. BIBASWAN MISHRA
Asst. Professor
Department of Pharmaceutics
Institute of Pharmacy & Technology, Salipur
At / Po:- Salipur, Dist: Cuttack, Odisha - 754202

March 2023

INSTITUTE OF PHARMACY & TECHNOLOGY, SALIPUR

Dist.- Cuttack-754202, ODISHA

(Estd. 1982, Regd. No. 5226/371/1987-88 of societies act XXI of 1860)
(Approved by All India Council for Technical Education, Pharmacy Council of India, Govt. of Orissa, Affiliated to Biju Patnaik University of Technology, NAAC (B+), NBA (B.Pharm) accredited and ISO 9001:2015 certified Institution)

CERTIFICATE

This is to certify that Mr/Ms SUBHAM PRIYADARSHI GHADEI .Reg.No. 1903257089 in the partial fulfillment of the requirement for the award of the Degree of Bachelor of Pharmacy has satisfactorily completed 150 hours of practice school under my direct supervision in Pharmaceutics Department in the academic session 2022-2023. I certify that she/he has carried out this practice school assignments with upmost precision. I hereby recommend the practice school report to be accepted in partial fulfillment of requirement for the Degree of Bachelor of Pharmacy.

24/02/23

Date:

Place:

Dr. BIBASWAN MISHRA
Asst.Professor
Department of Pharmaceutics,
Institute of Pharmacy andTechnology,
Salipur, Cuttack-754202

PRACTICE SCHOOL REPORT

Subject Code: BP706 PS

Submitted to

BIJU PATNAIK UNIVERSITY OF TECHNOLOGY, ODISHA
ROURKELA

In partial fulfillment of requirement for
Award of Degree of Bachelor of Pharmacy
(Session- 2022-23)

Submitted by
SUPRANGYA SUBHADARSINI
B. Pharm 7th Semester
Roll/Regd. No.:1903257092

Institute of Pharmacy and Technology,
At /Po:- Salipur, Dist: Cuttack, Odisha - 754202

Under the Supervision of
Dr. MINAKETAN SAHOO
Asst.Professor
Department of Pharmaceutics Analysis
Institute of Pharmacy & Technology, Salipur
At / Po:- Salipur, Dist: Cuttack, Odisha - 754202

March 2023

INSTITUTE OF PHARMACY & TECHNOLOGY, SALIPUR

Dist.- Cuttack-754202, ODISHA

(Estd. 1982, Regd. No. 5226/371/1987-88 of societies act XXI of 1860)
(Approved by All India Council for Technical Education, Pharmacy Council of India, Govt. of Orissa, Affiliated to Biju Patnaik University of Technology, NAAC (B+), NBA (B.Pharm) accredited and ISO 9001:2015 certified Institution)

CERTIFICATE

This is to certify that Ms.Suprangya Subhadarsini .Reg. No. 1903257092 in the partial fulfillment of the requirement for the award of the Degree of Bachelor of Pharmacy has satisfactorily completed 150 hours of practice school under my direct supervision in Pharma. Analysis Department in the academic session 2022-2023. I certify that she/he has carried out this practice school assignments with upmost precision. I hereby recommend the practice school report to be accepted in partial fulfillment of requirement for the Degree of Bachelor of Pharmacy.

Sahoo 25.2.23

Date: 25.02.2023

Place: IPT, Salipur

Dr. Minaketan Sahoo
Assistant Professor
Department of Pharma. Analysis,
Institute of Pharmacy and Technology,
Salipur, Cuttack-754202

PRACTICE SCHOOL REPORT

Subject Code: BP706 PS

Submitted to

BIJU PATNAIK UNIVERSITY OF TECHNOLOGY, ODISHA
ROURKELA

In partial fulfillment of requirement for
Award of Degree of Bachelor of Pharmacy
(Session- 2022-23)

Submitted by
[Swapnashree Mohanty]
B. Pharm 7th Semester
Roll/Regd. No.: 1903257094

Institute of Pharmacy and Technology,
At /Po:- Salipur, Dist: Cuttack, Odisha - 754202

Under the Supervision of
Dr.Swalin Parija
Assistant Professor
Department of Pharmaceitics
Institute of Pharmacy & Technology, Salipur
At / Po:- Salipur, Dist: Cuttack, Odisha - 754202

March 2023

INSTITUTE OF PHARMACY & TECHNOLOGY, SALIPUR

Dist.- Cuttack-754202, ODISHA

(Estd. 1982, Regd. No. 5226/371/1987-88 of societies act XXI of 1860)
(Approved by All India Council for Technical Education, Pharmacy Council of India, Govt. of Orissa, Affiliated to Biju Patnaik University of Technology, NAAC (B+), NBA (B.Pharm) accredited and ISO 9001:2015 certified Institution)

CERTIFICATE

This is to certify that Miss. **Swapnashree Mohanty** Reg. No. **1903257094** in the partial fulfillment of the requirement for the award of the Degree of Bachelor of Pharmacy has satisfactorily completed 150 hours of practice school under my direct supervision in Pharmaceutics Department in the academic session 2022-2023. I certify that he has carried out this practice school assignments with upmost precision. I hereby recommend the practice school report to be accepted in partial fulfillment of requirement for the Degree of Bachelor of Pharmacy.

Date: 24-02-23

Place: IPT, Salipur

Dr. Swatin Parija
Asst. Professor
Department of Pharmaceutics,
Institute of Pharmacy and Technology,
Salipur, Cuttack-754202

PRACTICE SCHOOL REPORT

Subject Code: BP706 PS

Submitted to

BIJU PATNAIK UNIVERSITY OF TECHNOLOGY, ODISHA
ROURKELA

In partial fulfillment of requirement for
Award of Degree of Bachelor of Pharmacy
(Session- 2022-23)

Submitted by
SWASTIK KAR
B. Pharm 7th Semester
Roll/Regd. No.:1903257095

Institute of Pharmacy and Technology,
At /Po:- Salipur, Dist: Cuttack, Odisha - 754202

Under the Supervision of
Mr.DEEPAK KUMAR HATI
Assistant Professor
Department of - Pharmacognosy
Institute of Pharmacy & Technology, Salipur
At / Po:- Salipur, Dist: Cuttack, Odisha - 754202

March 2023

INSTITUTE OF PHARMACY & TECHNOLOGY, SALIPUR

Dist.- Cuttack-754202, ODISHA

(Estd. 1982, Regd. No. 5226/371/1987-88 of societies act XXI of 1860)
(Approved by All India Council for Technical Education, Pharmacy Council of India, Govt. of Orissa, Affiliated to Biju Patnaik University of Technology, NAAC (B+), NBA (B.Pharm) accredited and ISO 9001:2015 certified Institution)

CERTIFICATE

This is to certify that Mr. SWASTIK KAR ....Reg.No-1903257095 in the partial fulfillment of the requirement for the award of the Degree of Bachelor of Pharmacy has satisfactorily completed 150 hours of practice school under my direct supervision in Pharmacognosy.Department in the academic session 2022-2023. I certify that she/he has carried out this practice school assignments with upmost precision. I hereby recommend the practice school report to be accepted in partial fulfillment of requirement for the Degree of Bachelor of Pharmacy.

Date:

Place:

14/3/22

Dr. Deepak Kumar Hati
Assistant Professor
Department of Pharmacognosy
Institute of Pharmacy andTechnology,
Salipur, Cuttack-754202

PRACTICE SCHOOL REPORT

Subject Code: BP706 PS

Submitted to

BIJU PATNAIK UNIVERSITY OF TECHNOLOGY, ODISHA
ROURKELA

In partial fulfillment of requirement for
Award of Degree of Bachelor of Pharmacy
(Session- 2022-23)

Submitted by
TARINI ASHISH SAHOO
B. Pharm 7th Semester
Roll/Regd. No.:1903257097

Institute of Pharmacy and Technology,
At /Po:- Salipur, Dist: Cuttack, Odisha - 754202

Under the Supervision of
Mr.BHABANI SHANKAR NAYAK
Associate. Professor
Department of - Pharmaceutics
Institute of Pharmacy & Technology, Salipur
At / Po:- Salipur, Dist: Cuttack, Odisha - 754202

2023

INSTITUTE OF PHARMACY & TECHNOLOGY, SALIPUR

Dist.- Cuttack-754202, ODISHA

(Estd. 1982, Regd. No. 5226/371/1987-88 of societies act XXI of 1860)
(Approved by All India Council for Technical Education, Pharmacy Council of India, Govt. of Orissa, Affiliated to Biju Patnaik University of Technology, NAAC (B+), NBA (B Pharm) accredited and ISO 9001:2015 certified Institution)

CERTIFICATE

This is to certify that Mr. TARINI ASHISH SAHOO Reg. No. 1903257097 in the partial fulfillment of the requirement for the award of the Degree of Bachelor of Pharmacy has satisfactorily completed 150 hours of practice school under my direct supervision in pharmaceutics Department in the academic session 2022-2023. I certify that she/he has carried out this practice school assignments with upmost precision. I hereby recommend the practice school report to be accepted in partial fulfillment of requirement for the Degree of Bachelor of Pharmacy.

25/2/2023

Date:25/02/23

Place:IPT, SALIPUR

Dr. BHABANI SHANKAR NAYAK
Professor
Department of pharmaceutics.,
Institute of Pharmacy andTechnology,
Salipur, Cuttack-754202

PRACTICE SCHOOL REPORT

Subject Code: BP706 PS

Submitted to

BIJU PATNAIK UNIVERSITY OF TECHNOLOGY, ODISHA
ROURKELA

In partial fulfillment of requirement for
Award of Degree of Bachelor of Pharmacy
(Session- 2022-23)

Submitted by
TOOFAN ORJEET PATI
B. Pharm 7th Semester
Roll/Regd. No.:1903257099

Institute of Pharmacy and Technology,
At /Po:- Salipur, Dist: Cuttack, Odisha - 754202

Under the Supervision of
Dr.BHABANI SHANKAR NAYAK
Associate. Professor
Department of - Pharmaceutics
Institute of Pharmacy & Technology, Salipur
At / Po:- Salipur, Dist: Cuttack, Odisha - 754202

2023

INSTITUTE OF PHARMACY & TECHNOLOGY, SALIPUR

Dist.- Cuttack-754202, ODISHA

(Estd. 1982, Regd. No. 5226/371/1987-88 of societies act XXI of 1860)
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CERTIFICATE

This is to certify that Mr.TOOFAN ORJEET PATI Reg. No. 1903257099 in the partial fulfillment of the requirement for the award of the Degree of Bachelor of Pharmacy has satisfactorily completed 150 hours of practice school under my direct supervision in pharmaceutics Department in the academic session 2022-2023. I certify that she/he has carried out this practice school assignments with upmost precision. I hereby recommend the practice school report to be accepted in partial fulfillment of requirement for the Degree of Bachelor of Pharmacy.

25/2/2023

Date:25/02/23

Place:IPT, SALIPUR

Dr. BHABANI SHANKAR NAYAK
Professor
Department of pharmaceutics.,
Institute of Pharmacy andTechnology,
Salipur, Cuttack-754202

PRACTICE SCHOOL REPORT

Subject Code: BP706 PS

Submitted to

BIJU PATNAIK UNIVERSITY OF TECHNOLOGY, ODISHA
ROURKELA

In partial fulfillment of requirement for
Award of Degree of Bachelor of Pharmacy
(Session- 2022-23)

Submitted by
UDAYA KIRAN SAHOO
B. Pharm 7th Semester
Roll/Regd. No.:1903257100

Institute of Pharmacy and Technology,
At /Po:- Salipur, Dist: Cuttack, Odisha - 754202

Under the Supervision of
Mr.BHABANI SHANKAR NAYAK
Associate. Professor
Department of - Pharmaceutics
Institute of Pharmacy & Technology, Salipur
At / Po:- Salipur, Dist: Cuttack, Odisha - 754202

2023

INSTITUTE OF PHARMACY & TECHNOLOGY, SALIPUR

Dist.- Cuttack-754202, ODISHA

(Estd. 1982, Regd. No. 5226/371/1987-88 of societies act XXI of 1860)
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CERTIFICATE

This is to certify that Mr. UDAYA KIRAN SAHOO Reg. No. 1903257100 in the partial fulfillment of the requirement for the award of the Degree of Bachelor of Pharmacy has satisfactorily completed 150 hours of practice school under my direct supervision in pharmaceutics Department in the academic session 2022-2023. I certify that she/he has carried out this practice school assignments with upmost precision. I hereby recommend the practice school report to be accepted in partial fulfillment of requirement for the Degree of Bachelor of Pharmacy.

25/2/2023

Dr. BHABANI SHANKAR NAYAK
Professor
Department of pharmaceutics.,
Institute of Pharmacy andTechnology,
Salipur, Cuttack-754202

Date:25/02/23

Place:IPT, SALIPUR

PRACTICE SCHOOL REPORT

Subject Code: BP706 PS

Submitted to

BIJU PATNAIK UNIVERSITY OF TECHNOLOGY, ODISHA
ROURKELA

In partial fulfillment of requirement for
Award of Degree of Bachelor of Pharmacy
(Session- 2022-23)

Submitted by
SATYABRAT BISWAL
B. Pharm 7th Semester
Roll/Regd. No.: 1903257103

Institute of Pharmacy and Technology,
At /Po:- Salipur, Dist: Cuttack, Odisha - 754202

Under the Supervision of
DR. MRITYUNJAY BANERJEE
Asst.Professor
Department of pharmacology
Institute of Pharmacy & Technology, Salipur
At / Po:- Salipur, Dist: Cuttack, Odisha - 754202

March 2023

INSTITUTE OF PHARMACY & TECHNOLOGY, SALIPUR

Dist.- Cuttack-754202, ODISHA

(Estd. 1982, Regd. No. 5226/371/1987-88 of societies act XXI of 1860)
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CERTIFICATE

This is to certify that Mr. SATYABRAT BISWAL Reg. No. 1903257103 in the partial fulfillment of the requirement for the award of the Degree of Bachelor of Pharmacy has satisfactorily completed 150 hours of practice school under my direct supervision in Pharmaceutical Chemistry .Department in the academic session 2022-2023. I certify that he has carried out this practice school assignments with upmost precision. I hereby recommend the practice school report to be accepted in partial fulfillment of requirement for the Degree of Bachelor of Pharmacy.

Banerjee 24/2/23

Date: 24.02.23

Place: IPT Salipur

Dr. MRITYUNJAY BANERJEE
.Professor
Department of Pharmaceutical Chemistry,
Institute of Pharmacy and Technology,
Salipur, Cuttack-754202

PRACTICE SCHOOL REPORT

Subject Code: BP706 PS

Submitted to

BIJU PATNAIK UNIVERSITY OF TECHNOLOGY, ODISHA
ROURKELA

In partial fulfillment of requirement for
Award of Degree of Bachelor of Pharmacy
(Session- 2022-23)

Submitted by
[SAUMAN DAS]
B. Pharm 7th Semester
Roll/Regd. No.:1903257104

Institute of Pharmacy and Technology,
At /Po:- Salipur, Dist: Cuttack, Odisha - 754202

Under the Supervision of

Dr.AMARESH CHANDRA SAHOO
Asst.Professor
Department of Pharmacrutics
Institute of Pharmacy & Technology, Salipur
At / Po:- Salipur, Dist: Cuttack, Odisha - 754202

March 2023

INSTITUTE OF PHARMACY & TECHNOLOGY, SALIPUR

Dist.- Cuttack-754202, ODISHA

(Estd. 1982, Regd. No. 5226/371/1987-88 of societies act XXI of 1860)
(Approved by All India Council for Technical Education, Pharmacy Council of India, Govt. of Orissa, Affiliated to Biju Patnaik University of Technology, NAAC (B+), NBA (B.Pharm) accredited and ISO 9001:2015 certified Institution)

CERTIFICATE

This is to certify that Mr/Ms. SAUMAN DAS Reg. No. 1903257104 in the partial fulfillment of the requirement for the award of the Degree of Bachelor of Pharmacy has satisfactorily completed 150 hours of practice school under my direct supervision in Pharmaceutics Department in the academic session 2022-2023. I certify that she/he has carried out this practice school assignments with upmost precision. I hereby recommend the practice school report to be accepted in partial fulfillment of requirement for the Degree of Bachelor of Pharmacy.

Date:

Place:

Dr.Amaresh Chandra Sahoo
Asst.Professor
Department of Pharmaceutics
Institute of Pharmacy and Technology,
Salipur, Cuttack-754202

PRACTICE SCHOOL REPORT

Subject Code: BP706 PS

Submitted to

BIJU PATNAIK UNIVERSITY OF TECHNOLOGY, ODISHA
ROURKELA

In partial fulfillment of requirement for
Award of Degree of Bachelor of Pharmacy
(Session- 2022-23)

Submitted by
[DEBAPRAKASH NAYAK]
B. Pharm 7th Semester
Roll/Regd. No.: 2023257001

Institute of Pharmacy and Technology,
At /Po:- Salipur, Dist: Cuttack, Odisha - 754202

Under the Supervision of

Dr. BIBASWAN MISHRA
Asst. Professor
Department of Pharmaceutics
Institute of Pharmacy & Technology, Salipur
At / Po:- Salipur, Dist: Cuttack, Odisha - 754202

March 2023

INSTITUTE OF PHARMACY & TECHNOLOGY, SALIPUR

Dist.- Cuttack-754202, ODISHA

(Estd. 1982, Regd. No. 5226/371/1987-88 of societies act XXI of 1860)
(Approved by All India Council for Technical Education, Pharmacy Council of India, Govt. of Orissa, Affiliated to Biju Patnaik University of Technology, NAAC (B+), NBA (B Pharm) accredited and ISO 9001:2015 certified Institution)

CERTIFICATE

This is to certify that Mr/Ms DEBAPRAKASH NAYAK Reg.No. 1903257001 in the partial fulfillment of the requirement for the award of the Degree of Bachelor of Pharmacy has satisfactorily completed 150 hours of practice school under my direct supervision in Pharmaceutics Department in the academic session 2022-2023. I certify that she/he has carried out this practice school assignments with upmost precision. I hereby recommend the practice school report to be accepted in partial fulfillment of requirement for the Degree of Bachelor of Pharmacy.

24/02/23

Dr. BIBASWAN MISHRA
Asst.Professor
Department of Pharmaceutics,
Institute of Pharmacy and Technology,
Salipur, Cuttack-754202

Date:

Place:

PRACTICE SCHOOL REPORT

Subject Code: BP706 PS

Submitted to

BIJU PATNAIK UNIVERSITY OF TECHNOLOGY, ODISHA
ROURKELA

In partial fulfilment of requirement for
Award of Degree of Bachelor of Pharmacy
(Session- 2022-23)

Submitted by
AISHWARIKA JENA
B. Pharm 7th Semester
Roll/Regd. No.:~ 2023257002

Institute of Pharmacy and Technology,
At /Po:- Salipur, Dist: Cuttack, Odisha - 754202

Under the Supervision of
Dr. RANJAN KUMAR GIRI
Assistant Professor
Department of Pharmacology
Institute of Pharmacy & Technology, Salipur
At / Po:- Salipur, Dist: Cuttack, Odisha - 754202

March 2023

INSTITUTE OF PHARMACY & TECHNOLOGY, SALIPUR

Dist.- Cuttack-754202, ODISHA

(Estd. 1982, Regd. No. 5226/371/1987-88 of societies act XXI of 1860)
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CERTIFICATE

This is to certify that Ms. **Aishwarika Jena** Reg. No. **2023257002** in the partial fulfillment of the requirement for the award of the Degree of Bachelor of Pharmacy has satisfactorily completed 150 hours of practice school under my direct supervision Pharmacology Department in the academic session 2022-2023. I certify that she/he has carried out this practice school assignments with upmost precision. I hereby recommend the practice school report to be accepted in partial fulfillment of requirement for the Degree of Bachelor of Pharmacy.

Date: 3rd Apr

Place: 25/02/23

Dr. Ranjan Kumar Giri
Assistant Professor
Department of Pharmacology,
Institute of Pharmacy and Technology,
Salipur, Cuttack-754202

PRACTICE SCHOOL REPORT

Subject Code: BP706 PS

Submitted to

BIJU PATNAIK UNIVERSITY OF TECHNOLOGY, ODISHA
ROURKELA

In partial fulfillment of requirement for
Award of Degree of Bachelor of Pharmacy
(Session- 2022-23)

Submitted by
BHAGYASHREE ROUT
B. Pharm 7th Semester
Roll/Regd. No.:2023257004

Institute of Pharmacy and Technology,
At /Po:- Salipur, Dist: Cuttack, Odisha - 754202

Under the Supervision of
Dr. MINAKETAN SAHOO
Asst.Professor
Department of Pharmaceutics Analysis
Institute of Pharmacy & Technology, Salipur
At / Po:- Salipur, Dist: Cuttack, Odisha - 754202

March 2023

INSTITUTE OF PHARMACY & TECHNOLOGY, SALIPUR

Dist.- Cuttack-754202, ODISHA

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CERTIFICATE

This is to certify that Ms.Bhagyashree Rout .Reg. No. 2023257004 in the partial fulfillment of the requirement for the award of the Degree of Bachelor of Pharmacy has satisfactorily completed 150 hours of practice school under my direct supervision in Pharma. Analysis Department in the academic session 2022-2023. I certify that she/he has carried out this practice school assignments with upmost precision. I hereby recommend the practice school report to be accepted in partial fulfillment of requirement for the Degree of Bachelor of Pharmacy.

25-2-23

Date: 25-02-2023

Place: IPT, Salipur

Dr. Minaketan Sahoo
Assistant Professor
Department of Pharma. Analysis,
Institute of Pharmacy and Technology,
Salipur, Cuttack-754202

PRACTICE SCHOOL REPORT

Subject Code: BP706 PS

Submitted to

BIJU PATNAIK UNIVERSITY OF TECHNOLOGY, ODISHA
ROURKELA

In partial fulfillment of requirement for
Award of Degree of Bachelor of Pharmacy
(Session- 2022-23)

Submitted by
KRISHNA KALPITA KAR
B. Pharm 7th Semester
Roll/Regd. No.: 2023257008

Institute of Pharmacy and Technology,
At /Po:- Salipur, Dist: Cuttack, Odisha - 754202

Under the Supervision of
Dr.SUJIT KUMAR SAHU
Assistant Professor
Department of Pharmaceutical Chemistry
Institute of Pharmacy & Technology, Salipur
At / Po:- Salipur, Dist: Cuttack, Odisha - 754202

March 2023

INSTITUTE OF PHARMACY & TECHNOLOGY, SALIPUR

Dist.- Cuttack-754202, ODISHA

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CERTIFICATE

This is to certify that Mr/Ms. KRISHNA KALPITA KAR Reg. No. 2023257008 in the partial fulfillment of the requirement for the award of the Degree of Bachelor of Pharmacy has satisfactorily completed 150 hours of practice school under my direct supervision in Pharmaceutical Chemistry Department in the academic session 2022-2023. I certify that she/he has carried out this practice school assignments with upmost precision. I hereby recommend the practice school report to be accepted in partial fulfillment of requirement for the Degree of Bachelor of Pharmacy.

Date: 20/2/23

Place: Salipur

Dr. SUJIT KUMAR SAHU
Asst.Professor
Department of Pharmaceutical Chemistry
Institute of Pharmacy and Technology,
Salipur, Cuttack-754202

PRACTICE SCHOOL REPORT

Subject Code: BP706 PS

Submitted to

BIJU PATNAIK UNIVERSITY OF TECHNOLOGY, ODISHA
ROURKELA

In partial fulfillment of requirement for
Award of Degree of Bachelor of Pharmacy
(Session- 2022-23)

Submitted by
MOHAMMED FAYAZ
B. Pharm 7th Semester
Roll/Regd. No.:2023257010

Institute of Pharmacy and Technology,
At /Po:- Salipur, Dist: Cuttack, Odisha - 754202

Under the Supervision of
Dr.BISHWANATH MISHRA
Assistant Professor
Department of - Pharmacology
Institute of Pharmacy & Technology, Salipur
At / Po:- Salipur, Dist: Cuttack, Odisha - 754202

March 2023

INSTITUTE OF PHARMACY & TECHNOLOGY, SALIPUR

Dist - Cuttack-754202, ODISHA

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CERTIFICATE

This is to certify that Mr/Ms. MOHAMED FAYAZ Reg. No. 2023257010 in the partial fulfillment of the requirement for the award of the Degree of Bachelor of Pharmacy has satisfactorily completed 150 hours of practice school under my direct supervision in Pharmacology Department in the academic session 2022-2023. I certify that she/he has carried out this practice school assignments with upmost precision. I hereby recommend the practice school report to be accepted in partial fulfillment of requirement for the Degree of Bachelor of Pharmacy.

Date:

Place:

Dr. Bishwanath Mishra
Asst.Professor
Department of Pharmacology
Institute of Pharmacy and Technology,
Salipur, Cuttack-754202

PRACTICE SCHOOL REPORT

Subject Code: BP706 PS

Submitted to

BIJU PATNAIK UNIVERSITY OF TECHNOLOGY, ODISHA
ROURKELA

In partial fulfillment of requirement for
Award of Degree of Bachelor of Pharmacy
(Session- 2022-23)

Submitted by

MANAS RANJAN MAHARANA **(2023257009)**
SOUMYA RANJAN TRIPATHY **(1903257086)**
BINAYAK NAYAK **(2023257006)**
SANKET KUMAR ROUT **(1903257065)**
DIPTENDU SAHOO **(1903257029)**

B. Pharm 7thSemester

Institute of Pharmacy and Technology,
At /Po:- Salipur, Dist: Cuttack, Odisha - 754202

Under the Supervision of

Dr.SUJIT DASH

Assistant Professor

Department of - Pharmacognosy

Institute of Pharmacy & Technology, Salipur

At / Po:- Salipur, Dist: Cuttack, Odisha - 754202

March 2023

INSTITUTE OF PHARMACY & TECHNOLOGY, SALIPUR

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(Approved by All India Council for Technical Education, Pharmacy Council of India, Govt. of Orissa, Affiliated to Biju Patnaik University of Technology, NAAC (B+), NBA (B Pharm) accredited and ISO 9001:2015 certified Institution)

CERTIFICATE

This is to certify that Mr/Ms.MANAS RANJAN MAHARANA,SOUMYA RANJAN TRIPATHY,BINAYAK NAYAK,SANKET KUMAR ROUT,DIPTENDU SAHOO Reg. No. 2023257009,1903257086,2023257006,1903257065,1903257029 in the partial fulfillment of the requirement for the award of the Degree of Bachelor of Pharmacy has satisfactorily completed 150 hours of practice school under my direct supervision in Pharmacognosy Department in the academic session 2022-2023. I certify that she/he has carried out this practice school assignments with upmost precision. I hereby recommend the practice school report to be accepted in partial fulfillment of requirement for the Degree of Bachelor of Pharmacy.

24/2/2023

Date: 24/2/2023

Place: Salipur

Dr.SUJIT DASH
Asst.Professor
Department of Pharmacognosy
Institute of Pharmacy and Technology,
Salipur, Cuttack-754202

PRACTICE SCHOOL REPORT

Subject Code: BP706 PS

Submitted to

BIJU PATNAIK UNIVERSITY OF TECHNOLOGY, ODISHA
ROURKELA

In partial fulfillment of requirement for
Award of Degree of Bachelor of Pharmacy
(Session- 2022-23)

Submitted by

SURYAKANTA SAHOO	**1903257093**
ANIL KUMAR MOHARANA	**1903257006**
SAMRAT SWAIN	**1903257064**
PRATIK BARMA	**1903257050**
PARTHA SARATHI PRAHARAJ	**1903257046**

B. Pharm 7thSemester

Institute of Pharmacy and Technology,
At /Po:- Salipur, Dist: Cuttack, Odisha - 754202

Under the Supervision of
Dr. SUSHANTA KUMAR BEHERA
Assistant Professor
Department of Pharmaceutics
Institute of Pharmacy & Technology, Salipur
At / Po:- Salipur, Dist: Cuttack, Odisha - 754202

March 2023

INSTITUTE OF PHARMACY & TECHNOLOGY, SALIPUR

Dist.- Cuttack-754202, ODISHA

(Estd. 1982, Regd. No. 5226/371/1987-88 of societies act XXI of 1860)
(Approved by All India Council for Technical Education, Pharmacy Council of India, Govt. of Orissa, Affiliated to Biju Patnaik University of Technology, NAAC (B+), NBA (B.Pharm) accredited and ISO 9001:2015 certified Institution)

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SAMRAT SWAIN **1903257064**
PRATIK BARMA **1903257050**
PARTHA SARATHI PRAHARAJ **1903257046**

in the partial fulfillment of the requirement for the award of the Degree of Bachelor of Pharmacy has satisfactorily completed 150 hours of practice school under my direct supervision in Pharmaceutics Department in the academic session 2022-2023. I certify that she/he has carried out this practice school assignments with upmost precision. I hereby recommend the practice school report to be accepted in partial fulfillment of requirement for the Degree of Bachelor of Pharmacy.

Date: 25.02.23

Place:

Dr. SUSHANTA KUMAR BEHERA
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PRACTICE SCHOOL REPORT

Subject Code: BP706 PS

Submitted to

BIJU PATNAIK UNIVERSITY OF TECHNOLOGY, ODISHA
ROURKELA

In partial fulfillment of requirement for
Award of Degree of Bachelor of Pharmacy
(Session- 2022-23)

Submitted by

SHAHIL MISHRA	**1903257072**
SUBHAM MOHAPATRA	**1903257088**
RADHAKANTA NANDA	**1903257057**
SAYED TAFZIL HASSAN	**1903257071**
SK AWAB WASIM	**1903257078**

B. Pharm 7th Semester

Institute of Pharmacy and Technology,
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March 2023

INSTITUTE OF PHARMACY & TECHNOLOGY, SALIPUR

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Date:

Place:

Dr. A K PRUSTY
Asst.Professor
Department of Pharmaceutics
Institute of Pharmacy and Technology,
Salipur, Cuttack-754202

PHYTO-ANALYTICAL AND ANTI-DIABETIC EVALUATION OF CLERODENDRUM VISCOSUM FLOWER

THESIS SUBMITTED TO
BIJU PATNAIK UNIVERSITY OF TECHNOLOGY ODISHA
FOR THE AWARD OF

MASTER OF PHARMACY

By

AMIT KUMAR SAHOO

Regd. No.- 2108257001

Under the joint Guidance of

Dr. Minaketan Sahoo
Asst. Professor, Department of
Pharmaceutical Analysis

Dr. Bishwanath Mishra
Asst. Professor,
Department of Pharmacology

INSTITUTE OF PHARMACY & TECHNOLOGY,
SALIPUR, CUTTACK, ODISHA-754202
2023

PHYTO-ANALYTICAL AND ANTI-DIABETIC EVALUATION OF CLERODENDRUM VISCOSUM FLOWER

THESIS SUBMITTED TO
BIJU PATNAIK UNIVERSITY OF TECHNOLOGY ODISHA
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MASTER OF PHARMACY

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AMIT KUMAR SAHOO

Regd. No.- 2108257001

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Dr. Minaketan Sahoo
Asst. Professor, Department of Pharmaceutical Analysis

Dr. Bishwanath Mishra
Asst. Professor,
Department of Pharmacology

INSTITUTE OF PHARMACY & TECHNOLOGY,
SALIPUR, CUTTACK, ODISHA-754202
2023

CERTIFICATE

This is to certify that the thesis entitled **"Phyto-analytical and anti-diabetic evaluation of *Clerodendrum viscosum* flower"** submitted in the fulfillment for the award of degree of **Master of Pharmacy** was carried out in the Laboratories of Institute of Pharmacy and Technology, Salipur by **Mr. Amit Kumar Sahoo** under the joint supervision of **Dr. Minaketan Sahoo** (Asst. Professor, Department of Pharmaceutical Analysis) and **Dr. Bishwanath Mishra** (Asst. Professor, Department of Pharmacology).

21/08/23

Dr. P. K. Sinha Mahapatra,
M.Pharm., Ph.D.
Principal,
Institute of Pharmacy and Technology,
Salipur, Odisha.

PRINCIPAL I/C,
INSTITUTE OF PHARMACY & TECHNOLOGY, SALIPUR
AT/PO-SALIPUR, DIST-CUTTACK-754202, ODISHA

CERTIFICATE

This is to certify that the thesis entitled **"Phyto-analytical and anti-diabetic evaluation of *Clerodendrum viscosum* flower"** pertain to the bonafide project work was carried out by **Mr. Amit Kumar Sahoo,** under our joint supervision for the award of degree of **Master of Pharmacy** in the Department of Pharmaceutical Analysis, Institute of Pharmacy and Technology, Salipur, affiliated to Biju Patnaik University Technology, Odisha.

Sahoo 20.07.23

Dr. Minaketan Sahoo
Asst. Professor, Department of
Pharmaceutical Analysis

20/7/23

Dr. Bishwanath Mishra
Asst. Professor,
Department of Pharmacology

DEVELOPMENT OF SIMULTANEOUS DETERMINATION OF TICAGRELOR AND ASPIRIN BY STABILITY INDICATING UV SPECTROPHOTOMETRIC AND RP-HPLC METHODS IN BULK AND THEIR FORMULATIONS

THESIS SUBMITTED TO
BIJU PATNAIK UNIVERSITY OF TECHNOLOGY ODISHA
FOR THE AWARD OF

MASTER OF PHARMACY

By

ANSHUMAN BARIK

M. Pharm.

Regd. No.- 2108257002

Under the joint Guidance of

Dr. Minaketan Sahoo
Asst. Professor, Department of Pharmaceutical Analysis

Dr. Amaresh Chandra Sahoo
Asst. Professor,
Department of Pharmaceutics

INSTITUTE OF PHARMACY AND TECHNOLOGY,
SALIPUR, CUTTACK, ODISHA-754202

2023

DEVELOPMENT OF SIMULTANEOUS DETERMINATION OF TICAGRELOR AND ASPIRIN BY STABILITY INDICATING UV SPECTROPHOTOMETRIC AND RP-HPLC METHODS IN BULK AND THEIR FORMULATIONS

THESIS SUBMITTED TO
BIJU PATNAIK UNIVERSITY OF TECHNOLOGY ODISHA
FOR THE AWARD OF

MASTER OF PHARMACY

By

ANSHUMAN BARIK

M. Pharm.

Regd. No.- 2108257001

Under the joint Guidance of

Dr. Minaketan Sahoo
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Dr. Amaresh Chandra Sahoo
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2023

CERTIFICATE

This is to certify that the thesis entitled **"Development of Simultaneous Determination of Ticagrelor and Aspirin by Stability Indicating UV Spectrophotometric and RP-HPLC methods in bulk and their Formulations"** pertain to the bonafide project work was carried out by **Mr. Anshuman Barik,** for the award of degree of **Master of Pharmacy** in the Department of Pharmaceutical Analysis, Institute of Pharmacy and Technology, Salipur, affiliated to Biju Patnaik University Technology, Odisha.

Sahoo 20.07.23

Dr. Minaketan Sahoo
Asst. Professor, Department of
Pharmaceutical Analysis

Amaresh Ch Sahoo 20.7.2023

Dr. Amaresh Chandra Sahoo
Asst. Professor,
Department of Pharmaceutics

CERTIFICATE

This is to certify that the thesis entitled **"Development of Simultaneous Determination of Ticagrelor and Aspirin by Stability Indicating UV Spectrophotometric and RP-HPLC methods in bulk and their Formulations"** submitted in the fulfillment for the award of degree of **Master of Pharmacy** was carried out in the Laboratories of Institute of Pharmacy and Technology, Salipur by **Mr. Anshuman Barik** under the joint supervision of **Dr. Minaketan Sahoo** and **Dr. Amaresh Chandra Sahoo.**

21/08/23

Dr. P. K. Sinha Mahapatra,
M.Pharm., Ph.D.
Principal,
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Salipur, Odisha.

PRINCIPAL I/C.
INSTITUTE OF PHARMACY & TECHNOLOGY, SALIPUR
AT/PO-SALIPUR, DIST-CUTTACK-754202, ODISHA

STABILITY INDICATING SPECTROPHOTOMETRIC METHOD FOR SIMULTANEOUS ESTIMATION OF EMTRICITABINE & TENOFOVIR IN BULK & PHARMACEUTICAL DOSAGE FORM

A dissertation submitted in partial fulfilment of the requirements for the
Master degree in Pharmacy

Submitted By

ASHALATA NAYAK

M. Pharm 4th Semester

(Regd. No.:- 2108257004)

Department of Pharmaceutical Analysis

Under the Joint Guidance of

Guide

Mrs. Bipasha Behera
ASST. PROFESSOR
Department of Pharmaceutical Analysis

&

Co-Guide

Dr. Minaketan Sahoo
ASST. PROFESSOR
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INSTITUTE OF PHARMACY AND TECHNOLOGY

SALIPUR, CUTTACK, ODISHA -754202

2023

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Department of Pharmaceutical Analysis

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SALIPUR, CUTTACK. ODISHA -754202

2023

CERTIFICATE

This is to certify that the thesis entitled "**Stability Indicating Spectrophotometric Method For Simultaneous Estimation Of Emtricitabine & Tenofovir In Bulk & Pharmaceutical Dosage Form**" is a bonafide work submitted by **Miss. ASHALATA NAYAK** (Reg. No.2108257004) in partial fulfillment of the requirement for the Degree of Master of Pharmacy under my direct supervision at the Department of Pharmaceutical Analysis, Institute of Pharmacy and Technology, Salipur, Cuttack. I certify that she has carried out this research work with upmost precision. I hereby recommend this dissertation to be accepted in partial fulfillment of requirement for the Degree of Master of Pharmacy. I am pleased to forward this thesis for evaluation.

Date - 20.07.23

Place -

Mrs. Bipasha Behera

Assistant Professor

Department of Pharmaceutical Analysis

Institute of Pharmacy & Technology

Salipur, Cuttack-754202

CERTIFICATE

This is to certify that the thesis entitled "**Stability Indicating Spectrophotometric Method For Simultaneous Estimation Of Emtricitabine & Tenofovir In Bulk & Pharmaceutical Dosage Form**" is a bonafide work submitted by **Miss. ASHALATA NAYAK** (Reg. No.2108257004) in partial fulfillment of the requirement for the Degree of Master of Pharmacy under my direct supervision at the Department of Pharmaceutical Analysis, Institute of Pharmacy and Technology, Salipur, Cuttack. I certify that she has carried out this research work with upmost precision. I hereby recommend this dissertation to be accepted in partial fulfillment of requirement for the Degree of Master of Pharmacy. I am pleased to forward this thesis for evaluation.

Place: Salipur

Date- 20.07.23

Sahoo 20.07.23

Dr. Minaketan Sahoo
Assistant Professor
Department of Pharmaceutical Analysis
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Salipur,Cuttack-754202

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Place: Salipur

Date- 20.07.23

20/07/23

Principal

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DR. P.K. SINHAMAHAPATRA
PRINCIPAL I/C,
INSTITUTE OF PHARMACY & TECHNOLOGY, SALIPUR
AT/PO-SALIPUR, DIST-CUTTACK-754202, ODISHA

COMPARISON STUDY OF FORMULATED AND MARKETED FAST DISSOLVING TABLETS OF PIOGLITAZONE

The

Thesis Submitted in partial fulfillment to

BPUT

For the award of Master of Pharmacy (Pharmaceutical Analysis)

By

Bhagyadhara Behera

Regd No.2108257005

Under the joint guidance of

Dr Amiya kumar Prusty M. Pharm, PhD

&

Dr Saroja Kumar Patro M. Pharm, PhD

INSTITUTE OF PHARMACY & TECHNOLOGY

Salipur, Cuttack, Odisha –754202

July,2023

INSTITUTE OF PHARMACY & TECHNOLOGY
SALIPUR
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(Regd. No. 5226/371/1987-88 of Societies Act. XXI of 1860)
(An ISO 9001: 2008 Certified institution)
Estd. 1982
Approved by All India Council of Technical Education, Pharmacy Council of India, & Govt. of Odisha
Affiliated to Biju Patnaik University of Technology & Odisha Board of Pharmacy, Odisha

VISION: To generate competent pharma human resources
MISSION: To impart quality education in pharmacy with continuous enrichment of knowledge and skill, to inculcate the competitive attitude, leadership quality with ethical approach, to meet the dynamic needs of global village in all relevant fields

CERTIFICATE

This is to certify that **Bhagyadhara Behera,** **Regd No.2108257005** has carried out the research work entitled "**Comparison study of formulated and marketed fast dissolving tablets of Pioglitazone.**" under the joint guidance of Dr. Amiya Kumar Prusty, Asst. Professor, IPT, Salipur and Dr Saroja Kumar Patro, Associate professor during the academic year 2022-23 submitted in partial fulfillment for the award of M. Pharma(Pharmaceutical analysis) degree from Biju Patnaik University of Technology, Rourkela.

Dr. Amiya Kumar Prusty
M. Pharm, PhD
Asst. Professor
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INSTITUTE OF PHARMACY & TECHNOLOGY
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AT/P.O. SALIPUR, DIST. CUTTACK, PIN 754 202, ODISHA.

(Regd. No. 3220 371-1987-88 of Societies Act. XXI of 1860)

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21/05/23

Dr. P. K. Sinha mahapatra
Principal (I/C)
Institute of Pharmacy& Technology
Salipur, Cuttack, Odisha -754202

Stability Indicating Analytical Method Development And Validation Of Ritonavir In Bulk And Tablet Dosage Form

THESIS SUBMITTED TO BIJU PATNAIK UNIVERSITY OF TECHNOLOGY FOR THE PARTIAL FULFILMENT OF AWARD FOR THE DEGREE OF MASTER OF PHARMACY

IN

PHARMACEUTICAL ANALYSIS

Submitted By

BITARKITA ROU TRAY

M. Pharm 4th Semester

(Regd. No.:- 2108257006)

Under the Joint Guidance of

Guide

MRS. BIPASHA BEHERA
ASST. PROFESSOR

&

Co-Guide

DR.MINAKETAN SAHOO
ASST. PROFESSOR

DEPARTMENT OF PHARMACEUTICAL ANALYSIS

INSTITUTE OF PHARMACY AND TECHNOLOGY

SALIPUR, CUTTACK, ODISHA -754202

2023

CERTIFICATE

This is to certify that the thesis entitled **"Stability Indicating Analytical method development and validation of Ritonavir in Bulk and Tablet Dosage form"** submitted in partial fulfillment of the award of the degree of Master in Pharmacy in Pharmaceutical Analysis & Quality assurance was carried out by **Bitarkita Routray** (Regd. No: 2108257006) under the joint guidance of **Mrs Bipasha Behera** (Assistant Professor) & **Dr.Minaketan Sahoo** (Assistant Professor).

Place: Salipur

Date- 20·07·23

B Behera

Mrs. Bipasha Behera
Assistant Professor
IPT, Salipur

CERTIFICATE

This is to certify that the thesis entitled **"Stability Indicating Analytical method development and validation of Ritonavir in Bulk and Tablet Dosage form"** submitted in partial fulfillment of the award of the degree of Master in Pharmacy in Pharmaceutical Analysis & Quality assurance was carried out by **Bitarkita Routray** (Regd. No: 2108257006) under the joint guidance of **Mrs Bipasha Behera** (Assistant Professor) & **Dr.Minaketan Sahoo** (Assistant Professor).

Place: Salipur

Date- 20·7·23

Sahoo 20.07.23

Dr.Minaketan Sahoo
Assistant Professor
IPT, Salipur

CERTIFICATE

This is to certify that the thesis entitled **"Stability Indicating Analytical method development and validation of Ritonavir in Bulk and Tablet Dosage form"** is a bonafide work submitted by **Bitarkita Routray,** in partial fulfillment of the requirement for the degree of Master in Pharmacy (Pharmaceutical Analysis & Quality Assurance) was carried out in the Institute of Pharmacy & Technology, Salipur, under the joint guidance of **Mrs Bipasha Behera** (Assistant Professor) & **Dr.Minaketan Sahoo** (Assistant Professor).

Place: Salipur

Date- 20.7.23

Principal

Institute of Pharmacy &Technology

Salipur, Cuttack, Odisha-754202

DR. P.K. SINHAMAHAPATRA
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