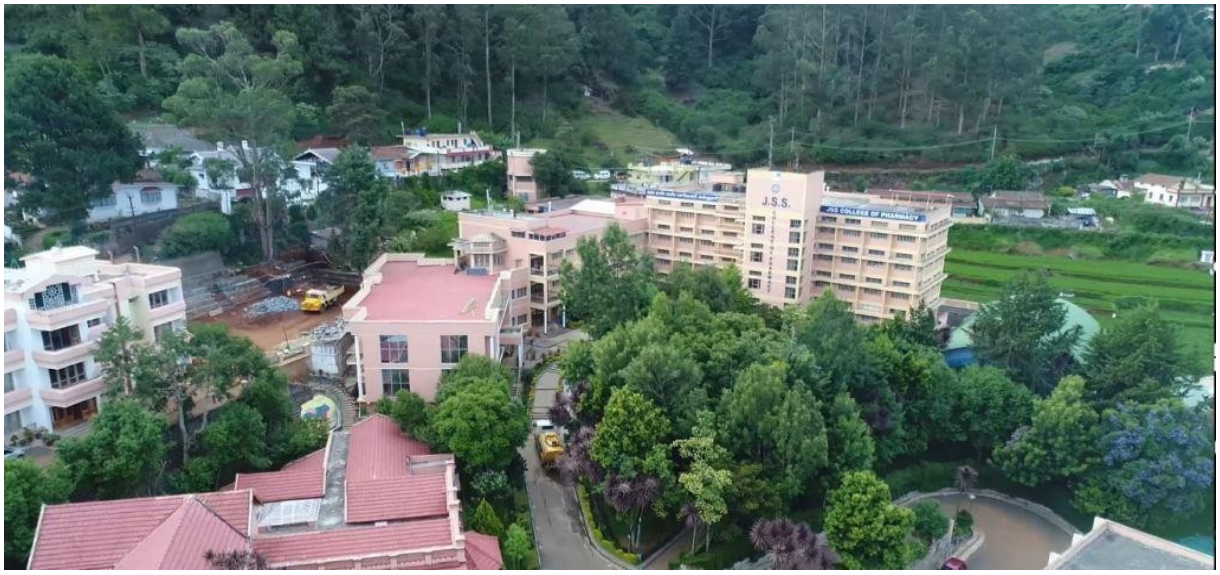
JSS Academy of Higher Education & Research, Mysuru
(Accredited 'A++' Grade by NAAC)

JSS College of Pharmacy, Ooty

(ISO 9001:2015 Certified Institution)



College Calendar

Academic Year: 2023-24

June 2024

Date	Day	Particulars
1	SAT	
2	**SUN**	**Holiday**
3	MON	**Commencement of Academic Year 2023-24 for II-V Year Pharm.D. & II Year D.Pharm.**
4	TUE	
5	WED	
6	THU	
7	FRI	
8	SAT	
9	**SUN**	**Holiday**
10	MON	
11	TUE	
12	WED	
13	THU	
14	FRI	
15	SAT	
16	**SUN**	**Holiday**
17	**MON**	**Bakrid - Holiday**
18	TUE	
19	WED	
20	THU	
21	FRI	
22	SAT	
23	**SUN**	**Holiday**
24	MON	
25	TUE	
26	WED	
27	THU	**Commencement of Short Vacation**
28	FRI	
29	SAT	
30	**SUN**	**Holiday - Completion of Internship for VI Pharm.D.**

July 2023

Date	Day	Particulars
1	MON	**Commencement of Academic Session 2023-24 for VI Pharm.D. (Internship)**
2	TUE	
3	WED	
4	THU	**Reporting after Short Vacation**
5	FRI	**Orientation Program for I Year D.Pharm., I Pharm.D., and I Pharm.D. (PB) & I Sem B.Pharm. and I Sem M.Pharm.** **Commencement of Academic Year 2023-24 for III, V, VII Sem B.Pharm., and III Sem M.Pharm.**
6	SAT	**Orientation Program for Freshers**
7	**SUN**	**Holiday - Orientation Program for Freshers**
8	MON	**Orientation Program for Freshers**
9	TUE	**Orientation Program for Freshers**
10	WED	**Commencement of regular classes to all Freshers**
11	THU	
12	FRI	
13	SAT	
14	**SUN**	**Holiday**
15	MON	
16	TUE	
17	**WED**	**Muharram- Holiday**
18	THU	
19	FRI	
20	SAT	
21	**SUN**	**Holiday**
22	MON	
23	TUE	
24	WED	
25	THU	
26	FRI	
27	SAT	**Fresher's Day Celebrations @ 12.00 Noon**
28	**SUN**	**Holiday**
29	MON	
30	TUE	
31	WED	

August 2023

Date	Day	Particulars
1	THU	
2	FRI	
3	SAT	
4	**SUN**	**Holiday**
5	MON	
6	TUE	
7	WED	
8	THU	
9	FRI	
10	SAT	
11	**SUN**	**Holiday**
12	MON	
13	TUE	
14	WED	
15	**THU**	**Independence Day - Holiday, Independence Day Celebrations & Flag Hoisting by 9.00 a.m.**
16	FRI	
17	SAT	Model OSCE for V PharmD
18	**SUN**	**Holiday**
19	MON	I Sessional Practical Examinations for I, III, V and VII Sem B.Pharm., I and III Sem M.Pharm., I - IV Year Pharm.D. & I-II Year D.Pharm.
20	TUE	I Sessional Practical Examinations for I, III, V and VII Sem B.Pharm., I and III Sem M.Pharm., I - IV Year Pharm.D. & I-II Year D.Pharm.
21	WED	I Sessional Practical Examinations for I, III, V and VII Sem B.Pharm., I and III Sem M.Pharm., I - IV Year Pharm.D. & I-II Year D.Pharm.
22	THU	I Sessional Practical Examinations for I, III, V and VII Sem B.Pharm., I and III Sem M.Pharm., I - IV Year Pharm.D. & I-II Year D.Pharm.
23	FRI	I Sessional Practical Examinations for I, III, V and VII Sem B.Pharm., I and III Sem M.Pharm., I - IV Year Pharm.D. & I-II Year D.Pharm.
24	SAT	I Sessional OSCE for V PharmD
25	**SUN**	**Holiday**
26	**MON**	**Krishna Jayanthi - Holiday**
27	TUE	
28	WED	
29	**THU**	**Jayanthi of His Holiness Jagadguru Rajaguru Tilaka Dr. Sri Shivarathri Rajendra Mahaswamiji - Special Pooja on the eve of Jayanthi Celebrations of His Holiness Jagadguru Rajaguru Tilaka Dr. Sri Shivarathri Rajendra Mahaswamiji by 4PM - 6PM**
30	FRI	I Sessional Theory Examinations for I, III, V and VII Sem B.Pharm., I and III Sem M.Pharm., I - IV Year Pharm.D. & I-II Year D.Pharm.
31	SAT	I Sessional Theory Examinations for I, III, V and VII Sem B.Pharm., I and III Sem M.Pharm., I - IV Year Pharm.D. & I-II Year D.Pharm.

September 2023

Date	Day	Particulars
1	**SUN**	**Holiday**
2	MON	I Sessional Theory Examinations for I, III, V and VII Sem B.Pharm., I and III Sem M.Pharm., I - IV Year Pharm.D. & I-II Year D.Pharm.
3	TUE	I Sessional Theory Examinations for I, III, V and VII Sem B.Pharm., I and III Sem M.Pharm., I - V Year Pharm.D. & I-II Year D.Pharm.
4	WED	I Sessional Theory Examinations for I, III, V and VII Sem B.Pharm., I - V Year Pharm.D. & I-II Year D.Pharm.
5	THU	I Sessional Theory Examinations for I, III, V and VII Sem B.Pharm., I - V Year Pharm.D. & I-II Year D.Pharm.
6	FRI	
7	**SAT**	**Holiday - Vinayakar Chathurthi**
8	**SUN**	**Holiday**
9	MON	
10	TUE	
11	WED	
12	THU	
13	FRI	
14	SAT	
15	**SUN**	**Onam - Holiday**
16	**MON**	**Milad-un-Nabi - Holiday**
17	TUE	
18	WED	
19	THU	
20	FRI	
21	SAT	
22	**SUN**	**Holiday**
23	MON	
24	TUE	
25	**WED**	**World Pharmacist Day Celebrations and Professional Activities in association with IPA Nilgiris Local Branch**
26	THU	
27	FRI	
28	SAT	
29	**SUN**	**Holiday**
30	MON	

October 2023

Date	Day	Particulars
1	TUE	
2	**WED**	**Gandhi Jayanthi - Holiday**
3	THU	
4	FRI	
5	SAT	
6	**SUN**	**Holiday**
7	MON	
8	TUE	
9	WED	
10	THU	
11	**FRI**	**Ayutha Pooja - Holiday**
12	**SAT**	**Vijaya Dasami - Holiday**
13	**SUN**	**Holiday**
14	MON	
15	TUE	
16	WED	
17	THU	
18	FRI	
19	SAT	
20	**SUN**	**Holiday**
21	MON	
22	TUE	
23	WED	
24	THU	
25	FRI	
26	SAT	
27	**SUN**	**Holiday**
28	MON	
29	TUE	
30	WED	
31	**THU**	**Holiday - Deepavali**

November 2023

Date	Day	Particulars
1	FRI	
2	SAT	
3	**SUN**	**Holiday**
4	MON	II Sessional Practical Examinations for I, III, V and VII Sem B.Pharm., I and III Sem M.Pharm., I - IV Year Pharm.D. & I-II Year D.Pharm.
5	TUE	II Sessional Practical Examinations for I, III, V and VII Sem B.Pharm., I and III Sem M.Pharm., I - IV Year Pharm.D. & I-II Year D.Pharm.
6	WED	II Sessional Practical Examinations for I, III, V and VII Sem B.Pharm., I and III Sem M.Pharm., I - IV Year Pharm.D. & I-II Year D.Pharm.
7	THU	II Sessional Practical Examinations for I, III, V and VII Sem B.Pharm., I and III Sem M.Pharm., I - IV Year Pharm.D. & I-II Year D.Pharm.
8	FRI	II Sessional Practical Examinations for I, III, V and VII Sem B.Pharm., I and III Sem M.Pharm., I - IV Year Pharm.D. & I-II Year D.Pharm.
9	SAT	II Sessional OSCE for V PharmD
10	**SUN**	**Holiday**
11	MON	II Sessional Theory Examinations for I, III, V and VII Sem B.Pharm., I and III Sem M.Pharm., I - IV Year Pharm.D. & I-II Year D.Pharm.
12	TUE	II Sessional Theory Examinations for I, III, V and VII Sem B.Pharm., I and III Sem M.Pharm., I - IV Year Pharm.D. & I-II Year D.Pharm.
13	WED	II Sessional Theory Examinations for I, III, V and VII Sem B.Pharm., I and III Sem M.Pharm., I - IV Year Pharm.D. & I-II Year D.Pharm.
14	THU	II Sessional Theory Examinations for I, III, V and VII Sem B.Pharm., I and III Sem M.Pharm., I - V Year Pharm.D. & I-II Year D.Pharm.
15	FRI	II Sessional Theory Examinations for I, III, V and VII Sem B.Pharm., I - V Year Pharm.D. & I-II Year D.Pharm.
16	SAT	II Sessional Theory Examinations for I, III, V and VII Sem B.Pharm., I - V Year Pharm.D. & I-II Year D.Pharm.
17	**SUN**	**Holiday**
18	MON	
19	TUE	
20	WED	
21	THU	
22	FRI	
23	SAT	
24	**SUN**	**Holiday**
25	MON	Commencement of End-Semester Examinations (Theory) for I, III, V and VII Sem B.Pharm., & I and III Sem M.Pharm., (Tentative)
26	TUE	
27	WED	
28	THU	
29	FRI	
30	SAT	

December 2023

Date	Day	Particulars
1	**SUN**	**Holiday**
2	MON	
3	TUE	
4	WED	
5	THU	
6	FRI	
7	SAT	
8	**SUN**	**Holiday**
9	MON	
10	TUE	
11	WED	
12	THU	
13	FRI	
14	SAT	
15	**SUN**	**Holiday**
16	MON	Commencement of End-Semester Examinations (Practical) for I, III, V and VII Sem B.Pharm., & I Sem M.Pharm., (Tentative)
17	TUE	
18	WED	
19	THU	
20	FRI	
21	SAT	
22	**SUN**	**Holiday**
23	MON	**Commencement of Winter Vacation**
24	TUE	
25	**WED**	**Christmas – Holiday**
26	THU	
27	FRI	
28	SAT	
29	**SUN**	**Holiday**
30	MON	
31	TUE	

January 2024*

Date	Day	Particulars
1	**WED**	**New Year - Holiday**
2	THU	
3	FRI	
4	SAT	
5	**SUN**	**Holiday**
6	MON	
7	TUE	
8	WED	
9	THU	
10	FRI	
11	SAT	
12	**SUN**	**Holiday**
13	MON	
14	**TUE**	**Pongal - Holiday**
15	**WED**	**Thiruvalluvar Day - Holiday**
16	**THU**	**Uzhavar Thirunal - Holiday**
17	FRI	Commencement of Classes for II, IV, VI & VIII Sem B.Pharm and II & IV Sem M.Pharm. Commencement of Classes for I, II D.Pharm. and I-V Year Pharm.D. after the Winter Vacation
18	SAT	
19	**SUN**	**Holiday**
20	MON	
21	TUE	
22	WED	
23	THU	
24	FRI	**64th National Pharmacy Week Celebrations - Inauguration @ 10.30 a.m.**
25	SAT	
26	**SUN**	**Republic Day – Holiday** **Republic Day Celebrations & Flag Hoisting by 9.00 a.m.**
27	MON	
28	TUE	**63rd National Pharmacy Week Celebrations - Valedictory @ 06.00 p.m.**
29	WED	
30	THU	
31	FRI	

* The holidays of the year 2025 is subject to confirmation by the Government.

February 2024

Date	Day	Particulars
1	SAT	
2	**SUN**	**Holiday**
3	MON	
4	TUE	
5	WED	
6	THU	
7	FRI	
8	SAT	
9	**SUN**	**Holiday**
10	MON	
11	TUE	
12	WED	
13	THU	
14	FRI	
15	SAT	
16	**SUN**	**Holiday**
17	MON	
18	TUE	
19	WED	
20	THU	
21	FRI	**Annual Sports Meet**
22	SAT	**Annual Sports Meet**
23	**SUN**	**Holiday**
24	MON	
25	TUE	
26	WED	
27	THU	
28	FRI	

March 2024

Date	Day	Particulars
1	SAT	
2	**SUN**	**Holiday**
3	MON	
4	TUE	
5	WED	
6	THU	
7	FRI	
8	SAT	Annual, Awards, Alumni Day Celebrations 2024 & Release of Pharmasaga Vol. XXXII
9	**SUN**	**Holiday**
10	MON	I Sessional Practical Examinations for II, IV, VI and VIII Sem B.Pharm., II Sem M.Pharm., and III Sessional Examinations for I - IV Year Pharm.D. & I-II Year D.Pharm.
11	TUE	I Sessional Practical Examinations for II, IV, VI and VIII Sem B.Pharm., II Sem M.Pharm., and III Sessional Examinations for I - IV Year Pharm.D. & I-II Year D.Pharm.
12	WED	I Sessional Practical Examinations for II, IV, VI and VIII Sem B.Pharm., II Sem M.Pharm., and III Sessional Examinations for I - IV Year Pharm.D. & I-II Year D.Pharm.
13	THU	I Sessional Practical Examinations for II, IV, VI and VIII Sem B.Pharm., II Sem M.Pharm., and III Sessional Examinations for I - IV Year Pharm.D. & I-II Year D.Pharm.
14	FRI	I Sessional Practical Examinations for II, IV, VI and VIII Sem B.Pharm., II Sem M.Pharm., and III Sessional Examinations for I - IV Year Pharm.D. & I-II Year D.Pharm.
15	SAT	III Sessional OSCE for V PharmD
16	**SUN**	**Holiday**
17	MON	I Sessional Theory Examinations for II, IV, VI and VIII Sem B.Pharm., II Sem M.Pharm., and III Sessional Examinations for I - IV Year Pharm.D. & I-II Year D.Pharm.
18	TUE	I Sessional Theory Examinations for II, IV, VI and VIII Sem B.Pharm., II Sem M.Pharm., and III Sessional Examinations for I - IV Year Pharm.D. & I-II Year D.Pharm.
19	WED	I Sessional Theory Examinations for II, IV, VI and VIII Sem B.Pharm., II Sem M.Pharm., and III Sessional Examinations for I - IV Year Pharm.D. & I-II Year D.Pharm.
20	THU	I Sessional Theory Examinations for II, IV, VI and VIII Sem B.Pharm., II Sem M.Pharm., and III Sessional Examinations for I - V Year Pharm.D. & I-II Year D.Pharm.
21	FRI	I Sessional Theory Examinations for II, IV, VI and VIII Sem B.Pharm., and III Sessional Examinations for I - V Year Pharm.D. & I-II Year D.Pharm.
22	SAT	I Sessional Theory Examinations for II, IV, VI and VIII Sem B.Pharm., and III Sessional Examinations for I - V Year Pharm.D. & I-II Year D.Pharm.
23	**SUN**	**Holiday**
24	MON	
25	TUE	
26	WED	
27	THU	
28	FRI	
29	SAT	
30	**SUN**	**Ugadi - Holiday**
31	**MON**	**Ramadhan - Holiday (Tentative)**

April 2024

Date	Day	Particulars
1	TUE	Commencement of End-Year Examinations (Theory) for I-V Pharm.D. and I-II D.Pharm. (Tentative)
2	WED	
3	THU	
4	FRI	
5	SAT	
6	**SUN**	**Holiday**
7	MON	
8	TUE	
9	WED	
10	**THU**	**Mahaveer Jayanthi - Holiday**
11	FRI	
12	SAT	
13	**SUN**	**Holiday**
14	**MON**	**Tamil New Year & Dr. Babasaheb Ambedkar's Jayanthi - Holiday**
15	TUE	
16	WED	
17	THU	
18	**FRI**	**Good Friday - Holiday**
19	SAT	
20	**SUN**	**Holiday**
21	MON	
22	TUE	
23	WED	
24	THU	
25	FRI	
26	SAT	
27	**SUN**	**Holiday**
28	MON	Commencement of End-Year Examinations (Practical) for I-V Pharm.D. and I-II D.Pharm. (Tentative)
29	TUE	
30	WED	

May 2024

Date	Day	Particulars
1	**THU**	**May Day - Holiday**
2	FRI	
3	SAT	
4	**SUN**	**Holiday**
5	MON	
6	TUE	
7	WED	
8	THU	
9	FRI	
10	SAT	
11	**SUN**	**Holiday**
12	MON	
13	TUE	
14	WED	
15	THU	
16	FRI	
17	SAT	
18	**SUN**	**Holiday**
19	MON	II Sessional Practical Examinations for II, IV, VI and VIII Sem B.Pharm., II Sem M.Pharm.
20	TUE	II Sessional Practical Examinations for II, IV, VI and VIII Sem B.Pharm., II Sem M.Pharm.
21	WED	II Sessional Practical Examinations for II, IV, VI and VIII Sem B.Pharm., II Sem M.Pharm.
22	THU	II Sessional Practical Examinations for II, IV, VI and VIII Sem B.Pharm., II Sem M.Pharm.
23	FRI	II Sessional Practical Examinations for II, IV, VI and VIII Sem B.Pharm., II Sem M.Pharm.
24	SAT	
25	**SUN**	**Holiday**
26	MON	II Sessional Theory Examinations for II, IV, VI and VIII Sem B.Pharm., II Sem M.Pharm.
27	TUE	II Sessional Theory Examinations for II, IV, VI and VIII Sem B.Pharm., II Sem M.Pharm.
28	WED	II Sessional Theory Examinations for II, IV, VI and VIII Sem B.Pharm., II Sem M.Pharm.
29	THU	II Sessional Theory Examinations for II, IV, VI and VIII Sem B.Pharm., II Sem M.Pharm.
30	FRI	II Sessional Theory Examinations for II, IV, VI and VIII Sem B.Pharm.
31	SAT	II Sessional Theory Examinations for II, IV, VI and VIII Sem B.Pharm.

June 2024*

Date	Day	Particulars
1	**SUN**	**Holiday**
2	MON	**Commencement of Academic Session 2025 – 26 for II Yr to V Yr Pharm.D. and II Yr D. Pharm.**
3	TUE	
4	WED	
5	THU	
6	FRI	
7	**SAT**	**Bakrid - Holiday**
8	**SUN**	**Holiday**
9	MON	**Commencement of End-Semester Examinations (Theory) for II, IV, VI and VIII Sem B.Pharm., II Sem M.Pharm., (Tentative)**
10	TUE	
11	WED	
12	THU	
13	FRI	
14	SAT	
15	**SUN**	**Holiday**
16	MON	
17	TUE	
18	WED	
19	THU	
20	FRI	
21	SAT	
22	**SUN**	**Holiday**
23	MON	
24	TUE	
25	WED	
26	THU	
27	FRI	
28	SAT	
29	**SUN**	**Holiday**
30	MON	**Commencement of End-Semester Examinations (Practical) for II, IV, VI and VIII Sem B.Pharm., II and IV Sem M.Pharm., (Tentative)** **Completion of Internship for VI Pharm.D.**

*Note: This will be overlapping in the AY 2025-26

July 2024*

Date	Day	Particulars
1	TUE	**Commencement of Academic Session 2024-25 for VI Pharm.D. (Internship)**
2	WED	
3	THU	
4	FRI	
5	SAT	
6	**SUN**	**Holiday-Muharram**
7	MON	**Commencement of Academic Session 2025-26 for I Year D.Pharm. and I Pharm.D. & I Sem B.Pharm. and I Sem M.Pharm.** **Commencement of Academic Year 2025-26 for III, V, VII Sem B.Pharm., III Sem M.Pharm.**
8	TUE	**Orientation Program for Freshers**
9	WED	**Orientation Program for Freshers**
10	THU	**Orientation Program for Freshers**
11	FRI	**Orientation Program for Freshers**
12	SAT	
13	**SUN**	**Holiday**
14	MON	
15	TUE	
16	WED	
17	THU	
18	FRI	
19	SAT	
20	**SUN**	**Holiday**
21	MON	
22	TUE	
23	WED	
24	THU	
25	FRI	
26	SAT	
27	**SUN**	**Holiday**
28	MON	
29	TUE	
30	WED	
31	THU	

*Note: This will be overlapping in the AY 2025-26

Abstract of Working days, Teaching days and Holidays for the Academic Year 2023-24

Name of the Class	Date of Commencement	No. of Teaching Days	First Sessional	No. of Teaching Days	Second Sessional	No. of Teaching Days	Third Sessional	Total No. of Teaching Days	Commencement of University Examination	Total No. of Sessional Days	Total No. of Preparation Days	Non-Teaching Days (Function)	Total No. of Working Days
Annual Pattern													
I.D. Pharm	05.07.2023	40	30.08.2023	49	11.11.2023	73	17.03.2025	162	01.04.2025	18	6	13	199
II D. Pharm	03.06.2023	71	30.08.2023	49	11.11.2023	73	17.03.2025	193	01.04.2025	18	6	9	226
I Pharm.D.	05.07.2023	40	30.08.2023	49	11.11.2023	73	17.03.2025	162	01.04.2025	18	6	13	199
II – IV Pharm.D.	03.06.2023	71	30.08.2023	49	11.11.2023	73	17.03.2025	193	01.04.2025	18	6	9	226
V Pharm.D.	03.06.2023	72	30.08.2023	51	11.11.2023	75	17.03.2025	198	01.04.2025	12	6	9	225
Semester Pattern													
I Sem B. Pharm	05.07.2023	40	30.08.2023	49	11.11.2023	-	-	89	25.11.2024	12	6	6	113
III Sem B.Pharm	05.07.2023	44	30.08.2023	49	11.11.2023	-	-	93	25.11.2024	12	6	2	113
V Sem B.Pharm	05.07.2023	44	30.08.2023	49	11.11.2023	-	-	93	25.11.2024	12	6	2	113
VII Sem B.Pharm	05.07.2023	44	30.08.2023	49	11.11.2023	-	-	93	25.11.2024	12	6	2	113
II Sem B. Pharm	17.01.2024	43	17.03.2024	49	26.05.2024	-	-	92	09.06.2025	12	5	7	116
IV Sem B. Pharm	17.01.2024	43	17.03.2024	49	26.05.2024	-	-	92	09.06.2026	12	5	7	116
VI Sem B. Pharm	17.01.2024	43	17.03.2024	49	26.05.2024	-	-	92	09.06.2027	12	5	7	116
VIII Sem B. Pharm	17.01.2024	43	17.03.2024	49	26.05.2024	-	-	92	09.06.2028	12	5	7	116
I. Sem. M. Pharm	05.07.2024	40	30.08.2024	51	11.11.2024	-	-	91	25.11.2024	8	8	6	113
II Sem. M. Pharm	17.01.2024	43	17.03.2024	51	26.05.2024	-	-	94	09.06.2028	8	7	7	116

Month Wise details of Teaching Days, Sessional Days, Preparation Leave, Total Working Days, Function Days to Tally 365 Days

Name of the Class	Jun-23	Jul-23	Aug-23	Sep-23	Oct-23	Nov-23	Dec-23	Jan-24	Feb-24	Mar-24	Apr-24	May-24	Jun-24	Total No. of Working Days	Sessional days	Pre-Leave	Functions	Teaching Days	Total No of Holidays (including univ. exam & Sundays)	Total No. of Days
Annual Pattern																				
I.D. Pharm	0	22	25	23	23	26	18	13	24	25	0	0	-	199	18	6	13	162	166	365
II D. Pharm	23	26	25	23	23	26	18	13	24	25	0	0	-	226	18	6	9	193	139	365
I Pharm. D.	0	22	25	23	23	26	18	13	24	25	0	0	-	199	18	6	13	162	166	365
II – IV Pharm.D.	23	26	25	23	23	26	18	13	24	25	0	0	-	226	18	6	9	193	139	365
V Pharm.D.	23	26	24	23	23	26	18	13	24	25	0	0	-	225	12	6	9	198	140	365
VI Pharm. D	0	26	25	23	23	26	25	23	24	25	23	26	24	293	0	0	9	284	72	365
Semester Pattern																				
I.Sem B. Pharm	-	22	25	23	23	20	0	-	-	-	-	-	-	113	12	6	6	89	71	184
III Sem B.Pharm	-	22	25	23	23	20	0	-	-	-	-	-	-	113	12	6	2	93	71	184
V Sem B.Pharm	-	22	25	23	23	20	0	-	-	-	-	-	-	113	12	6	2	93	71	184
VII Sem B.Pharm	-	22	25	23	23	20	0	-	-	-	-	-	-	113	12	6	2	93	71	184
II Sem B. Pharm	-	-	-	-	-	-	-	13	24	25	23	26	5	116	12	5	7	92	65	181
IV Sem B. Pharm	-	-	-	-	-	-	-	13	24	25	23	26	5	116	12	5	7	92	65	181
VI Sem B. Pharm	-	-	-	-	-	-	-	13	24	25	23	26	5	116	12	5	7	92	65	181
VIII Sem B. Pharm	-	-	-	-	-	-	-	13	24	25	23	26	5	116	12	5	7	92	65	181
I Sem M. Pharm	-	22	25	23	23	20	0	-	-	-	-	-	-	113	8	8	6	91	71	184
III Sem M. Pharm	-	22	25	23	23	20	0	-	-	-	-	-	-	113	0	0	6	107	71	184
II Sem M. Pharm	-	-	-	-	-	-	-	13	24	25	23	26	5	116	8	7	7	94	65	181
IV Sem M. Pharm	-	-	-	-	-	-	-	13	24	25	23	26	5	116	0	0	7	109	65	181

Function Days (Working Day BUT Non-Teaching Days)

Sl. No.	Month	Date(s)	Remarks
1	Jun-23	Nil	-
2	Jul-23	5th to 9th	Orientation program for fresher's (I Semester B.Pharm., I year Pharm.D. and I year D.Pharm.) - 4 working days
3	Aug-23	29th	Jayanthi of His Holiness Jagadguru Rajaguru Tilaka Dr. Sri Shivarathri Rajendra Mahaswamiji
4	Sep-23	25th	World Pharmacist's Day
5	Oct-23	Nil	-
6	Nov-23	Nil	-
7	Dec-23	Nil	-
8	Jan-24	24th to 28th	63rd National Pharmacy Week Celebration - 4 working days
9	Feb-24	21st to 22nd	Annual Sports Day
10	Mar-24	8th	Alumni, Annual and Award Day Celebrations & Release of College Magazine 'PHARMASAGA' – Vol. XXXII.
11	Apr-24	Nil	-
12	May-24	Nil	-

Vacation Details:	
Summer (2023-24)	7 days
Winter (2024-25)	25 days
Total	**32 days**

JSS Academy of Higher Education & Research, Mysuru

(Deemed to be University)

(Accredited 'A^{+}' Grade by NAAC)

JSS COLLEGE OF PHARMACY, ROCKLANDS, OOTY

(ISO 9001:2015 Certified)

Lecture Plan

(Academic Year: 2023-2024)

Course: I. B.PHARM

I SEMESTER

Name of the Subject	Human Anatomy and Physiology-I (Theory)
Name of the Faculty	Dr. A. Justin,M.Pharm., Ph.D,
Designation, Department	Associate Professor, Department of Pharmacology
Mobile Number	9942932150
e-Mail i.d.	justin@jssuni.edu.in

Scope, Course Objectives and Course Outcomes

Scope: This subject is designed to impart fundamental knowledge on the structure andfunctions of the various systems of the human body. It also helps in understanding bothhomeostatic mechanisms. The subject provides the basic knowledge required tounderstand the various disciplines of pharmacy.

Objectives: The primary objectives of this course are to

1. Explain the gross morphology, structure and functions of various organs of the humanbody.
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 Outcomes (COs): At completion of this course it is expected that the students will be able to

CO 1: Define the gross anatomy and physiological functions of cell, tissues, bones, muscles, blood and cardiovascular systems of human body.

CO 2: Interpret the homeostatic mechanisms in human body and understand the disordersassociated with their imbalances.

CO 3: Recognize the various tissues and organs structure of multiple systems of human body.

CO 4: Demonstrate the functions of special senses and nervous system using experiments.

CO 5: Interlink the coordinated working pattern of different organs of human body through its physiological functions.

LECTURE PLAN – Abstract

Sessional	No. of Hours of Didactic Lecture	No. of Hours of other Activities	Total No. of Lecture Hours
I	22	03	25
II	23	03	26
Total No. ofHours	45	06	51

I SESSIONAL:22 Lectures + 03 Activities

Lecture No.	Lecture Details	Hours
Unit-1		**(10)**
Introduction to Human Body		
1.	Definition and scope of anatomy and physiology Levels of structural organization and body systems	**03**
2.	Basic life processes, Homeostasis	
3.	Basic anatomical terminology	
Cellular level of organization		
4.	Structure and functions of cell	**04**
5.	Transport across cell membrane	
6.	Cell division, Cell junctions	
7.	General principles of cell communication, intracellular signaling pathway activation by extracellular signalmolecule, Forms of intracellular signaling: a) Contact-dependent b)Paracrine c) Synaptic d) Endocrine	
Tissue level of organization		
8.	Classification of tissues	**03**
9.	Structure, location and functions of epithelial, muscular tissues	
10.	Structure, location and functions of connective,nervous tissues	
Unit-2:		**(10)**
Integumentary system		
1.	Structure and functions of skin	**02**
2.	Structure and functions of skin	
Skeletal system		
3.	Divisions of skeletal system and types of bone	**06**
4.	Salient features and functions of bones of axial skeletal system	
5.	Salient features and functions of bones of appendicular skeletal system	
6.	Organization of skeletal muscle	

7.	Physiology of muscle contraction	
8.	Neuromuscular junction	
Joints		
9.	Structural and functional classification of joints	**02**
10.	Types of joints movements and itsarticulation	
Unit- 3		**(10)**
Body fluids and blood		
1.	Body fluids, composition and functions of blood	**02**
2.	Hemopoeisis	
Activity - 1	Unit Test – 1	
Activity - 2	MCQ Test – 1	
Activity - 3	MCQ Test – 2	

II SESSIONAL: 23 Lectures + 03 Activities

Lecture No.	Lecture Details	Hours
1.	Formation of hemoglobin, anemia	**04**
2.	Mechanisms of coagulation	
3.	Blood grouping Rh factors, Transfusion and its significance	
4.	Disorders of blood, Reticuloendothelial system	
Lymphatic system		
1.	Lymphatic organs and tissues	**04**
2.	Lymphatic vessels	
3.	Lymph circulation	
4.	Functions of lymphatic system	
Unit-4:		**(08)**
Peripheral Nervous system		
1.	Classification of peripheral nervous system, Structure and functions of sympathetic nervous system	**04**
2.	Structure and functions of parasympathetic nervous system	
3.	Origin and functions of spinal nerves	
4.	Origin and functions of cranial nerves	
Special senses		
5.	Structure and function of eye and their disorders	**04**
6.	Structure and function of ear and their disorders	
7.	Structure and function of nose and their disorders	
8.	Structure and function of tongue and their disorders	
Unit-5		**(07)**
Cardiovascular system		
1.	Heart – anatomy and physiology of heart	

2.	Blood circulation, blood vessels, structure and functions ofartery, vein and capillaries	**07**
3.	Elements of conduction system of heart and heartbeat, its regulation by autonomic nervous system	
4.	Cardiac output, Pulse	
5.	Cardiac cycle	
6.	Regulation of blood pressure	
7.	Electrocardiogram and disorders of heart	
Activity - 1	Unit Test – 1	
Activity - 2	MCQ Test – 1	
Activity - 3	MCQ Test – 2	

Text books

1. Essentials of Medical Physiology by K. Sembulingam and P. Sembulingam. Jaypeebrother's 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

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 (vol1 and 2) by Dr. C.C. Chatterrje,Academic Publishers Kolkata.

*** *** ***

Name of the Subject	Pharmaceutical Analysis (Theory)
Name of the Faculty	Dr.B. Babu, M.Pharm., Ph.D
Designation, Department	Asst Professor, Department of Pharmaceutical Analysis
Mobile Number	9840142319
e-Mail i.d.	babu@jssuni.edu.in

Scope, Course Objectives and Course Outcomes

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

Objectives: The primary objectives of this course are to

1. To understand the various techniques of analytical.
2. To understand the principles of volumetric and electro chemical analysis.
3. To carryout various volumetric and electrochemical titrations.
4. To develop analytical skills.

Course Outcomes (COs): At completion of this course it is expected that the students will be able to

CO 1 : Understand the basic concept of preparation and representation of various forms of solution concentration.
CO 2 : The need to determining the quality of the pharmaceutical product and substances.
CO 3 : The concepts of basic methods and its disadvantages in determining the qualitative and quantitative aspects of pharmaceuticals.
CO 4 : Practical aspects of instrumentation and various techniques of measurement.

LECTURE PLAN –Abstract

Sessional	No. of Hours Lecture	No of Hours of other Activities	Total No. of Lecture Hours
	Pharmaceutical Analysis		
I	22	-	22
II	23	-	23
Total No. of Hours	45	-	45

I SESSIONAL: 22 Lectures

Lecture No.	Lecture Details	Hours
PHARMACEUTICAL ANALYSIS		**(45)**
Unit-1: Pharmaceutical Analysis		**10**
	Orientation to the subject	
1.	Definition and scope, different techniques of analysis,Methods of expressing concentration	
2.	Primary and Secondary standards	
3.	Preparation and standardization of various molar and normal solutions – Oxalic acid, sodium hydroxide	
4.	Hydrocholoric acid, sodium thiosulphate	
5.	Potassium Permanganate, Ceric ammonium sulphate, Sulphuric acid	
6.	Errors: Sources of errors, types of errors	
7.	Methods of minimizing errors	
8.	Accuracy, Precision, Significant figures	
9.	Pharmacopeia	
10.	Sources of impurities in medicinal agents, Limit Test	
Unit-2: Acid Base Titration, Non Aqueous Titration		**10**
1.	Acid Base Titration: Theories of acid base and indicators	
2.	Theories of indicators	
3.	Classifications of acid base titrations	
4.	Theory involved in the titration of strong and weak and very weak acids and bases	
5.	Theory involved in the titration of strong and weak and very weak acids and bases	
6.	Neutralization curves	
7.	Types of Non aqueous titration: Solvents	
8.	Introduction to Non aqueous acidimetry and alkalimetry titration	
9.	Estimation of sodium benzoate	
10.	Estimation of Ephedrine HCL	
Unit-3: Precipitation Titration, Complexometric Titration and Gravimetry		**02**
1.	Mohrs method , Volhard's	

2.	Modified volhards , Fajans method	

II SESSIONAL: 23 Lectures

Lecture No.	Lecture Details	Hours
Unit-3: Precipitation Titration, Complexometric Titration and Gravimetry		
1.	Estimation of sodium chloride	
2.	Complexometric titration: Classification, metal ion indicators	
3.	Masking and demasking reagents	
4.	Estimation of magnesium sulphate and calcium gluconate	
5.	Gravimetry: Principle and steps involved in gravimetric analysis.	
6.	Purity of the precipitate: Co-precipitation and post precipitation	**08**
7.	Estimation of barium sulphate	
8.	Basic principles, methods and application of diazotization titration.	
Unit-4: Redox titration		
1.	Redox titration : Concepts of oxidation and reduction	
2.	Types of redox titration (Principle and application)	
3.	Cerimetry	**08**
4.	Iodimetry	
5.	Iodometry	
6.	Bromatometry	
7.	Dichrometry	
8.	Titration with potassium iodate	
Unit-5: Electro chemical Analysis		
1.	Electrochemical methods conductometry – Introduction Conductivity cell	
2.	Conductometric titration, application	
3.	Potentiometry – Electrochemical cell, construction and working of reference (Standard hydrogen, silver chloride electrode and calomel electrode)	**07**
4.	Indicator electrode (metal electrodes and glass electrode)	
5.	Methods to determine end point of potentiometric titration and applications.	
6.	Polarography – Principle, Ilkovic equation, construction and working of dropping mercury electrode.	
7.	Rotating platium electrode application	

Reference Books

1. A.H. Beckett & J.B. Stenlake's, Practical Pharmaceutical Chemistry Vol I & II, StahlonePressof 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.

Name of the Subject	Pharmaceutics (Theory)
Name of the Faculty	Dr. GNK. Ganesh M.Pharm., Ph.D
Designation, Department	Associate Professor, Department of Pharmaceutics
Mobile Number	9442191918
e-Mail i.d.	gnk@jssuni.edu.in

Scope, Course Objectives and Course Outcomes

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 Outcomes (COs): At completion of this course it is expected that the students will be able to

CO1: Explain history of profession of Pharmacy in India & Pharmacopeia and its development.
CO2: Learn parts and handling of prescription, posology & dose calculation of drug in children. Different types of dosage form.
CO3: Elaborate different pharmaceutical calculation involved in formulation.
CO4: Understand basic requirement and formulation of powder and liquid (monophasic& biphasic) dosages form.
CO5: Explain type of Pharmaceutical incompatibility.
CO6: Learn basic requirement, formulation and evaluation of suppositories and pessaries.
CO7: Understand the mechanisms of drug penetration and also the factors influencing permeation through transdermal route.
CO8: Explain the formulation and evaluation of semisolid preparation such as ointment, gel cream etc.

LECTURE PLAN – Abstract

Sessional	Number of Hours of Didactic Lecture	No. of Hours of other activities	Total Number of Lecture Hours
I	20	3	20
II	25	4	25
Total No.of Hours	45	7	45

I SESSIONAL: 20 lectures

Lecture No.	Lecture Details	Hours
Unit-1: : Historical background and development of profession of pharmacy		**(10)**
1.	History of profession of Pharmacy in India in relation to pharmacy education	10
2.	Industry and organization, Pharmacy as a career	
3.	Pharmacopoeias: Introduction to IP, Introduction to BP.	
4.	Introduction to USP	
5.	Dosage forms: Introduction to dosage forms, classification and definitions	
6.	Prescription: Definition, Parts of prescription, handling of Prescription	
7.	Errors in prescription	
8.	Posology: Definition, Factors affecting posology.	
9.	Pediatric dose calculations based on age.	
10.	Pediatric dose calculations based on body weight and body surface area	
Unit-2: Pharmaceutical calculations:		**(10)**
1.	Weights and measures - Imperial & Metric system, Calculations involving percentage solutions	10
2.	Allegation, proof spirit and isotonic solutions based on freezing point and molecular weight	
3.	Powders: Definition, classification, advantages and disadvantages	
4.	Simple & compound powders	
5.	Official preparations, dusting powders, effervescent, efflorescent Powders	
6.	Hygroscopic powders, eutectic mixtures	
7.	Geometric dilutions.	
8.	Liquid dosage forms: Advantages and disadvantages of liquid dosage forms	
9.	Excipients used in formulation of liquid dosage forms.	
10.	Solubility enhancement techniques.	

II SESSIONAL:25 Lectures

Lecture No.	Lecture Details	Hours

Unit-3: Monophasic liquids		**(10)**
1.	Monophasic liquids: Definitions and preparations of Gargles, Mouthwashes	10
2.	Throat Paint, Eardrops, Nasal drops, Enemas, Syrups,	
3.	Elixirs, Liniments and Lotions	
4.	Biphasic liquids - Suspensions: Definition, advantages and disadvantages, classifications, Preparation of suspensions; flocculated and deflocculated suspension	
5.	Stability problems of suspension and methods to overcome.	
6.	Emulsions: Definition, classification, emulsifying agent.	
7.	Test for the identification of emulsions	
8.	Types of emulsion	
9.	Methods of preparation of emulsion	
10.	stability problems of emulsions and methods to overcome	
Unit-4: Suppositories		**(05)**
1.	Definition, types, advantages and disadvantages, types of bases	05
2.	Methods of preparations, Displacement value, Calculations	
3.	Evaluation of suppositories, Pharmaceutical incompatibilities : Definition	
4.	Classification, Physical incompatibility	
5.	Chemical and therapeutic incompatibilities with examples	
Unit-5: Semisolid dosage forms		**(10)**
1.	Definitions, classification	10
2.	Mechanisms	
3.	Factors influencing dermal penetration of drugs	
4.	Preparation of ointments	
5.	Preparation of pastes	
6.	Preparation of creams and gels	
7.	Excipients used in semi solid dosage forms	
8.	Evaluation of semi solid dosages forms	

Activity-1	Unit test – 1
Activity-2	Unit test – 2
Activity-3	Unit test – 3
Activity-4	MCQ test – 1
Activity-5	MCQ test – 1
Activity-6	MCQ test – 1
Activity-7	Rivision Exam – 1

References:

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 GhebreSellassie: 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.

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Name of the Subject	Pharmaceutical Inorganic Chemistry (Theory)
Name of the Faculty	Dr.B. Gowramma M.Pharm., Ph.D
Designation, Department	Associate Professor, Department of Pharmaceutical Chemistry
Mobile Number	9442111172
e-Mail i.d.	gowrammab@jssuni.edu.in

Scope, Course Objectives and Course Outcomes

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 Outcomes (COs): At completion of this course it is expected that the students will be able to

CO 1: Well acquainted with the principles of limit tests.
CO 2: Familiar with different classes of inorganic pharmaceuticals and their analysis
CO 3: Identification of different anions, cations and different inorganic pharmaceuticals.
CO 4: Knowledge about the sources of impurities and methods to determine the impurities in inorganic drugs and pharmaceuticals understand the medicinal and pharmaceutical importance of inorganic compounds
CO 5:To have been introduced to a variety of inorganic drug classes.

LECTURE PLAN –Abstract

Sessional	No. of Hours of Didactic Lecture	No of Hours of other Activities	Total No. of Lecture Hours
I	22	02	24
II	23	02	25
Total No. of Hours	45	04	49

I SESSIONAL: 23 Lectures + 02 Activities

Lecture No.	Lecture Details	Hours
Unit-1: Impurities in Pharmaceutical substance		**10**
1.	Impurities Introduction	
2.	History of Pharmacopoeia	
3.	Source and types of impurities	
4.	importance of limit test, general principle and procedures for limit test	
5.	limit test for chloride, sulphate	
6.	limit test for Iron,	
7.	limit test for Arsenic	
8.	limit test for Lead	

9.	limit test for heavy metals	
10.	Modified limit test for chloride, sulphate	
a.	Introduction to Biopharmaceutics	
Unit-2: Acids, Bases and Buffers, Major extra and intracellular electrolytes and Dental Products		**10**
	Acids, Bases and Buffers	
1.	Buffer equations and buffer capacity in general, buffers in pharmaceutical systems,	
2.	preparation, stability, buffered isotonic solutions,	
3.	measurements of tonicity, calculations and methods of adjusting isotonicity.	
a.	**Major extra and intracellular electrolytes**	
3.	Functions of major physiological ions	
4.	Electrolytes used in the replacement therapy: Sodium chloride*, Potassium chloride,	
5.	Calcium gluconate* and Oral Rehydration Salt (ORS),	
6.	Physiological acid base balance	
a.	**Dental Products**	
7.	Dentifrices, role of fluoride in the treatment of dental caries	
8.	Desensitizing agents, Calcium carbonate	
9.	Sodium fluoride and Zinc eugenol cement	
Unit-3: Gasterointestional agents		**2**
1.	Gastrointestinal agents- introduction	
2.	**Acidifies:** Ammonium chloride* and Dil. HCl	
Activity 1	MCQ Test	**2**
Activity 2	MCQ Test	

II SESSIONAL: 22 Lectures + 2 Activities

Lecture No.	Lecture Details	Hours
Unit-3: Gasterointestional agents		**8**
1	**Antacid:** Ideal properties of antacids, combinations of antacids	
2	Sodium Bicarbonate*, Aluminum hydroxide gel, Magnesium hydroxide mixture	
3	**Cathartics:** Magnesium sulphate, Sodium orthophosphate	
4	Kaoline and Bentonite	
5	**Antimicrobials**: Mechanism, classification,	
6	Potassium permanganate, Boric acid,	
7	Hydrogen peroxide*, Chlorinated lime*,	
8	Iodine and its preparations	
Unit-4:	Miscellaneous compounds	
1	**Expectorants:** Potassium iodide	

2	Ammonium chloride*	**08**
3	**Emetics**: Copper sulphate*	
4	Sodium potassium tartarate	
5	**Haematinics:** Ferrous sulphate*, Ferrous gluconate	
6	**Poison and Antidote:** Sodium thiosulphate*,	
7	Activated charcoal, Sodium nitrate	
8	**Astringents**: Zinc Sulphate, Potash Alum	
Unit-5: Radiopharmaceuticals		**07**
1	Radio activity	
2	Measurement of radioactivity	
3	Properties of α, β, γ radiations	
4	Half-life, radio isotopes	
5	study of radio isotopes - Sodium iodide I^{121}	
6	Storage conditions, precautions	
7	pharmaceutical application of radioactive substances	
Acitiy 1	MCQ Test	**2**
Acitiy 2	MCQ Test	

Text Books

1. P. Gundu Rao, Inorganic Pharmaceutical Chemistry, 3rd Edition
2. Anand& Chatwal, Inorganic Pharmaceutical Chemistry
3. M.L Schroff, Inorganic Pharmaceutical Chemistry
4. A.I. Vogel, Text Book of Quantitative Inorganic analysis

Reference Books

1. A.H. Beckett & J.B. Stenlake's, Practical Pharmaceutical Chemistry Vol I & II
2. Stahlone Press of University of London, 4th edition
3. Bentley and Driver's Textbook of Pharmaceutical Chemistry
4. Indian Pharmacopoeia

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Name of the Subject	Remedial Biology (Theory)
Name of the Faculty	Dr. Shanmugam R
Designation, Department	Assistant Professor, Department of Pharmacognosy
Mobile Number	+91 98434 54943
e-Mail i.d.	shanmugamr@jssuni.edu.in

Scope, Course Objectives and Course Outcomes

Scope

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

Objectives

The primary objectives of this course are to

1. Know the classification and salient features of five kingdoms of life.
2. Understand the basic components of anatomy & physiology of plant.
3. Understand the basic components of anatomy & physiology of animal with special reference to human.

Course Outcomes (COs)

On successful completion of the subject the student shall be able to

CO 1: Know about the kingdoms of plants, basic concepts and components of animal with reference to human

LECTURE PLAN –Abstract

Sessional	No. of Hours of Didactic Lecture	No of Hours of other Activities	Total No. of Lecture Hours
I	15	02	17
II	15	02	17
Total No. of Hours	30	04	34

I SESSIONAL: 15 Lectures+ 2 Activities

Lecture No.	Lecture Details	Hours15
Unit-1: Living world and Morphology of Flowering Plants		**07**
1.	Definition and characters of living organisms	
2.	Diversity in the living world	
3.	Binomial nomenclature	
4.	Five kingdoms of life and basis of classification	
5.	Salient features of Monera, Potista, Fungi, Animalia and Plantae, Virus	
6.	Morphology of different parts of flowering plants – Root, stem, inflorescence, flower, leaf, fruit, seed.	
7.	General Anatomy of Root, stem, leaf of monocotyledons &Dicotylidones.	
Unit-2: Body fluids, Digestion and Respiration		**08**
1.	Composition of blood, blood groups, coagulation of blood	
2.	Composition and functions of lymph	
3.	Human circulatory system	
4.	Structure of human heart and blood vessels	
5.	Cardiac cycle, cardiac output and ECG	
6.	Human alimentary canal and digestive glands Digestion, absorption and assimilation of digested food	
7.	Mechanism of breathing and its regulation, Exchange of gases, transport of gases and regulation of respiration	
8.	Modes of excretion and Human excretory system- structure and function	
	Activity 1 : Group discussion	
	Activity 2 : Class test	

II SESSIONAL: 15 Lectures+ 2 Activities

Lecture No.	Lecture Details	Hours 15
Unit-3: Excretory products, Neural control and Human Reproductive System		
1.	Urine formation and Rennin angiotensin system	**06**
2.	Definition & classification of nervous system , Structure of a neuron, Generation & conduction of nerve impulse	
3.	Structure of brain and spinal cord, Functions of cerebrum, cerebellum, hypothalamus and medulla oblongata	
4.	Endocrine glands and their secretions	
5.	Functions of hormones secreted by endocrine glands	
6.	Parts of female reproductive system , Parts of male reproductive system, Spermatogenesis, Oogenesis and Menstrual cycle	**05**
Unit-4: Plants and mineral nutrition, Photosynthesis		
1.	Essential mineral, macro and micronutrients, Nitrogen metabolism	
2.	Nitrogen cycle and biological nitrogen fixation	
3.	Autotrophic nutrition and photosynthesis	
4.	Photosynthetic pigments	
5.	Factors affecting photosynthesis	
Unit-5: Respiration and Cell		
1.	Plant respiration:Respiration, glycolysis, fermentation (anaerobic).	**04**
2.	Phases and rate of plant growth, Condition of growth,Introduction to plant growth regulators	
3.	Structure and functions of cell and cell organelles.Cell division	
4.	Definition, types of tissues, location and functions.	
	Activity 1 : Group discussion	
	Activity 2 : Class test	

Text Books

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

Reference Books

1. A Text book of Biology by B.V. SreenivasaNaidu b.
2. A Text book of Biology by Naidu andMurthy c.
3. Botany for Degree students By A.C.Dutta. d.
4. Outlines of Zoology by M. Ekambaranathaayyer and T. N. Ananthakrishnan. e.
5. A manual for pharmaceutical biology practical by S.B. Gokhale and C. K. Kokate

Name of the Subject	Remedial Mathematics
Name of the Faculty	Mr. C Jayakumar. MCA., M.Phil., B.Ed., PGDCA., FCED

Designation, Department	Assistant Professor, Department of Pharmacy Practice
Mobile Number	9443476698
e-Mail i.d.	jrccc@jssuni.edu.in

Scope, Course Objectives and Course Outcomes

Scope: This course is designed to impart knowledge and skills necessary for introduction to mathematics. This subject deals with the introduction to Partial fraction, Logarithm, matrices and Determinant, Analytical geometry, Calculus, differential equation and Laplace transform.

Objectives: The primary objectives of this course are to enable students to

1. Know the theory and their application of mathematics in pharmacy.
2. Solve the different types of problems by applying theory.
3. Appreciate the important application of mathematics in Pharmacy.
4. Perform abstract mathematical reasoning

Course Outcomes (COs): At completion of this course it is expected that the students will be able to

CO 1 : Apply mathematical concepts and principles to perform computations for Pharmaceutical Sciences.

CO 2 : Create, use and analyze mathematical representations and mathematical relationships

CO 3 : Communicate mathematical knowledge and understanding to help in the field of Clinical Pharmacy

LECTURE PLAN –Abstract

Sessional	Number of Hours of Didactic Lecture	No of Hours of other Pedagogy	Total Number of Lecture Hours
I	11	01	12

II	19	02	21
Total No of Hours	30	03	33

I SESSIONAL: 11 Lectures + 01 Activities

Lecture No.	Lecture Details	Hours
Unit-1: Partial Fractions, Logarithms, Functions , Limits and continuity		**(12)**
1	Introduction to polynomial, rational functions, and fractions	**(11)**
2	Resolving into partial fractions	
3	Application of partial fraction in chemical kinetics and pharmaceutics	
4	Concept of information systems and software	
5	Logarithms, properties, Pharmaceutical examples	
6	Functions , limits and continuity of given functions	
Unit-II: Matrices and Determinants		
7	Matrices, basic operations and sums. Product of matrices	
8	Determinants, properties, adjoint and inverse of matrices	
9	Solutions of linear equations using matrix method and Cramer's rule	
10	Characteristic equations of matrix, Cayley Hamilton's theorem	
11	Applications of matrices in solving pharmacokinetic equations	
Activity -1	Unit Test – I	
Activity -2	MCQ Test -	
Activity -3	Revision Test – 3	

II SESSIONAL: 19 Lectures+03 Activities

12	Sums related to matrices and determinants (**Activity)**	**(01)**
Unit-III: Calculus –Differentiation		**(19)**
13	Derivative of functions , product and quotient rule **Activity)**	**(19)**
14	Derivatives of x^n, e^x, logx and a^x using first principles	
15	Derivatives of trigonometric functions using first principles	
16	Condition for maximum and minimum point	
17	Applications of differentiation to pharmaceutical problems	
18	Sums related to differentiation	
19	Sign test and distance formula, sums related to distance formula	
20	Slope of a straight line, Slope intercept form of straight line	
21	Parallelism and perpendicularity of straight lines	
22	Introduction and rules of integration	
23	Method of substitution and partial fraction	
24	Integration by parts , evaluation of definite integrals and applications to pharmaceutical problems	
25	variable separable method of differential equations	
26	Homogenous and linear differential equations	
27	Applications of solving pharmacokinetics equations	

28	Definition and elementary functions of Laplace transforms	
29	Solving linear differential equations	
30	Applications in solving chemical kinetics and pharmacokinetics equations	
Activity -1	Revision MCQ Test – 1	
Activity -2	Revision MCQ Test – 2	
Activity -3	Final Revision Test – 1	

Recommended Books (Latest Edition)

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

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II SEMESTER

Name of the Subject	Human Anatomy and Physiology-II (Theory)
Name of the Faculty	Dr. A. JustinM.Pharm., Ph.D
Designation, Department	Associate Professor, Department of Pharmacology
Mobile Number	9942932150
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Scope, Course Objectives and Course Outcomes

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: The primary objectives of this course are 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 Outcomes (COs): At completion of this course it is expected that the students will be able to

CO 1: Define the gross anatomy and physiological functions of nervous, digestive, urinary, respiratory, endocrine and reproductive systems

CO 2: Interpret the homeostatic mechanisms in human body and understand the disorders associated with their imbalances

CO 3: Recognize the various tissues and organs structure of multiple systems of human body

CO 4: Demonstrate the physiological systems of various systems of human body using relevant experiments

CO 5: Interlink the coordinated working pattern of different organs of human body through its physiological functions

LECTURE PLAN – Abstract

Sessional	No. of Hours of Didactic Lecture	No. of Hours of other Activities	Total No. of Lecture Hours
I	23	03	26
II	22	03	25
Total No. ofHours	45	06	51

I SESSIONAL: 23 Lectures + 03 Activities

Lecture No.	Lecture Details	Hours
Unit-1	**(10)**	

Nervous system		
1.	Organization of nervous system, Neuron, Neuroglia	**10**
2.	Classification and properties of nerve fibre	
3.	Electrophysiology, action potential, nerve impulse	
4.	Receptors, synapse, neurotransmitters	
5.	Meninges, ventricles of brain and cerebrospinal fluid	
6.	Structure and functions of cerebrum	
7.	Structure and functions of cerebellum	
8.	Structure and functions of brain stem	
9.	Spinal cord - gross anatomy and functions	
10.	Functions of afferent and efferent nerve tracts, reflex activity	
Unit-2:	**(06)**	
Digestive system		
1.	Anatomy and functions of GI tract	**06**
2.	Production and regulation of stomach acid, pepsin role in protein digestion	
3.	Anatomy and functions of salivary glands, movements of GIT	
4.	Anatomy and functions of pancreas and liver	
5.	Digestion and absorption of nutrients and disorders of GIT	
6.	Energetics: Formation and role of ATP, Creatinine Phosphate and BMR	
Unit -3:	**(10)**	
Respiratory system		
1.	Anatomy of lungs	**05**
2.	Mechanism of respiration	
3.	Regulation of respiration	
4.	Lung Volumes and capacities transport of respiratory gases	
5.	Artificial respiration and resuscitation methods	
Urinary system		
1.	Anatomy of kidney and nephrons	**02**
2.	Functions of kidney and urinary tract	
Activity – 1	Unit Test – 1	
Activity – 2	MCQ Test – 1	
Activity – 3	MCQ Test – 2	

II SESSIONAL: 22 Lectures + 03 Activities

Lecture No.	Lecture Details	Hours
3.	Physiology of urine formation, micturition reflex	**03**
4.	Role of kidneys in acid base balance	
5.	Role of RAS in kidney and disorders of kidney	
Unit-4:Endocrine system	**(10)**	
1.	Classification of hormones	**10**

2.	Mechanism of hormone action	
3.	Structure and functions of pituitary gland	
4.	Structure and functions of thyroid gland	
5.	Structure and functions of parathyroid gland	
6.	Structure and functions of adrenal gland	
7.	Structure and functions of pancreas	
8.	Structure and functions of pineal gland	
9.	Structure and functions of thymus gland	
10.	Endocrine related disorders	
Unit-5:		**(09)**
Reproductive system		
1.	Anatomy and functions of male reproductive system	**06**
2.	Anatomy and functions of female reproductive system	
3.	Sex hormones, physiology of menstruation	
4.	Fertilization	
5.	Spermatogenesis, oogenesis	
6.	Pregnancy and parturition	
Introduction to genetics		
1.	Chromosomes, genes and DNA	**03**
2.	Protein synthesis	
3.	Genetic pattern of inheritance	
Activity – 1	Unit Test – 1	
Activity – 2	MCQ Test – 1	
Activity – 3	MCQ Test – 2	

Text books

1. Essentials of Medical Physiology by K. Sembulingam and P. Sembulingam. Jaypeebrothers 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

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**.**

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Name of the Subject	Pharmaceutical Organic ChemistryI (Theory)
Name of the Faculty	Dr.B. GowrammaM.Pharm., Ph.D
Designation, Department	Associate Professor, Department of Pharmaceutical Chemistry
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Scope, Course Objectives and Course Outcomes

Scope: This subject deals with classification and nomenclature of simple organiccompounds, structural isomerism, intermediates forming in reactions, important physicalproperties, 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 Outcomes (COs): At completion of this course it is expected that the students will be able to

CO 1: Write the structure, name of the organic compound
CO 2: Knowledge about the type of isomerism
CO 3: Write the reaction, name the reaction and orientation of reactions
CO 4: Account for reactivity/stability of compounds
CO 5: Identify/confirm the unknown organic compound
CO 6: Knowledge about the naming reactions of carbonyl compounds
CO 7: To perform common laboratory techniques including reflux, distillation, recrystallization, vacuum filtration, etc.

LECTURE PLAN –Abstract

Sessional	No. of Hours of Didactic Lecture	No of Hours of other Activities	Total No. of Lecture Hours
I	23	01	24
II	22	02	24
Total No. of Hours	45	03	48

I SESSIONAL: 23 Lectures + 01 Activities

Lecture No.	Lecture Details	Hours
Unit-1: Classification, nomenclature and isomerism		**7**
1.	Classification of Organic Compounds	
2.	Common and IUPAC systems of nomenclature of organic compounds	
3.	Common and IUPAC systems of nomenclature of organic compounds	
4.	Common and IUPAC systems of nomenclature of organic compounds	
5.	Common and IUPAC systems of nomenclature of organic compounds	
6.	Common and IUPAC systems of nomenclature of organic compounds	
7.	Structural isomerism's in organic compounds	
Unit-2: Alkanes, Alkenes and Conjugated dienes		**10**
1.	Alkanes preparation, properties	
2.	SP^3 hybridization in alkanes, Halogenation of alkanes, uses of paraffins	
3.	Alkenes preparation & properties	
4.	E1 reactions -kinetics, order of reactivity of alkyl halides, stereochemistry and rearrangement of carbocations.	
5.	E2 reactions - kinetics, order of reactivity of alkyl halides, stereochemistry	
6.	E_1 versus E_2 reactions, Factors affecting E_1 and E_2 reactions	
7.	Ozonolysis, electrophilic addition reactions of alkenes	
8.	Markownikoff's orientation, free radical addition reactions of alkenes, Anti Markownikoff's orientation.	
9.	Conjugated dienes preparation, properties and Stability	
10.	Diel-Alder, electrophilic addition, free radical addition reactions of conjugated dienes, allylic rearrangement	
Unit-3: Alkyl halides Alcohols		**06**
1.	Alkyl halides preparation & properties	
2.	SN1 kinetics, order of reactivity of alkyl halides, stereochemistry	
3.	Rearrangement of carbocations.	
4.	SN2 reactions - kinetics, order of reactivity of alkyl halides, stereochemistry	
5.	SN_1 versus SN_2 reactions, Factors affecting SN_1 and SN_2 reactions	
6.	Structure and uses of ethylchloride, Chloroform, trichloroethylene, tetrachloroethylene,	

Activity-1	MCQ Test	**01**

II SESSIONAL: 22 Lectures + 2 Activities

Lecture No.	Lecture Details	Hours
Unit-3: Alkyl halides Alcohols		**04**
1.	Dichloromethane, tetrachloromethane and iodoform.	
2.	Alcohols preparation & properties	
3.	Qualitative tests, Structure & uses of Ethanol, chlorobutanol,	
4.	Cetosteryl alcohol, Benzyl alcohol, Glycerol, Propylene glycol	
Unit-4: Carbonyl compounds* (Aldehydes and ketones)		**10**
1.	Aldehydes and ketones preparation	
2.	Aldehydes and ketones properties	
3.	Aldehydes and ketones properties	
4.	Electromeric effect	
5.	aldol condensation, Crossed Aldol condensation	
6.	Cannizzaro reaction, Crossed Cannizzaro reaction	
7.	Benzoin condensation	
8.	Perkin condensation, Qualitative tests,	
9.	Structure and uses of Formaldehyde, Paraldehyde, Acetone, Chloral hydrate	
10.	Hexamine, Benzaldehyde, Vanilin, Cinnamaldehyde.	
Unit-5: carboxylic cid and amines		**18**
1.	Carboxylic acids preparation & properties	
2.	Acidity of carboxylic acids, effect of substituents on acidity,	
3.	inductive effect and qualitative tests for carboxylic acids	
4.	qualitative tests for amide and ester, Structure and Uses of Acetic acid, Lactic acid	
5.	Tartaric acid, Citric acid, Succinic acid. Oxalic acid, Salicylic acid, Benzoic acid, Benzyl benzoate, Dimethyl phthalate, Methyl salicylate and Acetyl salicylic acid	
6.	Aliphatic amines preparation & properties	
7.	Basicity, effect of substituent on Basicity.	
8.	Qualitative test, Structure & uses- Ethanolamine, Ethylenediamine, Amphetamine	
Activity-1	MCQ Test	**02**
Activity-2	MCQ Test	

Text Books

1. Textbook of Organic Chemistry by B.S. Bahl&ArunBahl.
2. Practical Organic Chemistry by Mann andSaunders.
3. Vogel's text book of Practical Organic Chemistry.

4. Advanced Practical organic chemistry by N.K.Vishnoi.
5. Reaction and reaction mechanism by Ahluwaliah/Chatwal.

Reference Books

1. Organic Chemistry by Morrison and Boyd.
2. Organic Chemistry by I.L. Finar , Volume-I.
3. Organic Chemistry by P.L.Soni.
4. Introduction to Organic Laboratory techniques by Pavia, Lampman and Kriz.

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Name of the Subject	Biochemistry (Theory)
Name of the Faculty	Dr.Gomathi Swaminathan, M.Pharm., Ph.D.,
Designation, Department	Lecturer, Department of Pharmaceutical Chemistry
Mobile Number	9790095279
e-Mail i.d.	gomathiswaminathan@jssuni.edu.in

Scope, Course Objectives and Course Outcomes

Scope:

Biochemistry deals with complete understanding of the molecular levels of thechemical process associated with living cells. The scope of the subject is providingbiochemical facts and the principles to understand metabolism of nutrient molecules inphysiological and pathological conditions. It is also emphasizing on genetic organizationof mammalian genome and hetero & autocatalytic functions of DNA.

Objectives: The primary objectives of this course are to

1. Provide the biochemical facts and the principles to the students of pharmacy.
2. Understand the catalytic activity of enzymes and importance of enzymes in diagnosis of diseases and therapeutic agents.
3. Know the metabolic pathways of biomolecules in health and illness (metabolic disorders).
4. Understand the genetic organization of mammalian genome, protein synthesis,replication, mutation and repair mechanism.

Course Outcomes (COs): At completion of this course it is expected that the students will be able to

CO 1: Define the basic concepts in biochemistry.

CO 2: Apply concepts and knowledge of medicinal biochemistry to clinical scenarios.

CO 3: Critically interpret how the biomolecules acts on the body and its mechanisms.

CO 4: Link the biochemical reactions and pathways of several diseases.

CO 5: Explain the common laboratory values in clinical chemistry.

CO 6: Use scientific laboratory equipment in order to gather and analyze data on biochemistry.

LECTURE PLAN –Abstract

Sessional	No. of Hours of Didactic Lecture	No of Hours of other Activities	Total No. of Lecture Hours
I	23	3	26
II	22	4	26
Total No. of Hours	45	7	52

I SESSIONAL: 23 Lectures + 3 Activities

Lecture No.	Lecture Details	Hours
Unit-1		**(08)**
Biomolecules & Bioenergetics		**08**
	Orientation to the subject	
1.	Biomolecules, Introduction, classification	
2.	Chemical nature and biological role of carbohydrate, lipids,	
3.	Nucleic acids, amino acids and proteins.	
4.	Bioenergetics, Concept of free energy, endergonic and exergonic reaction	
5.	Relationship between free energy, enthalpy and entropy	
6.	Redox potential. Energy rich compounds, classification	
7.	Biological significances of ATP	
8.	Biological significances of cyclic AMP	
Unit-2		**(10)**
Carbohydrate metabolism & Biological oxidation		

1.	Carbohydrate metabolism, Glycolysis – Pathway, energetics and significance	**10**
2.	Citric acid cycle- Pathway, energetics and significance	
3.	HMP shunt and its significance	
4.	Glucose-6-Phosphate dehydrogenase, (G6PD) deficiency	
5.	Glycogen metabolism Pathways and glycogen storage diseases (GSD)	
6.	Gluconeogenesis- Pathway and its significance	
7.	Hormonal regulation of blood glucose level and Diabetes mellitus	
8.	Biological oxidation, Electron transport chain (ETC) and its mechanism.	
9.	Oxidative phosphorylation & its mechanism and substrate Phosphorylation	
10.	Inhibitors ETC and oxidative phosphorylation/Uncouplers	
Unit-3 (10)		
Lipid & Amino acid metabolism		**05**
1.	Lipid metabolism, β-Oxidation of saturated fatty acid (Palmitic acid)	
2.	Formation and utilization of ketone bodies, ketoacidosis	
3.	De novo synthesis of fatty acids (Palmitic acid), Biological significance of cholesterol	
4.	Conversion of cholesterol into bile acids, steroid hormone and vitamin D	
5.	Disorders of lipid metabolism: Hypercholesterolemia, atherosclerosis, fatty liver and obesity.	
Activity1	MCQ Test	
Activity2	MCQ Test	
Activity3	Revision Test	

II SESSIONAL: 22Lectures + 4 Activities

Lecture No.	Lecture Details	Hours
6.	Amino acid metabolism, General reactions of amino acid metabolism: Transamination, deamination & decarboxylation,	**05**
7.	Urea cycle and its disorders	
8.	Catabolism of phenylalanine and tyrosine and their metabolic disorders (Phenyketonuria, Albinism, alkeptonuria, tyrosinemia)	
9.	Synthesis and significance of biological substances; 5-HT, melatonin, dopamine, noradrenaline, adrenaline	
10.	Catabolism of heme; hyperbilirubinemia and jaundice	
Unit-4		**(10)**

Nucleic acid metabolism and Genetic information transfer		**10**
1.	Nucleic acid metabolism and genetic information transfer-Intro	
2.	Biosynthesis of purine and pyrimidine nucleotides	
3.	Catabolism of purine nucleotides	
4.	Hyperuricemia and Gout disease	
5.	Organization of mammalian genome	
6.	Structure of DNA and their functions	
7.	Structure of RNA and their functions	
8.	DNA replication (semi conservative model)	
9.	Transcription or RNA synthesis	
10.	Genetic code, Translation or Protein synthesis and inhibitors	
Unit-5(07)		
Enzymes		**07**
1.	Enzymes, Introduction, properties, nomenclature	
2.	IUB classification of enzymes	
3	Enzyme kinetics (Michaelis plot, Line Weaver Burke plot)	
4.	Enzyme inhibitors with examples	
5.	Regulation of enzymes: enzyme induction and repression, allosteric enzymes regulation	
6.	Therapeutic and diagnostic applications of enzymes and isoenzymes	
7.	Coenzymes –Structure and biochemical functions	
Activity-1	MCQ Test	
Activity-2	MCQ Test	
Activity-3	MCQ Test	
Activity-4	Revision Test	

Text Books

1. Biochemistry by D. Satyanarayan and U.Chakrapani
2. Textbook of Biochemistry by Deb.
3. Textbook of Biochemistry by Rama Rao.

Reference Books

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. Outlines of Biochemistry by Conn and Stumpf

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Name of the Subject	Pathophysiology
Name of the Faculty	Mr. Syed Omar.
Designation, Department	Lecturer, Department of Pharmacy Practice
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Scope, Course Objectives and Course Outcomes

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: The primary objectives of this course are to

1. Discuss the Basic concepts and principles of pathophysiology
2. Describe the etiology and pathogenesis of the selected disease states;
3. Name the signs and symptoms of the diseases; and
4. Mention the complications of the diseases.

Course Outcomes (COs): At completion of this course it is expected that the students will be able to

CO 1: Demonstrate a basic understanding of the ideas and fundamentals of disease
CO 2: Identify the causes and mechanism of pathological process that result in disease.
CO 3: Discuss clinical manifestations or signs and symptoms of selected disease processes and health problems
CO 4: Determine the consequences of the disease process in chronic and acute conditions

LECTURE PLAN – Abstract

Sessional	No. of Hours of Didactic Lecture Pathophysiology
I	24
II	21
Total No. of Hours	45

I SESSIONAL: 24 Lectures

Lecture No.	Lecture Details	Hours
UNIT 1		**10 hours**
Basic principles of Cell injury and Adaptation		
1.	Introduction, definitions, Homeostasis, Components and Types of Feedback systems, Causes of cellular injury	**01**
2.	Pathogenesis	**02**
3.	Morphology of cell injury – Adaptive changes, Cell swelling	**01**
4.	Intra cellular accumulation, Calcification, Enzyme leakage and Cell Death Acidosis &Alkalosis, Electrolyte imbalance	**01**
	Basic mechanism involved in the process of inflammation and repair	
5.	Introduction, Clinical signs of inflammation, Different types of Inflammation	**01**
6.	Mechanism of Inflammation – Alteration in vascular permeability and blood flow, migration of WBC's, Mediators of inflammation	**02**
7.	Basic principles of wound healing in the Skin	**01**
8.	Pathophysiology of Atherosclerosis	**01**
UNIT II		**10 Hours**
Cardiovascular System		
1.	Hypertension	**02**
2.	Congestive cardiac failure	**01**
3.	Angina	**01**
4.	Myocardial Infarction	**01**
	Respiratory system	
5.	Asthma	**01**
6.	Chronic obstructive airways diseases	**01**
Renal System		

7.	Acute renal failure	**01**
8.	Chronic renal failure	**02**
UNIT III		**04 hours**
Haematological Diseases		
1.	Iron deficiency & Megaloblastic Anemia	**01**
2.	Sickle cell anemia, Thalasemia , Hereditary acquired anemia & Hemophilia	**01**
Endocrine system		
3.	Diabetes	**01**
4.	Thyroid diseases & Disorders of sex hormones	**01**

II SESSIONAL: 21 Lectures

Lecture No.	Lecture Details	Hours
UNIT III		**06 hours**
Nervous system		
5.	Epilepsy	**01**
6.	Parkinson's disease	**01**
7.	Stroke	**01**
8.	Depression	**01**
9.	Schizophrenia	**01**
10.	Alzheimer's disease, Gastrointestinal system- Peptic Ulcer	**01**
UNIT IV		**8 hours**
Gastrointestinal system		
1.	Inflammatory bowel diseases	**01**
2.	Jaundice, hepatitis (A,B,C,D,E,F)	**01**
3.	Alcoholic liver disease.	**01**
Disease of bones and joints		
4.	Rheumatoid arthritis	**01**
5.	Osteoporosis	**01**
6.	Gout	**01**
7.	**Principles of cancer- classification, etiology and pathogenesis of cancer**	**02**
UNIT V		**07 Hours**
Infectious diseases		
1.	Meningitis	**01**
2.	Typhoid	**01**

3.	Leprosy	**01**
4.	Tuberculosis	**01**
5.	Urinary tract infections	**01**
6.	Sexually transmitted diseases-AIDS	**01**
7.	Sexually transmitted diseases-Syphilis & Gonorrhea	**01**

Reference Books

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

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Name of the Subject	Computer Application in Pharmacy

Name of the Faculty	Mr. C Jayakumar. MCA., M.Phil., B.Ed., PGDCA., FCED
Designation, Department	Assistant Professor, Department of Pharmacy Practice
Mobile Number	9443476698
e-Mail i.d.	jrccc@jssuni.edu.in

Scope, Course Objectives and Course Outcomes

Scope: This course is designed to impart knowledge and skills necessary for number systems, database management systems,webtechnologies and the IT tools used in the field of Pharmacy.

Objectives: The primary objectives of this course are to

4. Understand the various IT tools available in the field of pharmacy.
5. Apply the knowledge and applications with respect to Databases.
6. Use web technologies to study about the newer innovations in the field of Pharmacy.
7. Know various uses of databases in the field of pharmacy.

Course Outcomes (COs): At completion of this course it is expected that the students will be able to

CO 1: Apply the knowledge of mathematics and computing fundamentals to pharmaceutical applications for any given requirement.
CO 2: Design and develop solutions to analyze pharmaceutical problems using computers.
CO 3: Integrate and apply efficiently the contemporary IT tools to all Pharmaceutical related activities.
CO 4: Solve and work with a professional context pertaining to ethics, social, cultural and regulations with regard to Pharmacy.

LECTURE PLAN –Abstract

Sessional	Number of Hours of Didactic Lecture	No of Hours of other Pedagogy	Total Number of Lecture Hours
I	23	01	24
II	22	01	23
Total No of Hours	45	02	47

I SESSIONAL: 23 Lectures + 01 Activities

Lecture No.	Lecture Details	Hours
Unit-I: Number system		**(06)**
1	Types of Number systems, Introduction	**(06)**
2	Conversion from one number system to other, simple sums	
3	Binary arithmetic, addition, subtraction , simple sums	
4	Binary multiplication and division, simple sums	
5	Method of complementation, introduction	
6	One's and Two's complement, uses, simple sums	
Unit-I: Concept of Information Systems and Software		**(06)**
7	Introduction to information gathering, methods and uses	**(06)**
8	Introduction to requirement and feasibility analysis	
9	Data flow diagrams, applications and uses	
10	Process Flow and its uses	
11	Input and output designs and their applications	
12	Planning and managing the project	
Unit-II: Web technologies		**(06)**
13	Introduction to HTML	**(06)**
14	Designing a web page	
15	Examples XML, applications and uses	
16	Introduction to Style sheets, CSS and their applications	
17	Programming languages and their uses	
18	Introduction to web servers and uses	
Unit-II: Introduction to databases		**(05)**
19	Server Products and their applications	**(05)**
20	Introduction to pharmacy databases	
21	MS Access and MYSQL, structure and uses	
22	Pharmacy databases and their types	
23	Use of pharmacy databases	
Activity - 1	Online Databases – Hands on activity	

II SESSIONAL: 22 Lectures + 01 Activities

Lecture No.	Lecture Details	Hours
Unit-III: Applications of Computers in pharmacy		**(09)**
24	Introduction to drug information storage and retrieval	**(09)**
25	Pharmacokinetics and its applications	
26	Mathematical model in drug design	
27	Applications of computers in hospital and clinical pharmacy	
28	EP systems and their applications	
29	Barcode medicine identification and automated dispensing of drugs	
30	Importance of mobile technology and adherence monitoring	
31	Different types of diagnosing systems and their advantages	
32	Patient monitoring and Pharma info systems	
Activity – 2	Information system – hands on activity online	
Unit-IV: Bioinformatics		**(06)**
33	Introduction to bioinformatics,uses	**(06)**
34	Bioinformatics databases	
35	Introduction to vaccine discovery, impact and new trends	
36	Future trends in Bioinformatics	
37	Improvement and new trends in vaccine discovery	
38	Future trends in bioinformatics	
Unit-V : Computers in data analysis and preclinical development		**(07)**
39	Chromatographic data analysis	**(07)**
40	Uses, trends and innovations	
41	LIMS , introduction	
42	Uses, trends and innovations of LIMS	
43	TIMS , introduction	
44	Methods and uses of TIMS	
45	New methods and trends of TIMS	

Reference Books

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.

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PRINCIPAL
J.S.S. COLLEGE OF PHARMACY
Rockland's, Ootacamund - 643 001

JSS Academy of Higher Education & Research, Mysuru

(Deemed to be University)

(Accredited 'A^{+}' Grade by NAAC)

JSS COLLEGE OF PHARMACY, ROCKLANDS, OOTY

(ISO 9001:2015 Certified)

Lecture Plan

(Academic Year: 2024-2025)

Course: II. B.PHARM

Name of the Subject	Pharmaceutical Organic Chemistry II (Theory)
Name of the Faculty	Dr. Gomathi S M.Pharm., Ph.D
Designation, Department	Lecturer, Department of Pharmaceutical Chemistry
Mobile Number	+91 97900 95279
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Scope, Course Objectives and Course Outcomes

Scope: This course 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: The primary objectives of this course are to

1. Study the preparation and reactions of organic compounds
2. Learn the mechanisms, reactivity and orientation of the reactions.
3. Write the structures of medicinal compounds and know their medicinal uses.
4. Study the physical,chemical properties and analysis of fats and oils
5. Study the stability of cycloalkanes

Course Outcomes (COs): At completion of this course it is expected that the students will be able to

1. Understand the general principles and mechanisms involved in various organic reactions.
2. Apply the knowledge of reactivity and orientation of organic reactions in synthesis of medicinal drugs and intermediates.
3. Describe the chemistry of fats and oils.
4. Learn the interpretation of the analysis for fats and oils.
5. Know the medicinal uses and other applications of organic compounds.
6. Acquire the knowledge about the stability of cyclo alkanes.

LECTURE PLAN – Abstract

Sessional	No. of Hours of Didactic Lecture	No of Hours of other Activities	Total No. of Lecture Hours
I	24	2	26
II	21	3	27
Total No. of Hours	45	6	53

I SESSIONAL : 24 Lectures + 3 Activities

Lecture No.	Lecture Details	Hours
Activity-1	Introduction to Pharmaceutical Organic Chemistry II	
Unit-1: Benzene and its derivatives		**(10)**
1.	Structure of benzene-Analytical,synthetic and other evidences	**10**
2.	Orbital Structure & Resonance in Benzene	
3.	Aromaticity & Huckel's Rule	
4.	Reactions of Benzene- Nitation	
5.	Reactions of Benzene- Halogenation & Sulphonation	
6.	Reactions of Benzene- Friedal Crafts Alkylation	
7.	Reactions of Benzene- Friedal Crafts Acylation	
8.	Effect of substituent's on reactivity and orientation of mono substituted compounds on substitution	
9.	Effect of substituent's on reactivity and orientation of mono substituted compounds on substitution (cont…)	
10.	Structure and uses of DDT, Saccharin, BHC and Chloramine T	
Unit-2: Phenols, Aromatic Amines &Aromatic Acids		**(10)**
1.	Preparation of Phenols	**10**
2.	Reactions of Phenols	
3.	Acidity of Phenols Effect of substituents on Acidity	
4.	Qualitative tests of Phenols & Structure and uses of Phenols,Cresols,Resorcinols and Naphthols	
5.	Preparation of Aromatic amines	
6.	Reactions of Aromatic amines	
7.	Basicity of amines &Effect of substituents on basicity	
8.	Synthetic uses of aryl diazonium salts	
9.	Preparations and important reactions of Aromatic acids	
10.	Effect of substituents on acidity	
Unit-3: Fats and oils		**(10)**

1.	Introduction of Fatty acids	**04**
2.	Reactions of Fatty acids	
3.	Hydrolysis and Halogenation of oils	
4.	Saponification, Rancidity and drying of oils	
Activity-1	Discussion on MCQs	
Activity-2	Revision class for first sessional portions	

II SESSIONAL : 21 Lectures + 3 Activities

Lecture No.	Lecture Details	Hours
Unit-3: Fats and oils (cont…)		
1.	Analytical constants- Acid Value	**06**
2.	Analytical constants- Saponification value	
3.	Analytical constants- Iodine Value	
4.	Analytical constants-Ester Value	
5.	Analytical constants- Acetyl Value	
6.	Analytical constants- RM Value	
Unit-4: Poly nuclear hydrocarbons		**(08)**
1.	Synthesis and Reactions of Naphthalene	**08**
2.	Structures and Medicinal uses of Naphthalene	
3.	Synthesis and Reactions of Phenanthrene	
4.	Structures and Medicinal uses of Phenanthrene	
5.	Synthesis and Reactions of Anthracene	
6.	Structures and Medicinal uses of Anthracene	
7.	Diphenyl Methane	
8.	Triphenyl methane	
Unit-5: Cyclo Alkanes		**(07)**
1.	Preparations of cycloalkanes	**07**
2.	Reactions of cyclo propane	
3.	Reactions of cyclo butane	
4.	Reactions of cyclo pentane	
5.	Reactions of cyclo hexane	
6.	Baeyer's Strain Theory; Limitations of Baeyer's Strain Theory	
7.	Coulson's and Mofitt's modification & Sachse Mohr's Theory	
Activity-1	Discussion on MCQs	
Activity-2	Revision class for II sessional Portions	
Activity-3	Revision class for End semester examination	

Text books

1. Text book of Organic Chemistry by B.S,Bahl & Arun Bahl
2. Organic Chemstry by Morrision & Boyd.

Reference books

1. Text book of Organic Chemistry by IL.Finar
2. Organic Chemistry by Paula Yerkanis Bruice
3. Organic Chemistry by PL.Soni

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Name of the Subject	Physical Pharmaceutics I (Theory)
Name of the Faculty	Dr. Kousalya M.Pharm., Ph.D
Designation, Department	Lecturer, Department of Pharmaceutics
Mobile Number	+91 79049 27414
e-Mail i.d.	kousalyas@jssuni.edu.in

Scope, Course Objectives and Course Outcomes

Scope: This course is designed to impart knowledge and skills necessary for the understanding of physicochemical properties, and principles involved in dosage forms/formulations. The 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: The primary objectives of this course are to

1. Understand various physicochemical properties of drug molecules in the designing the dosage forms
2. Know the principles of solubility, dissolution, diffusion & to use them identifying the suitable dosage form for drug candidates
3. Demonstrate use of physicochemical properties in the formulation development and evaluation of dosage forms.

Course Outcomes (COs): At completion of this course it is expected that the students will be able to

CO 1: Define the basic concepts of the physicochemical properties of drug candidates
CO 2: Identify the solutions for the drug condiates with poor physicochemical properties
CO 3: Identify the solutions for improving the solubility of water insoluble drugs
CO 4: Identify the drug dissolution and partitioning properties of drug canditates with their improvement
CO 5: Critically interpret all the drug related properties and finding the best suitable dosage form

LECTURE PLAN – Abstract

Sessional	Number of Hours of Didactic Lecture	No. of Hours of other activities	Total Number of Lecture Hours
I	25	03	28
II	20	03	23
Total Number of Lecture Hours	45	06	51

I SESSIONAL: 25 lectures + 03 Activities

Lecture No.	Lecture Details	Hours
1.	Introduction to Physical Pharmaceutics I	**01**
Unit-1: Solubility of drugs		**(10)**
1.	Solubility expressions	10
2.	Mechanisms of solute solvent interactions, ideal solubility & Scatchard-Hildebrand equation	
3.	Solubility parameters, solvation & association	
4.	Quantitative approach to the factors influencing solubility of drugs, Dissolution & drug release	
5.	Diffusion principles in biological systems	
6.	Solubility of gas in liquids, solubility of liquids in liquids, (Binary solutions, ideal solutions)	
7.	Raoult's law, real solutions, azeotropic mixtures, fractional distillation	
8.	Partially miscible liquids	
9.	Critical solution temperature and applications.	
10.	Distribution law, its limitations and applications	
Unit-2: States of Matter and properties of matter:		**(10)**
1.	State of matter	10
2.	Changes in the state of matter	
3.	Latent heats, vapour pressure	
4.	Sublimation critical point, eutectic mixtures, gases	
5.	Aerosols – inhalers, relative humidity	
6.	Liquid complexes, liquid crystals, glassy states, solid-crystalline	
7.	Amorphous & polymorphism	
8.	Refractive index, optical rotation	
9.	Dielectric constant, dipole moment	
10.	Dissociation constant, determinations and applications	
Unit-3: Surface and interfacial phenomenon		**(05)**
1.	Introduction and basics of Surface and Interfacial tensions	
2.	General principles	

3.	Surface free energy, spreading coefficient	05
4.	Measurement of Surface and Interfacial tensions	
5.	Adsorption at liquid interface (soluble monomolecular film)	
Activity 1	MCQ test -1	
Activity 2	MCQ test -2	
Activity 3	MCQ test -3	

II SESSIONAL : 20 Lectures + 03 Activities

Lecture No.	**Lecture Details**	**Hours**
Unit-3: Surface and interfacial phenomenon		**(05)**
1.	Surfactants and its applications	05
2.	HLB scale and its applications	
3.	Adsorption at solid interface	
4.	Freundlich and Langmuir constants and BET Equation	
5.	Types of adsorption isotherms, Electrical properties at interfaces	
Unit-4: Complexation and protein binding		**(08)**
1.	Introduction	08
2.	Classification of Complexation	
3.	Applications	
4.	Methods of analysis	
5.	Protein binding	
6.	Complexation and drug action	
7.	Crystalline structures of complexes	
8.	Thermodynamic treatment of stability constants	
Unit-5: pH, buffers and Isotonic solutions		**(07)**
1.	Sorensen's pH scale	07
2.	pH determination (electrometric and calorimetric)	
3.	Applications of buffers	
4.	Buffer equation	
5.	Buffer capacity	
6.	Buffers in pharmaceutical and biological systems	
7.	Buffered isotonic solutions	
Activity 1	MCQ test -1	
Activity 2	MCQ test -2	
Activity 3	MCQ test -3	

Text Books:

1. Physical Pharmaceutics by Ramasamy C and ManavalanR.
2. Laboratory Manual of Physical Pharmaceutics, C.V.S. Subramanyam, J. Thimma settee
3. Physical Pharmaceutics I by C.V.S. Subramanyam
4. Test book of Physical Phramacy, by Gaurav Jain & Roop K. Khar

Reference Books

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 to3, MarcelDekkar Inc.
6. Liberman H.A, Lachman C, Pharmaceutical Dosage forms. Disperse systems, volume 1, 2, 3. Marcel Dekkar Inc.

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Name of the Subject	Pharmaceutical Microbiology (Theory)
Name of the Faculty	Mr. Alin Bose M.Pharm.,
Designation, Department	Lecturer, Department of Pharmaceutical Biotechnology
Mobile Number	+91 81970 88591
e-Mail i.d.	alinbose@jssuni.edu.in

Scope, Course Objectives and Course Outcomes

Scope: This course aims to provide information about basic microbiology, which is the minimum requirements of industry-related operations such as sterilization, aseptic techniques, fermentation etc. The course also covers a broad range of skills needed to understand different microbiological principles of nutritional requirements, preservation, microbe cultivation, sterilization methods, spoilage forms and various application of cell culture in industry and research.

Objectives: The primary objectives of this course are to

1. Explain the criteria and procedures for the sterilization processes
2. Explain the definition and features of antiseptic, disinfectant and its mode of action
3. Get detailed insight into the structure and functions of microbes
4. Describe the various cultivation methods of bacteria, yeast, fungi and virus
5. Understand principle, working and applications of instruments viz, autoclave, hot air oven and laminar air flow

Course Outcomes (COs): At completion of this course it is expected that the students will be able to

CO 1: Gain insight into the theory and practical aspects of microbiology
CO 2: Classify and explain the structure and general characteristics of various microorganism
CO 3: Understand various basic concepts of sterilization, disinfectants in maintaining aseptic conditions
CO 4: Get insight into the pure culture technique, inoculations
CO 5: Describe validation parameter to be used for instrumentation evaluation.
CO 6: Design a clean room to maintain an industry, free of microbial ecosystem.

LECTURE PLAN – Abstract

Sessional	No. of Hours of Didactic Lecture	No of Hours of other Activities	Total No. of Lecture Hours
I	27	03	30
II	18	02	20
Total No. of Hours	45	05	50

I SESSIONAL: 27 Lectures + 3 Activities

Lecture No.	Lecture Details	Hours
Unit-1		**10**
	Orientation to the subject	
1.	Introduction, history of microbiology, its branches, scope and its importance	
2.	Introduction to Prokaryotes and Eukaryotes	
3.	Study of ultra-structure and morphological classification of bacteria	
4.	Nutritional requirements	
5.	Raw materials used for culture media and physical parameters for growth	
6.	Growth curve	
7.	Isolation and preservation methods for pure cultures	
8.	Cultivation of anaerobes	
9.	Quantitative measurement of bacterial growth (total & viable count)	
10.	Study of different types of phase microscopy, dark field microscopy and electron microscopy	
Unit-2		**10**
11.	Identification of bacteria using staining techniques (simple, Gram's & Acid fast staining)	
12.	Biochemical tests (IMViC)	
13.	Study of principle, procedure, merits, demerits and applications of Physical, chemical and mechanical method of sterilization	
14.	Study of principle, procedure, merits, demerits and applications of Physical, chemical and mechanical method of sterilization (Cont…)	
15.	Study of principle, procedure, merits, demerits and applications of Physical, chemical and mechanical method of sterilization (Cont…)	
16.	Evaluation of the efficiency of sterilization methods	
17.	Evaluation of the efficiency of sterilization methods (Cont…)	
18.	Evaluation of the efficiency of sterilization methods (Cont…)	
19.	Equipment's employed in large scale sterilization	
20.	Sterility indicators	

Unit-3		**10**
10.	Study of morphology, classification, reproduction/replication and cultivation of Fungi	
11.	Study of morphology, classification, reproduction/replication and cultivation of Virus	
12.	Study of morphology, classification, reproduction/replication and cultivation of Virus (Cont…)	
13.	Classification and mode of action of disinfectants	
14.	Factors influencing disinfection, antiseptics and their evaluation	
15.	Evaluation of bactericidal & Bacteriostatic.	
16.	Evaluation of bactericidal & Bacteriostatic (Cont…)	
Activity1	MCQ Test	
Activity2	MCQ Test	
Activity3	MCQ Test	

II SESSIONAL: 18 Lectures + 2 Activities

Lecture No.	Lecture Details	Hours
17.	Sterility testing of products (solids, liquids, ophthalmic and other sterile products) according to IP	
18.	Sterility testing of products (solids, liquids, ophthalmic and other sterile products) according to BP	
19.	Sterility testing of products (solids, liquids, ophthalmic and other sterile products) according to USP	
Unit-4		**08**
7.	Designing of aseptic area, laminar flow equipment's	
8.	Study of different sources of contamination in an aseptic area and methods of prevention	
9.	Clean area classification	
10.	Principles and methods of different microbiological assay	
11.	Methods for standardization of antibiotics, vitamins and amino acids	
12.	Assessment of a new antibiotic and testing of antimicrobial activity of a new substance	
13.	Assessment of a new antibiotic and testing of antimicrobial activity of a new substance (Cont…)	
14.	General aspects-environmental cleanliness	
Unit-5		**07**
9.	Types of spoilage, factors affecting, sources	
10.	Types of spoilage, factors affecting, sources (Cont…)	
11.	Preservation of pharmaceutical products	
12.	Preservation of pharmaceutical products (Cont…)	

13.	Preservation of pharmaceutical products (Cont…)	
14.	General procedure for cell culture	
15.	Application of cell cultures in pharmaceutical industry and research	
Activity-1	MCQ Test	
Activity-2	MCQ Test	

Text Books

1. Ananthnarayan : Text Book of Microbiology, Orient-Longman, Chennai
2. Prescott and Dunn., Industrial Microbiology, 4th edition, CBS Publishers & Distributors, Delhi.
3. Cooper and Gunn's: Tutorial Pharmacy, CBS Publisher and Distribution

Reference Books

1. I.P., B.P., U.S.P.- latest editions.
2. Pelczar, Chan Kreig, Microbiology, Tata McGraw Hill edn
3. Bergeys manual of systematic bacteriology, Williams and Wilkins- A Waverly company

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Name of the Subject	Pharmaceutical Engineering (Theory)
Name of the Faculty	Mr. Murugappan M , M.Pharm
Designation, Department	Lecturer, Department of Pharmaceutics
Mobile Number	+91 97900 30215
e-Mail i.d.	murugappan92@jssuni.edu.in

Scope, Course Objectives and Course Outcomes

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 Outcomes (COs): At completion of this course it is expected that the students will be able to

CO 1: Design the layout for pharmaceutical operation unit
CO 2: Handle the equipment associated with liquid handling systems
CO 3: Chose right choice of materials and machines for pharma articles.
CO 2: Solve process related problems in pharma industry
CO 4: Design new pharma equipment

LECTURE PLAN – Abstract

Sessional	No. of . Didactic Lecture	No of Hours of other Activities	Total No. of Lecture Hours
I	20	3	23
II	23	3	26
Total No. of Hours	43	6	49

I SESSIONAL : 20 Lectures + 3 Activities

Lecture No.	Lecture Details	Hours
Unit - 1		**(10)**
1.	**Flow of Fluids** – Types of manometers, Reynolds number and its significance	**04**
2.	Bernoulli's Theorem and its application, energy losses	
3.	Orifice meter, Venturimeter, Pilot tube and Rotometer	
4.	**Size Reduction** – Objectives, Mechanism and laws governing size reduction	**03**
5.	Factors affecting size reduction	
6.	Principle, Construction, Working, Uses, merits and demerits of Hammer mill, Ball mill, Fluid energy mill	
7.	Principle, Construction, Working, Uses, merits and demerits of Edge runner mill and End runner mill	
8.	**Size Separation** – Objective, Application, Mechanism of size separation, official standard of powders, sieves, size separation	**03**
9.	Principle, Construction, Working, Uses, merits and demerits of sieve shaker, cyclone separator	
10.	Principle, Construction, Working, Uses, merits and demerits of Air separator, elutriation tank	
Unit – 2		**(10)**
1.	**Heat Transfer** – Objective, Application and Heat transfer mechanism	**03**
2.	Fourier's Law	
3.	Heat Transfer by Conduction, Convection and Radiation. Heat Interchangers and Exchangers	
4.	**Evaporation** – Objective, Application, Factors Influencing Evaporation	**04**
5.	Difference between Evaporation and other heat processes, Principle, Construction, Working, Uses, Merits and Demerits of Steam jacketed Kettle.	
6.	Principle, Construction, Working, Uses, Merits and Demerits of Horizontal Tube evaporator, Climbing Film evaporator	
7.	Principle, Construction, Working, Uses, Merits and Demerits of Forced circulation evaporator, Multiple effect evaporator, Economy of multiple effect evaporator	

8.	**Distillation** – Basic principle and methodology of simple distillation	**03**
9.	Flash and Fractional Distillation	
10.	Distillation under reduced pressure, steam distillation and molecular distillation	
Activity-1	MCQ Test	
Activity-2	MCQ Test	
Activity-3	MCQ Test	

II SESSIONAL : 23 Lectures + 3 Activities

Lecture No.	Lecture Details	Hours
Unit – 3		**(08)**
1.	**Drying** - Objectives, Applications and mechanism of drying process	**04**
2.	Measurements and applications of equilibrium moisture content, rate of drying curve.	
3.	Principle, Construction, Working, Uses, Merits and Demerits of Tray dryer, Drum dryer, Spray dryer	
4.	Principle, Construction, Working, Uses, Merits and Demerits of Fluidized bed dryer, Vaccum dryer and Freeze dryer	
5.	**Mixing –** Objective, Applications and factors affecting mixing	**04**
6.	Difference between solid and liquid mixing, Mechanism of solid mixing, liquid mixing and semisolid mixing	
7.	Principle, Construction, Working, Uses, Merits and Demerits of Double cone blender, Twin shell blender, Ribbon Blender	
8.	Principle, Construction, Working, Uses, Merits and Demerits Sigma Blade mixer, Planetary mixer, propellents, Turbines, Paddles and Silverson Emulsifier	
Unit - 4		**(8)**
1.	**Filtration** – Objective, Applications, Theories and factors influencing filtration, filter aids, filter medias	**4**
2.	Theories and factors influencing filtration, filter aids, filter medias (Cont…)	
3.	Principle, Construction, Working, Uses, Merits and Demerits of Plate and Frame filter, Filter leaf	
4.	Principle, Construction, Working, Uses, Merits and Demerits of Rotary drum filter, Meta filter, Cartridge filter	
5.	Principle, Construction, Working, Uses, Merits and Demerits of Membrane filter, Seidtz filter	
6.	**Centrifugation** – Objective, principles and application of centrifugation	**4**

7.	Principle, Construction, Working, Uses, Merits and Demerits of Perforated basket centrifuge, Non-Perforated basket centrifuge	
8.	Principle, Construction, Working, Uses, Merits and Demerits of Semi-continuous centrifuge and Super centrifuge	
Unit - 5		**(7)**
1.	**Materials of Pharmaceutical Plant Construction, Corrosion and its prevention –** Introduction, Factors affecting during material selection foe pharmaceutical plant construction	**7**
2.	Theories of corrosion	
3.	Types of corrosion and their prevention	
4.	Ferrous and Non-Ferrous metals	
5.	Inorganic and Organic non-metals	
6.	Basics of material handling systems	
Activity-1	MCQ test	
Activity-2	MCQ test	
Activity-3	MCQ test	

Text Books

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.

Reference Books

1. Remington practice of pharmacy- Martin, Latest edition.
2. Pharmaceutical engineering principles and practices – C.V.S Subrahmanyam et al., Latest edition.
3. Theory and practice of industrial pharmacy by Lachmann., Latest edition.
4. Physical pharmaceutics- C.V.S Subrahmanyam et al., Latest edition.
5. Cooper and Gunn's Tutorial pharmacy, S.J. Carter, Latest edition.

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IV Semester

Name of the Subject	Pharmaceutical Organic Chemistry- III (Theory)
Name of the Faculty	Dr. Gomathi Swaminathan, M.Pharm., Ph.D
Designation, Department	Lecturer, Department of Pharmaceutical Chemistry
Mobile Number	+91-9393011114
e-Mail i.d.	gomathiswaminathan@jssuni.edu.in

Scope, Course Objectives and Course Outcomes

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: The primary objectives of this course are to

1. To provide knowledge about Stereo-chemical features including conformation and stereo electronic effects and geometrical isomerism
2. Describing detailed mechanisms for common naming reactions
3. To discuss various synthetic procedures, reactions and uses of simple pharmaceutically active organic compounds having
4. five and six membered heterocyclic compounds.

Course Outcomes (COs): At completion of this course it is expected that the students will be able to

CO 1: under stand the concepts of stereochemistry of organic compounds

CO 2: understand the chemistry of heterocyclic compounds, their synthesis mechanisms, reactions and medicinal uses.

CO 3: have knowledge about important named reactions for synthesis of organic compounds

LECTURE PLAN-Theory

Sessional	No. of . Didactic Lecture	No of Hours of other Activities	Total No. of Lecture Hours
I	21	02	23
II	21	02	23
Total No. of Hours	41	04	45

Lecture Plan

I SESSIONAL: 21 Lectures

Lecture No.	Lecture Details	Hours
Unit I: Stereoisomerism		**12**
1.	Introductory class	
2.	Introduction to stereochemistry, applications & principles	
3.	Concepts of Optical isomerism & Optical activity	
4.	Definition and examples of Enatiomerism, distereoisomerism	
5.	Definition and examples of mesocompounds.	
6.	Elements of symmetry, chirality and achirality.	
7.	DL system of nomenclature of optical isomers	
8.	Sequence rules, RS system of nomenclature of optical isomers	
9.	Reactions of chiral molecules	
10.	resolution of Racemic modifications and racemic mixtures	
11.	Asymmetric synthesis: partial and absolute	
12.	Introduction to geometrical isomerism& significance	
13.	Nomenclature of geometrical isomers (Cis Trans, EZ, Syn Anti systems)	
Unit II: Geometrical Isomerism		**12**
14.	Methods to determine configurations of geometrical isomers	
15.	Configurational isomerism of ethane	
16.	Configurational isomerism of n-butane	
17.	Configurational isomerism of cyclohexane	
18.	Configurational isomerism of cycloalkanes	
19.	Stereoisomerism in biphenyl compounds	
20.	Conditions for optical activity	
21.	Stereoselctive and stereospecific reactions	
22.	MCQ discussion	
23.	MCQ discussion	

II SESSIONAL: 22 Hours

Unit III: Heterocyclic compounds		**11**
24.	Introduction to heterocyclic chemistry, nomenclature and classification	
25.	Synthesis, reactions and medicinal uses of pyrrole	
26.	Synthesis, reactions and medicinal uses of furan	
27.	Synthesis, reactions and medicinal uses of thiophene	
28.	Relative aromaticity,Reactivity and basicity of pyrrole Basicity of pyrrole and pyridine	
29.	Synthesis, reactions and medicinal uses of pyrazole& imidazole	
30.	Synthesis, reactions and medicinal uses of oxazole &thiazole	
31.	Synthesis, reactions and medicinal uses of pyridine & quinoline	
32.	Synthesis, reactions and medicinal uses of isoquinoline, acridine	
33.	Synthesis, reactions and medicinal uses of indole& basicity of pyridine	
34.	Synthesis, reactions and medicinal uses of purines and their derivatives	
35.	Synthesis, reactions and medicinal uses of pyrimidines, azepine and their derivatives	
Unit IV: Reactions of synthetic importance		**11**
36.	Metal hydride reduction introduction	
37.	Reactions and synthetic importance of metal hydride reduction $NaBH_4$	
38.	Reactions and synthetic importance of metal hydride reduction LiAlH4	
39.	Reactions and synthetic importance of Clementon's reduction	
40.	Reactions and synthetic importance of Oppeneaur oxidation	
41.	Reactions and synthetic importance of wolf-kishner reduction and Birch reduction	
42.	Reactions and synthetic importance of Dakin reaction	
43.	Reactions and synthetic importance of Beckmanns rearrangement and Schmidt rearrangement	
44.	Reactions and synthetic importance of Schmidt reaction and Claisen-Schmidt condensation,	
45.	MCQ	
46.	MCQ	

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

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Name of the Subject	Medicinal Chemistry-I (Theory)
Name of the Faculty	Dr. Gomathy Subramanian , M. Pharm., Ph.D.,
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Scope, Course Objectives and Course Outcomes

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

Objectives: The primary objectives of this course are to

1. To study the introduction of Medicinal Chemistry
2. To understand the chemistry of drugs with respect to their biological activity
3. To help the students to understand the metabolic reactions, mechanisms and therapeutic value of drugs.
4. To know the general structural features of drugs and structural activity relationship of important class of drugs
5. To write the chemical synthesis of some important drugs

Course Outcomes (COs): At completion of Medicinal Chemistry-II, students will be able to:

CO 1 : Understand the basic concepts of medicinal Chemistry
CO-2 : Recognize the structure of drugs and predict the therapeutic action of drugs
CO 3 : Understand chemical synthetic reactions for selected drugs
CO 4 : Knowledge on the structural activity relationship and structural influences on pharmacological actions
CO 5 : Describe the mechanism, use and mode of application of the important drugs

LECTURE PLAN – Abstract

Sessional	No. of Hours of Didactic Lecture	No. of Hours of other Activities	Total No. of Lecture Hours
I	24	3	27
II	21	3	24
Total No. of Hours	**45**	**6**	**51**

I SESSIONAL: 24 Lectures + 3 Activities

Lecture No.	Lecture Details	Hours
Unit-1: INTRODUCTION TO MEDICINAL CHEMISTRY		**(10)**
1.	Introduction to Medicinal Chemistry	
2.	History and development of Medicinal chemistry	**02**
3.	Physiochemical properties in related to biological action - ionization, solubility, partition coefficient	**03**
4.	hydrogen bonding, protein binding	
5.	Chelation, bio-isosterism	
6.	Optical isomerism	
7.	Geometrical isomerism	
8.	Drug Metabolism – phase-I reactions	**05**
9.	Drug metabolism - phase II reactions	
10.	Factors affecting drug metabolism	
Unit-II: DRUGS ACTING ON AUTONOMIC NERVOUS SYSTEM		**(10)**
1.	Adrenergic neurotransmitters: biosynthesis and catabolism of catecholamine and distribution	**02**
2.	Biosynthesis and catabolism of adrenergic receptors (alpha & beta) and their distribution	
3.	Sympathomimetic agents: sar of sympathomimetic agents direct acting: nor-epinephrine, epinephrine,	**04**
4.	Phenylephrine*, dopamine, methyldopa, clonidine	
5.	Dobutamine, isoproterenol, terbutaline, salbutamol*, bitolterol	
6.	Naphazoline, oxymetazoline and xylometazoline.	
7.	Indirect acting agents: hydroxyamphetamine, pseudoephedrine, propylhexedrine.	
8.	Agents with mixed mechanism: ephedrine, metaraminol.	
9.	A. adrenergic antagonists: alpha adrenergic blockers: tolazoline*, phentolamine, phenoxybenzamine, prazosin, dihydroergotamine, methysergide	**04**
10.	beta adrenergic blockers: sar of beta blockers, Propranolol*, metipranolol, atenolol, betazolol, bisoprolol, esmolol, metoprolol,labetolol, carvedilol.	
Unit-III : CHOLINERGIC NEUROTRANSMITTERS		**(10)**
1.	Biosynthesis and catabolism of acetylcholine. Cholinergic receptors (muscarinic) and their distribution.	**04**
2.	Biosynthesis and catabolism of cholinergic receptors (nicotinic)	

	and their distribution.	
3.	Parasympathomimetic agents: SAR of Parasympathomimetic agents direct acting agents: acetylcholine, carbachol*, bethanechol, methacholine, pilocarpine.	
4.	Indirect Acting/ Cholinesterase Inhibitors (Reversible & Irreversible): Physostigmine, Neostigmine*, Pyridostigmine, Edrophonium Chloride, Tacrine Hydrochloride,	
Activity1	Descriptive Test	
Activity2	MCQ Test (Unit-I)	
Activity3	MCQ Test (Unit-II)	

II SESSIONAL: 21 Lectures + 3 Activities

Lecture No.	Lecture Details	Hours
5.	Ambenonium Chloride, isofluorphate, echothiophate iodide, parathion, Malathion, pralidoxime chloride	**06**
6.	Cholinergic blocking agents: SAR of cholinolytics. Solanaceous alkaloids and analogues: Atropine sulphate, hyosycamine sulphate, scopolamine hydrobromide, Homatropine hydrobromide, ipratropium bromide*	
7.	Synthetic cholinergic blocking agents: tropicamide, cyclopentolate hydrochloride, clidinium bromide, dicyclomine hydrochloride*	
8.	glycopyrrolate, methantheline bromide, propantheline bromide, benztropine mesylate,	
9.	Orphenadrine Citrate, Biperidine Hydrochloride, Procyclidine Hydrochloride*	
10.	Tridihexethyl chloride, isopropamide iodide, ethopropazine hydrochloride.	
Unit-IV:	**DRUGS ACTING ON CENTRAL NERVOUS SYSTEM**	**(08)**
15.	A. Sedatives and hypnotics: Benzodiazepines: SAR of benzodiazepines, chlordiazepoxide, diazepam*, oxazepam, chlorazepate, lorazepam, alprazolam, zolpidem	**02**
16.	Barbiturates: SAR Of Barbiturates, Barbital*, Phenobarbital, Mephobarbital, Amobarbital, Butabarbital, Pentobarbital, Secobarbital	
17.	Miscellaneous: Amides & imides: glutethmide. Alcohol & their carbamate derivatives: meprobomate, ethchlorvynol. Aldehyde & their derivatives: triclofos sodium, paraldehyde	
18.	B. Antipsychotics - Phenothiazines: SAR of phenothiazeines - promazine hydrochloride, chlorpromazine hydrochloride*, triflupromazine, thioridazine hydrochloride, piperacetazine hydrochloride, prochlorperazine maleate, trifluoperazine hydrochloride.	**03**
19.	Chlorprothixene, thiothixene, loxapine succinate, clozapine. Fluro buterophenones: haloperidol, droperidol, risperidone. Beta amino ketones: molindone hydrochloride.	
20.	C. Anticonvulsants: SAR & mechanism of anticonvulsant action	

	Barbiturates: phenobarbitone, methabarbital. Hydantoins: phenytoin*, mephenytoin, ethotoin Oxazolidine diones: trimethadione, paramethadione	**03**
21.	Succinimides: phensuximide, methsuximide, ethosuximide* Urea and monoacylureas: phenacemide, carbamazepine* Benzodiazepines: clonazepam	
22.	Miscellaneous: Primidone, Valproic acid, Gabapentin, Felbamate.	
Unit-V: DRUGS ACTING ON CENTRAL NERVOUS SYSTEM (CONTD.)		**(07)**
8.	General anesthetics: Inhalation anesthetics: halothane*, methoxyflurane, enflurane, sevoflurane, isoflurane, desflurane	**02**
9.	Ultra short acting barbitutrates: methohexital sodium*, thiamylal sodium, thiopental sodium. Dissociative anesthetics: ketamine hydrochloride.*	
10.	Narcotic and non-narcotic analgesics Morphine and related drugs: SAR of morphine analogues, morphine sulphate, codeine, meperidine hydrochloride, anilerdine hydrochloride, diphenoxylate hydrochloride	**03**
11.	Loperamide hydrochloride, fentanyl citrate*, methadone hydrochloride*, propoxyphene hydrochloride, pentazocine, levorphanol tartarate	
12.	Narcotic antagonists: nalorphine hydrochloride, levallorphan tartarate, naloxone hydrochloride.	
13.	Anti-inflammatory agents: sodium salicylate, aspirin, mefenamic acid*, meclofenamate, indomethacin, sulindac, tolmetin.	**02**
14.	Zomepriac, diclofenac, ketorolac, ibuprofen*, naproxen, piroxicam, phenacetin, acetaminophen, antipyrine, phenylbutazone.	
Activity-1	MCQ Test	
Activity-2	MCQ Test	
Activity-3	Descriptive Test	

Text Books

1. Wilson and Gisvold's Organic medicinal and Pharmaceutical Chemistry.
2. Foye's Principles of Medicinal Chemistry, 5th Edition.
3. Burger's Medicinal Chemistry, Vol. I to IV.
4. Textbook of Medicinal Chemistry, Vol. I by Ilango and Valentina

Reference Books

1. Wilson and Gisvold's Organic medicinal and Pharmaceutical Chemistry, 11th Edition.
2. Introduction to principles of drug design- Smith and Williams.
3. Remington's Pharmaceutical Sciences, 20th Edition.
4. Martindale's extra pharmacopoeia.
5. Organic Chemistry by I.L. Finar, Vol. II.
6. The Organic Chemistry of Drug Synthesis by Lednicer, Vol. 1 to 5.
7. Indian Pharmacopoeia 1996 and 2007 Editions.

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Name of the Subject	Physical Pharmaceutics II (Theory)
Name of the Faculty	Dr. Kousalya S. M.Pharm., Ph.D
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Scope, Course Objectives and Course Outcomes

Scope: This course is designed to impart knowledge and skills necessary for the understanding of physicochemical properties, and principles involved in dosage forms/formulations. The 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: The primary objectives of this course are to

1. Understand various physicochemical properties of drug molecules with respect to its size
2. Undersand and apply the conept of flow properties of liquids and solids in manufacturing of pharmacduticals
3. Know the principles of chemical kinetics & to use them for stability testing and determination of expiry date of formulations

Course Outcomes (COs): At completion of this course it is expected that the students will be able to

CO 1: Define the basic concepts and properties of the coarse, colloid and micron particles
CO 2: Identify the solutions for the instability problems in emulsions and suspensions
CO 3: Intrepret the fundamental and derived properties of powders
CO 4: Conduct and interpret the stability studies
CO 5: Identify and prevent the degradation mechanisms of drug candidates

LECTURE PLAN – Abstract

Sessional	Number of Hours of Didactic Lecture	No. of Hours of other activities	Total Number of Lecture Hours
I	23	03	26
II	25	03	28
Total Number of Lecture Hours	48	06	54

I SESSIONAL: 23 lectures + 03 Activities

Lecture No.	Lecture Details	Hours
1.	Introduction to Physical Pharmaceutics II	**01**
Unit-1: Colloidal dispersions		**(07)**
1.	General charectersitics	07
2.	Classification of colloids	
3.	Size, shapes and general properties of colloidal particles	
4.	Optical, kinetic & electrical properties	
5.	Stability of colloids	
6.	Effect of electrolytes, coacervation, peptization	
7.	Sensitization and protective colloidal action	
Unit-2: Rheology		**(10)**
1.	Newtonian systems	10
2.	Law of flow, kinematic viscosity	
3.	Effect of temperature, non-Newtonian systems	
4.	Pseudoplastic, dilatants	
5.	Plastic, thixotropy, thixotropy in formulation	
6.	Determination of viscosity, capillary	
7.	Falling Sphere, rotational viscometers	
8.	Applications of rheology	
9.	Plastic and elastic deformation	
10.	Plastic and elastic deformation, Heckel equation, Stress, Strain, Elastic Modulus	
Unit-3: Coarse dispersion		**(05)**
1.	Interfacial properties of suspended particles	05
2.	Settling in suspensions	
3.	Formulation of suspensions	
4.	Evaluation of suspenions	
5.	Stability of suspensions	
Activity 1	MCQ test -1	
Activity 2	MCQ test -2	
Activity 3	MCQ test -3	

II SESSIONAL : 25 Lectures + 03 Activities

Lecture No.	Lecture Details	Hours
Unit-3: Coarse dispersion		**(05)**
1.	Theories of emulsification	05
2.	Physical stability of emulsions	
3.	Preservation of emulsions	
4.	Rheological properties of emulsions	
5.	Phase equilibria and emulsion formulation.	
Unit-4: Micromeritics		**(10)**
1.	Introduction to particle size and its importance	10
2.	Particle size and size distribution (average particle size)	
3.	Particle size and size distribution (shape and number, particle-size distribution)	
4.	Particle size and size distribution (number and weight distributions)	
5.	Methods for determining particle size (Optical Microscopy and Sieving)	
6.	Methods for determining particle size (sedimentation particle volume measurement)	
7.	Methods for determining surface area (adsorption method air permeability method)	
8.	Pore size	
9.	DERIVED PROPERTIES OF POWDERS: Densities of Particles (True density, Granule density, Bulk density and Tapped density), Hausners Ratio & compressibility index	
10.	DERIVED PROPERTIES OF POWDERS: Flow Properties (Angle of repose), Porosity and Packing Arrangements	
Unit-5: Drug stability		**(10)**
1.	Reaction kinetics: zero, pseudo-zero, first & second order	10
2.	determination of reaction order	
3.	Physical factors influencing the chemical degradation of pharmaceutical product	
4.	Chemical factors influencing the chemical degradation of pharmaceutical product	
5.	Simple numerical problems	
6.	Stabilization of medicinal agents against common reactions like hydrolysis	
7.	Stabilization of medicinal agents against common reactions like oxidation	
8.	Photolytic degradation and its prevention	
9.	ICH/WHO stability guidelines	

10.	Accelerated stability testing in expiration dating of pharmaceutical dosage forms, Class test on entire syllabus	
Activity 1	MCQ test -1	
Activity 2	MCQ test -2	
Activity 3	MCQ test -3	

Text Books:

1. Physical Pharmaceutics by Ramasamy C and ManavalanR.
2. Laboratory Manual of Physical Pharmaceutics, C.V.S. Subramanyam, J. Thimma settee
3. Physical Pharmaceutics II by C.V.S. Subramanyam
4. Test book of Physical Phramacy, by Gaurav Jain & Roop K. Khar

Reference Books

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 to3, MarcelDekkar Inc.
6. Liberman H.A, Lachman C, Pharmaceutical Dosage forms. Disperse systems, volume 1, 2, 3. Marcel Dekkar Inc.

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Name of the Subject	Pharmacology I
Name of the Faculty	Dr. R. Vadivelan, M.Pharm., PhD
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Scope, Course Objectives and Course Outcomes

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 drug's 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: The primary objectives of this course are 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. Understand the basics for drug discovery and development
5. Understand the correlation and links between pharmacology and other bio medical sciences

Course Outcomes (COs): At completion of this course it is expected that the students will be able to

CO1: Define and explain the basic concepts in Pharmacology

CO2: Explain the pharmacological actions of different categories of drugs and their therapeutic applications

CO3: The students will be able correlate between Physiology, Biochemistry, Pathophysiology to understand the therapy for a disease

CO4: Understand the concepts of adverse drug reactions, drug toxicity and drug - drug interactions to minimize the toxic effects of drugs

CO5: Explain the pharmacokinetic (ADME) and pharmacodynamic aspects of a drug

CO6: Students could be able to understand and explain the basic steps involved in the drug discovery and development process

LECTURE PLAN – Abstract

Sessional	No. of Hours of Didactic Lecture	No of Hours of other Activities	Total No. of Lecture Hours
I	20	2	22
II	25	2	27
Total No. of Hours	45	4	49

I SESSIONAL : 20 Lectures + 2 Activities

Lecture No.	Lecture Details	Hours
PHARMACOLOGY - I		**(20)**
Unit-1: General Pharmacology		**08**
1.	Introduction to Pharmacology- Definition, historical landmarks and scope of pharmacology	
2.	Nature and source of drugs, essential drugs concepts, agonist	
3.	Routes of drug administration	
4.	Spare receptors, addiction, dependence	
5.	Tachyphylaxis, Idiosyncrasy, allergy	
6.	Pharmacokinetics - ADME	
7.	Enzyme inhibition and induction, Kinetics of Elimination	
Unit-2: General Pharmacology		**12**
21.	Principles and mechanisms of drug action, Receptor theories	
22.	Classification of receptors	
23.	Drug receptor interactions	
24.	DRC and Therapeutic index	
25.	Combined effect of drugs	
26.	Factors modifying drug action	
27.	Adverse drug effects	
28.	Drug - Drug interactions	
29.	Drug discovery and clinical evaluation of new drugs	
Activity 1	MCQ Test	
Activity 2	Group Discussion	

II SESSIONAL : 25 Lectures + 2 Activities

Lecture No.	Lecture Details	Hours
PHARMACOLOGY - I		**(25)**
UNIT - 3: Pharmacology of drugs acting on PNS		
1.	Organization and function of ANS	
2.	Neurohumoral transmission,co-transmission and neurotransmitters	
3.	Parasympathomimetics and Parasympatholytics	

4.	Sympathomimetics and sympatholytics	**10**
5.	Neuromuscular blocking agents	
6.	Skeletal muscle relaxants (peripheral)	
7.	Local anesthetic agents	
8.	Drugs used in myasthenia gravis and glaucoma	
Unit-4: Pharmacology of drugs acting on CNS		**08**
1.	Neurohumoral transmission in the C.N.S	
2.	General anaesthetics	
3.	Sedatives, hypnotics and centrally acting muscle relaxants	
4.	Anti-epileptics	
5.	Alcohols and disulfiram	
Unit-4: Pharmacology of drugs acting on CNS		**07**
1.	Psychopharmacological agents	
2.	Drugs used in Parkinsons disease and Alzheimer's disease	
3.	CNS stimulants and nootropics	
4.	Opioid analgesics and antagonists	
5.	Drug addiction, drug abuse	
6.	Tolerance and dependence	
Activity 1	MCQ Test	
Activity 2	Revision	

Text 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. K.D.Tripathi. Essentials of Medical Pharmacology, JAYPEE Brothers Medical Publishers (P) Ltd, New Delhi.
3. Sharma H. L., Sharma K. K., Principles of Pharmacology, Paras medical publisher
4. Katzung B. G., Masters S. B., Trevor A. J., Basic and clinical pharmacology, Tata Mc Graw-Hill

Reference Books (Latest editions)

1. Goodman and Gilman's, The Pharmacological Basis of Therapeutics
2. 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
3. Mycek M.J, Gelnet S.B and Perper M.M. Lippincott's Illustrated Reviews Pharmacology 101
4. Modern Pharmacology with clinical Applications, by Charles R. Craig& Robert,
5. Ghosh MN. Fundamentals of Experimental Pharmacology. Hilton & Company, Kolkata.

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Name of the Subject	Pharmacognosy I (Theory)
Name of the Faculty	Ms. Mumtha L
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Scope, Course Objectives and Course Outcomes

Scope

Drugs derived from natural resources were extremely contributed to the human health care by providing the herbal medicine since the existence of human civilization. In addition, medicinal plants, microbes and marine sources were also found to be the base for the discovery of various valuable and life saving pharmaceutical products which are currently available. Pharmacognosy has been taught as an important subject in Pharmacy education since around two centuries. The subject Pharmacognosy embraces the scientific and systematic study of biologically active compounds from plants, animals and microbes as well as phytotheraphy and nutraceuticals. Most of the available drugs are either obtained directly from plant or their semi-synthetic and synthetic derivatives which necessitates the systematic study of medicinal plants.

It also provides an insight into the history and discovery of each medicinal plant their biological source, chemistry and their therapeutical uses. Through the study of Pharmacognosy, students were enlightened with the cultivation of some important crude drugs and the factors affecting cultivation and their collection. Students were also provided with the various important primary and secondary metabolites of medicinal plants such as carbohydrates, lipids, proteins and fixed oils. Study of this subject also establishes the knowledge about how Pharmacognosy is strongly correlated with other subjects such as Pharmacology, Pharmaceutical chemistry, Pharmaceutical chemistry and Pharmacy practice. Hence the study of Pharmacognosy along with the recent resurgence in the use of herbal medicine, enlighten our undergraduate students regarding the importance and the contribution of our mother nature to the mankind.

Objectives

The primary objectives of this course are to

1. Familiarize with the various present scopes of Pharmacognosy.
2. To know about the contribution of various plants in the medicine.
3. To learn about the some of the important medicinal plants from families such as Apocyanceae, Solanaceae, Rubiaceae, Umbelliferae, Liliaceae and Leguminosae.
4. To learn about crude drugs obtained from various sources.
5. To understand the different types of classification of crude drugs.
6. To understand the importance of cultivation and propogation of medicinal plants.
7. To enlighten the importance of conservation of medicinal plants.
8. To disseminate the reasons for adulteration

9. To understand about various types of plant fibres and plant metabolites.

Course Outcomes (COs)

On successful completion of the subject the student shall be able to

CO 1 : Know about the basic concept, history and background of Pharmacognosy.

CO 2 : Learn about various methods of classification of crude drugs.

CO 3 : Understand the importance of the factors affecting the cultivation of crude drugs and know about the cultivation of some medicinally valued crude drugs

CO 4 : Recognize about the different cell inclusions, cell wall components and some secondary metabolites

CO 5 : Familiarize with the Pharmacognosy of some of the important primary metabolites such as carbohydrates, lipids and protein containing drugs

CO 6 : Distinguish about the different methods of adulteration of crude drugs.

CO 7 : Acquainted with knowledge about surgical dressings and metabolites

LECTURE PLAN – Abstract

Sessional	No. of Hours of Didactic Lecture	No of hours of other activities	Total no of lecture hours
I	22	02	24
II	23	02	25
Total No. of Hours	45	04	49

I SESSIONAL : 22 Lectures + 2 activities

Lecture No.	Lecture Details	Hours 22
Unit-1: Introduction to Pharmacognosy		**10**
1.	Definition, History, Scope and Development of Pharmacognosy	
2.	Sources of Drugs – Plants, Animals, Marine & Tissue Culture	
3.	Organized drugs and Unorganized drugs	
4.	Dried latex, Dried juices, Dried extracts, Gums and Mucilages	
5.	Oleoresins	
6.	Oleo-gum-resins	
7.	Alphabetical, morphological and Taxonomical method of classification of crude drugs	
8.	Pharmacological, Chemo and Serotaxonomical methods	
9.	Adulteration of drugs of natural origin	
10.	Quantitative microscopy of crude drugs	
Unit-2: Processing of crude drugs		**10**
30.	Importance of cultivation and collection of medicinal plants	
31.	Factors affecting cultivation of medicinal plants	
32.	Different methods of cultivation of medicinal plants	
33.	Plant hormones and their applications I	
34.	Plant hormones and their applications II	
35.	Plant hormones and their applications III	
36.	Polyploidy and Mutation	

37.	Hybridization techniques	
38.	Introduction to conservation of medicinal plants and its importance	
39.	Different methods of conservation of medicinal plants	
Unit-3: Plant Tissue Culture		
5.	Principle & Tool for Plant Tissue Culture (PTC)	**02**
6.	Nutrients for PTC and Preparation of Medium	
7.	Activity 1 : Group discussion	
8.	Activity 2 : Class test	

II SESSIONAL : 23 Lectures + 2 activities

Lecture No.	**Lecture Details**	**Hours 23**
Unit-3: Plant Tissue Culture		**05**
1.	Sterilization of Tools and Surface Sterilization	
2.	Suspension culture and Applications	
3.	Initiation of Callus culture	
4.	Immobilization techniques	
5.	Edible vaccines	
Unit-4: Pharmacognosy in various system of medicines		
23.	Role of Pharmacognosy in traditional system of medicine Ayurveda	
24.	Role of Pharmacognosy in traditional system of medicine Unani	
25.	Role of Pharmacognosy in traditional system of medicine Siddha	**10**
26.	Role of Pharmacognosy in traditional system of medicine Homeopathy	
27.	Role of Pharmacognosy in Chinese system of medicine	
28.	Definition, classification and properties of Alkaloids	
29.	Definition, classification and properties of Glycosides	
30.	Definition, classification and properties of Flavonoids	
31.	Definition, classification and properties of Tannins	
32.	Definition, classification and properties of Volatile oil and Resins	
Unit-5: Plant products and Metabolites		
16.	Fibres- Cotton, Jute, Hemp	
17.	Hallucinogens, Teratogens and Natural allergens	
18.	Carbohydrates- Acacia, Agar, Tragacanth and Honey	**08**
19.	Proteins and Enzymes- Gelatin and Casein	
20.	Proteolytic enzymes- Papain, Bromelain and Serratiopeptidase	
21.	Urokinase, Streptokinase and Pepsin	
22.	Lipids- Castor oil, Chaulmoogra oil, Wool fat and Bees wax	
23.	Marine drugs- Novel medicinal agents from marine sources	
24.	Activity 1 : Group discussion	
25.	Activity 2 : Class test	

Text Books

1. Pharmacognosy, Kokate, C.K, Purohit, A.R, Gokhale, S.B. 45th Edition, 2010. Nirali Prakashan; Pune
2. Pharmacognosy and Phytochemistry, Vinod D Rangari
3. Trease and Evans Pharmacognosy, Evans, W.C. 15th Edition, 2002. Elsevier Science Limited; Philadelphia.

Reference Books

1. Textbook of Pharmacognosy. Wallis, T.E. 5th Edition, 1985. J.A Churchill Limited; London.
2. Practical Pharmacognosy. Kokate, C.K. 4th Edition, 1994. Vallabh Prakashan; New Delhi
3. Anatomy of crude drugs. Iyengar, M.A., Nayak, S.G.K. 8th Edition, 2001. Manipal Power Press; Manipal

4. Pharmacognosy. Shah, B.S. and Qadry, J.S.12th Edition, 2005. B.S Shah Prakashan; Ahmedabad.

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PRINCIPAL
J.S.S. COLLEGE OF PHARMACY
Rockland's, Ootacamund - 643 001

JSS Academy of Higher Education & Research, Mysuru

(Deemed to be University)

(Accredited 'A^{+}' Grade by NAAC)

JSS COLLEGE OF PHARMACY, ROCKLANDS, OOTY

(ISO 9001:2015 Certified)

Lecture Plan

(Academic Year: 2024-2025)

Course: III. B.PHARM

Name of the Subject	Medicinal Chemistry-II (Theory)
Name of the Faculty	Dr. Gomathi S M.Pharm., Ph.D
Designation, Department	Lecturer, Department of Pharmaceutical Chemistry
Mobile Number	+91 97900 95279
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Scope, Course Objectives and Course Outcomes

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

Objectives: The primary objectives of this course are to

1. To study the fundamentals of Medicinal Chemistry
2. To understand the chemistry of drugs with respect to their biological activity
3. To help the students to understand the mechanism, drug metabolic pathways and therapeutic value of drugs.
4. To know the general structural features of drugs and structural activity relationship of important class of drugs
5. To write the chemical synthesis of important drugs

Course Outcomes (COs): At completion of Medicinal Chemistry-II, students will be able to:

CO 1 : Recognize the structure of drugs
CO 2 : To predict the therapeutic action of drugs
CO 3 : Understand chemical synthetic reactions for selected drugs
CO 4 : Knowledge on the structural activity relationship and structural influences on pharmacological actions
CO 5 : Describe the mechanism, use and mode of application of the important drugs

LECTURE PLAN – Abstract

Sessional	No. of Hours of Didactic Lecture	No. of Hours of other Activities	Total No. of Lecture Hours
I	24	3	27
II	21	3	24
Total No. of Hours	**45**	**6**	**51**

I SESSIONAL: 24 Lectures + 3 Activities

Lecture No.	Lecture Details	Hours
Unit-1: ANTI-HISTAMINIC AGENTS & ANTI-NEOPLASTIC AGENTS		**(10)**
1.	**Anti-Histaminic Agents:** Histamine, receptors and their distribution	**05**
2.	**H1-antagonists**: Diphenhydramine HCl*, Dimenhydrinate, doxylamine succinate, clemastine fumarate, diphenylphyraline HCl, ,	
3.	Tripelenamine HCl, chlorcyclizine HCl, meclizine HCl, buclizine HCl, Chlorpheniramine maleate.	
Tutorial-1	--	
3.	triprolidine HCl*, phenidamine tartarate, Promethazine HCl, trimeprazine tartarate, cyproheptadine HCl	
4.	Azatidine maleate, astemizole, loratadine, cetirizine, cromolyn sodium	
5.	**H2-antagonists:** Cimetidine*, famotidine, ranitidine	
6.	**Gastric proton pump inhibitors:** omeprazole, lansoprazole	**05**
7.	**Anti-Neoplastic agents:** **Alkylating agents**: Meclorethamine*, cyclophosphamide, melphalan, chlorambucil, busulfan, thiotepa.	
8.	**Antimetabolites**: mercaptopurine*, thioguanine, fluorouracil, floxuridine, cytarabine, methotrexate*, azathioprine.	
9.	**Antibiotics**: Dactinomycin, Daunorubicin HCl, Doxorubicin HCl, Bleomycin	
10.	**Plant products:** Etoposide, Vinblastin sulphate, vincristine sulphate **Miscellaneous**: Cisplatin, Mitotane.	
Unit-II: ANTI-ANGINAL AGENTS, DIURETICS & ANTI-HYPERTENSIVES		**(10)**
1.	**Anti-anginal agents:** **Vasodilators:** Amyl nitrite, Nitroglycerine*, Pentaerythritol tetranitrate, Isosorbide dinitrite*, dipyridamole.	**03**
2.	**Calcium channel blockers:** Verapamil, bepridil HCl, Diltiazem HCl, Nifedipine.	
3.	Amlodipine, Felodipine, nicardipine, nimodipine	
4.	**Diuretics: Carbonic anhydrase inhibitors**: Acetazolamide*, methazolamide, dichlorphenamide.	**04**
5.	**Thiazides:** chlorthiazide*, hydrochlorthiazide, hydroflumethiazide, cyclothiazide.	
6.	**Loop diuretics:** Furosemide*, bumetanide, Ethacrynic acid	
7.	**Potassium sparing diuretics:** Spiranolactone, triamterene, amiloride.	
8.	**Anti-hypertensive agents:** Timolol, captopril, Lisinopril, enalapril, benzapril HCl, Quinapril HCl	**03**
9.	Methyldopate HCl*, clonidine HCl, Guanethidine monosulphate Guanbenz acetate	
10.	Sodium nitroprusside, diazoxide, Minoxidil, reserpine, hydralazine HCl.	
Unit-III : ANTI-ARRHYTHMIC DRUGS, ANTI-HYPERLIPIDEMICS & CHF DRUGS		**(10)**
1.	**Anti-arrhythmic drugs:** Quinidine sulphate, procainamide HCl,	**04**
2.	disopyramide phosphate* Phenytoin sodium	
3.	lidocaine HCl, tocainide HCl	

4.	Mexiletine HCl, Lorcainide HCl, Amiodarone, Sotalol.	
Activity1	Descriptive Test	
Activity2	MCQ Test (Unit-I)	
Activity3	MCQ Test (Unit-II)	

I SESSIONAL: 21 Lectures + 3 Activities

Lecture No.	Lecture Details	Hours
5.	**ANTI-HYPERLIPIDEMIC AGENTS:** Clofibrate, lovastatin, cholesteramine and cholestipol.	**06**
6.	**Coagulant:** Menodione, Acetomenadione	
7.	**Anti-coagulant**: Warfarin*, Anisindione	
8.	**DRUGS USED IN CONGESTIVE HEART FAILURE:** Digoxin	
9.	Digitoxin, Nesiritide,	
10.	bosentan, tezosentan	
Unit-IV:	**DRUGS ACTING ON ENDOCRINE SYSTEM**	**(08)**
1.	Sex hormones: testosterone, nandralone, progestrones	**02**
2.	Oestriol, oestradiol, oestrione, diethyl stilbestrol	
3.	Drugs for erectile dysfunction: Sildenafil, levonorgestrol	**04**
4.	*Oral contraceptives:* Mifepristone, Norgestril, Levonorgestrol	
5.	Corticosteroids: Cortisone, hydrocortisone, prednisolone	
6.	Betamethasone, dexamethasone	
7.	Thyroid and anti-thyroid drugs: L-thyroxine, L-thyronine	**02**
8.	Propylthiouracil, methimazole	
Unit-V:	**ANTI-DIABETIC AGENTS & LOCAL ANESTHETICS**	**(07)**
1.	**Anti-diabetic agents:** Insulin and its preparations **Sulphonyl urea's:** Tolbutamide*, Chlorpropamide, glipizide, glimepiride	**03**
2.	**Thiazolidinediones:** Pioglitazone, Rosiglitazone **Meglitinides:** Repaglinide, Nateglinide	
3.	**Glucosidase inhibitors:** Acrabose, Voglibose	
4.	**Local anesthetics:** SAR of local anesthetics	**04**
5.	**Benzoic acid derivatives:** Cocaine, hexylcaine, meprylcaine, cyclomethycaine, piperocaine	
6.	**Amino benzoic acid derivatives:** Benzocaine*, butamben, procaine*, butacaine, propoxycaine, tertracaine, benoxinate	
7.	**Lidocaine/anilide derivatives:** lignocaine, mepivacaine, prilocaine, etidocaine **Miscellaneous:** Phenacaine, diperidon, dibucaine*	
Activity-1	MCQ Test	
Activity-2	MCQ Test	
Activity-3	Descriptive Test	

Text Books

1. Foye's Principles of Medicinal Chemistry, 5th Edition.

2. Burger's Medicinal Chemistry, Vol. I to IV.
3. Textbook of Medicinal Chemistry, Volume I by Ilango and Valentina

Reference Books

1. Wilson and Gisvold's Organic medicinal and Pharmaceutical Chemistry, 11th Edition.
2. Introduction to principles of drug design- Smith and Williams.
3. Remington's Pharmaceutical Sciences, 20th Edition.
4. Martindale's extra pharmacopoeia.
5. Organic Chemistry by I.L. Finar, Vol. II.
6. The Organic Chemistry of Drug Synthesis by Lednicer, Vol. 1 to 5.
7. Indian Pharmacopoeia 1996 and 2007 Editions.

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Name of the Subject	Pharmacology II (Theory)
Name of the Faculty	Mr. B. Shivaramakrishnan M.Pharm
Designation, Department	Assistant Professor, Department of Pharmacology
Mobile Number	+91-9620001429
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Scope, Course Objectives and Course Outcomes

Scope: Pharmacology II provides an opportunity for the students to learn about different classes of drugs with regard to classification, pharmacodynamic and pharmacokinetic aspects, adverse effects, uses, dose, routes of administration, precautions, contraindications and interaction with other drugs.

Objectives: The primary objectives of this course are 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 Outcomes (COs): At completion of this course it is expected that the students will be able to

CO 1 : Identify and explain the pharmacodynamics and pharmacokinetic properties of drugs of various categories

CO 2 : Recognize the adverse effects of drugs

CO 3 : Avoid adverse drug reactions

CO 4 : Recognize indications of different drugs and avoid contraindications

CO 5 : Provide vital information to patients about drugs during patient counselling

CO 6 : Design & execute animal experiments to identify the pharmacological properties of known drugs and unknown samples.

LECTURE PLAN – Abstract

Sessional	No. of Hours of Didactic Lecture	No of Hours of other Activities	Total No. of Lecture Hours
I	26	5	31
II	20	5	25
Total No. of Hours	46	10	56

I SESSIONAL: 26 Lectures + 5 Activity

Lecture No.	Lecture Details	Hours
Unit-1: Pharmacology of drugs acting on cardiovascular system		**10**
1.	Introduction to haemodynamics & electrophysiology of heart	
2.	Drugs used in congestive heart failure	
3.	Anti-hypertensive drugs	
4.	Anti-anginal drugs	
5.	Anti-arrhythmic drugs	
6.	Anti-hyperlipidemic drugs	
Unit-2: Pharmacology of drugs acting on cardiovascular system		**06**
1.	Drugs used in the therapy of shock	
2.	Haematinics	
3.	Coagulants	
4.	Anti-coagulants	

5.	Fibrinolytics	
6.	Anti-platelet drugs	
7.	Plasma volume expanders	
Unit-3: Pharmacology of drugs acting on Urinary system		**04**
1.	Diuretics	
2.	Anti-diuretics	
Unit-4: Autocoids & Related drugs		**06**
1.	Introduction to autacoids and classification	
2.	Histamine	
3.	5-HT and their antagonist	
4.	Prostaglandins	
5.	Thromboxanes and Leukotrienes	
6.	Angiotensin	
Activity-1	MCQ Test	
Activity-2	MCQ Test	
Activity-3	MCQ Test	
Activity-4	MCQ Test	
Activity-5	Revision	

II SESSIONAL: 20 Lectures + 5 Activities

Lecture No.	Lecture Details	Hours
Unit-4: Autocoids & Related drugs		**04**
1.	Bradykinin and Substance P	
2.	Non-steroidal Anti-inflammatory agents	
3.	Anti-gout drugs	
4.	Anti-rheumatic drugs	
Unit- 5: Pharmacology of drugs acting on endocrine system		**08**
1.	Basic concepts in endocrine pharmacology	
2.	Anterior pituitary hormones- analogues and their inhibitors	
3.	Thyroid hormones- analogues and their inhibitors	
4.	Hormones regulating plasma calcium level- Parathormone, Calcitonin & Vitamin-D	
5.	Insulin and Glucagon	
6.	ACTH and Corticosteroids	
7.	Oral Hypoglycemic agents	
Unit- 5: Pharmacology of drugs acting on endocrine system		**04**
8.	Androgens and Anabolic steroids	
9.	Estrogen & progesterone	
10.	Oral contraceptives	

11.	Drugs acting on uterus	
Unit-6: Bioassay		**04**
1.	Principles and Applications of bioassay	
2.	Types of bioassay	
3.	Bioassay of Insulin, Oxytocin, Vasopressin, ACTH	
4.	Bioassay of d-tubocurarine, Digitalis, Histamine and 5-HT	
Activity-1	MCQ Test	
Activity-2	MCQ Test	
Activity-3	Class Test	
Activity-4	Revision	
Activity-5	Exam Preparation & Time management skills	

Text Books

1. Rang H. P., Dale M. M., Ritter J. M., Flower R. J., Rang and Dale's Pharmacology, Churchil Livingstone Elsevier
2. Mycek M.J, Gelnet S.B and Perper M.M. Lippincott's Illustrated Reviews- Pharmacology.

Reference Books

1. Katzung B. G., Masters S. B., Trevor A. J., Basic and clinical pharmacology, Tata McGraw-Hill.
2. Goodman and Gilman's, The Pharmacological Basis of Therapeutics
3. K.D.Tripathi. Essentials of Medical Pharmacology. JAYPEE Brothers Medical Publishers (P) Ltd, New Delhi.
4. Sharma H. L., Sharma K. K., Principles of Pharmacology, Paras medical publisher

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Name of the Subject	Industrial Pharmacy-1 (BP502T)
Course/ Semester	B.Pharm, Vth Semester
Name of the Faculty	Dr Vivek Reddy
Designation, Department	Lecturer, Pharmaceutics
Mobile Number	+91 97005 45499
e-Mail i.d.	mvivekreddy@jssuni.edu.in

Scope, Course Objectives and Course Outcomes

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 Outcomes (COs): At completion of this course it is expected that the students will be able to

CO 1: Define the important of preformulation
CO 2: The students to understand the formulation and manufacturing aspects of various dosage forms
CO 3: The students will learn how to use the physicochemical properties of the drug/ excipients
CO 4: To development of pharmaceutical dosage forms.
CO 5: Describe the common measure use in quality.

LECTURE PLAN – Abstract

Sessional	No. of Hours of Didactic Lecture	No of Hours of other Activities	Total No. of Lecture Hours
I	23	3	23
II	22	3	22
Total No. of Hours	45	6	51

I SESSIONAL **LECTURE PLAN 23 Lectures+ 3 Activities**

Lecture No.	Lecture Details	
UNIT-1	Preformulation Studies (08)	**Hours**
1.	**Introduction**	08
2.	**Preformulation Studies:** Introduction to preformulation, goals and objectives, study of physicochemical characteristics of drug substances.	
3.	***a. Physical properties:*** particle size, shape	
4.	flow properties, solubility profile (pKa, pH, partition coefficient), polymorphism	
5.	**b. Chemical Properties:** Hydrolysis, oxidation, reduction, Racemisation, polymerization,	
6.	BCS classification of drugs	
7.	Application of preformulation considerations in the development of ***solid, liquid dosage*** forms and its impact on stability of dosage forms.	
8.	Application of preformulation considerations in the development of ***oral and parenteral dosage*** forms and its impact on stability of dosage forms.	
UNIT-2	Tablets (10)	10
9.	**Tablets: a. Introduction**	

10.	Ideal characteristics of tablets, classification of tablets. Excipients, Formulation of tablets	
11.	Granulation methods, compression and processing problems	
12.	Equipment's and tablet tooling.	
13.	**b. Tablet coating:** Types of coating, coating materials, formulation of coating materials,	
14.	Method of coating, equipment employed and Defects in coating.	
15.	**c. Quality control tests:** In process and finished product tests	
16.	**Liquid orals:** Formulation and manufacturing consideration of solutions, suspensions and emulsions; Filling and packaging	
17.	evaluation of liquid orals official in pharmacopoeia	
Activity1	MCQ Test	
Activity2	MCQ Test	
UNIT-3	Capsules (08)	
18.	**Capsules:** a. Hard gelatin capsules: Introduction, Extraction of gelatin and production of hard gelatin capsule shells. Filling,	
19.	Finishing and special techniques of formulation of hard gelatin capsules.	
20.	In process and final product quality control tests for capsules.	
21.	**b. Soft gelatin capsules:** Nature of shell and capsule content, importance of base adsorption and minimum/gram factors, production,	06
22.	In process and final product quality control tests. Packing, storage and stability testing of soft gelatin capsules	
Activity 3	MCQ Test	

II SESSIONAL : 22 Lectures + 3 Activities

23.	**Pellets:** Introduction, formulation requirements, pelletization process,	02
24.	equipment's for manufacture of pellets	
UNIT-4	Parenteral Products (10)	
25.	**Parenteral Products: a. Definition**, types, advantages and limitations.	
26.	Preformulation factors and essential requirements, vehicles, importance of isotonicity	
27.	**b. Production procedure**, production facilities and controls	10
28.	**c. Formulation** of injections, sterile powders	
29.	**Formulation** of injections, emulsions, suspensions	
30.	large volume parenteral and lyophilized products	

31.	Sterilization.	
32.	**d. Containers and closures** selection, filling and sealing of ampoules, vials and infusion fluids. Quality control tests.	
33.	**Ophthalmic Preparations:** Introduction, formulation considerations; formulation of eye drops, eye ointments and eye lotions;	
34.	Evaluation of ophthalmic preparations	
UNIT-5	Cosmetics (10)	10
35.	**Cosmetics:** Formulation and preparation of the following cosmetic preparations: lipsticks, shampoos, cold cream	
36.	vanishing cream, tooth pastes,	
37.	Hair dyes and sunscreens.	
38.	**Packaging Materials Science:** Materials used for packaging of pharmaceutical products	
39.	factors influencing choice of containers,	
40.	legal and official requirements for containers	
41.	Stability aspects of packaging materials, Quality control tests	
42.	**Pharmaceutical Aerosols:** Definition, propellants, containers	
43.	Valves, Types of aerosol systems;	
44.	formulation and manufacture of aerosols;	
Activity1	MCQ Test	
Activity1	MCQ Test	
Activity1	MCQ Test	

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

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Name of the Subject	Pharmacognosy and Phytochemistry - II
Name of the Faculty	Dr. S. Priyadarshini
Designation, Department	Lecturer, Department of Pharmacognosy
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Scope, Course Objectives and Course Outcomes

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: The primary objectives of this subject are,

6. To be familiar with the modern extraction techniques, characterization and identification of the herbal drugs and phytoconstituents
7. To understand the preparation and development of herbal formulation.
8. To understand the herbal drug interactions
9. To carryout isolation and identification of phytoconstituents

Course Outcomes (COs): At completion of this subject, it is expected that the students will be able to

CO 1: Define the basic metabolic pathways in higher plants and their role in the production of secondary metabolites

CO 2: Define the general introduction, composition, chemistry & chemical classes, bio sources, therapeutic uses and commercial applications of secondary metabolites.

CO 3: Isolate, Identify and Analysis of various significant Phytoconstituents present in herbals

CO 4: Produce, estimate and utilize the phytoconstituents at Industrial level

CO 5: Extract, isolate, purify, and identify the phytoconstituents by applying the latest techniques like Spectroscopy, chromatography and electrophoresis.

LECTURE PLAN – Abstract

Sessional	No. of Hours of Didactic Lecture	No of Hours of other Activities	Total No. of Lecture Hours
I	27	03	30
II	18	03	21
Total No. of Hours	45	06	51

I SESSIONAL : 24 Lectures + 3 Activities

Lecture No.	Lecture Details	Hours
METABOLIC PATHWAYS		**(07)**
Unit-1: Metabolic pathways in higher plants and their determination		**07**
1.	Introduction to Pharmacognosy II & Metabolic pathways	
2.	Shikimic acid pathway and formation of different secondary metabolites	
3.	Acetate pathways- Acetate melonate pathway and formation of different secondary metabolites	
4.	Acetate-Mevolanate pathway and its secondary metabolities	
5.	Amino acid pathway and formation of different secondary metabolites	
6.	Study of utilization of radioactive isotopes in the investigation of Biogenetic studies	
METABOLITES		**(14)**
Unit-2: General introduction, composition, chemistry & chemical classes, biosources, therapeutic uses and commercial application of metabolities		**14**
1.	General introduction about alakaloids, Vinca and Rauwolfia	
2.	Belladonna, Opium.	
3.	Phenyl Propanoids and Flavonoids- Lingans, Tea and Ruta.	
4.	Steroids, Cardiac glycosides,& Triterpenoids - Liquorice	
5.	Dioscorea, Digitalis	
6.	Volatile oils: Mentha, clove	
7.	Cinnamon, Fennel, Coriander	
8.	Tannins: Catechu, Pterocarpus	
9.	Resins: Benzoin, Guggul, Ginger	
10.	Asafoetida, Myrrh, Colophony	
11.	Glycosides: Senna, Aloes	
12.	Bitter almond	
13.	Iridoids, Other terpenoids & Naphthaquinones: Gentian, Artemisia	
14.	Taxus, Carotenoids	
PHYTOCONSTITUENTS		**(06)**

Unit-3: Isolation, identification and analysis of phytoconstituents		
1.	Terpenoids: Menthol, Citrol, Artemisin	06
2.	Glycosides: Glycyrhetinic acid & Rutin	
3.	Alkaloids: Atropine, Quinine	
4.	Reserpine, Caffeine, Podophyllotoxin, Curcumin	
Activity1	MCQ Test (Metabolic pathways)	
Activity2	MCQ Test (Metabolites)	
Activity3	MCQ Test (Phytoconstituents)	

II SESSIONAL : 17 Lectures + 2 Activities

Lecture No.	Lecture Details	Hours
INDUSTRIAL ASPECTS OF PHYTOCONSTITUENTS		**(10)**
Unit-4: Industrial production, estimation and utilization of phytoconstituents		**10**
1.	Forskolin	
2.	Sennoside	
3.	Artemisinin	
4.	Diosgenin	
5.	Digoxin	
6.	Atropine	
7.	Podophyhllotoxin	
8.	Caffeine	
9.	Taxol	
10.	Vincristine and vinblastin	
PHYTOCHEMISTRY		**(08)**
Unit-5: Basics of Phytochemistry		**08**
1.	Modern methods of extraction: General Extraction techniques	
2.	Soxhlet extraction, SCFE	
3.	Counter current extraction, Micro oven assisted extraction	
4.	Extraction of volatile oils	
5.	Application of spectroscopy in the isolation, purification identification of crude drugs - UV, IR	
6.	Application of spectroscopy in the isolation, purification identification of crude drugs - NMR, MS	
7.	Chromatography in the isolation, purification and identification of drugs	
Activity-1	MCQ Test (Industrial aspects of Phytoconstituents)	
Activity-2	MCQ Test (Phytochemistry)	
Activity-3	MCQ Test	

Text Books

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. Essentials of Pharmacognosy, Dr.SH.Ansari, IInd edition, Birla publications, New Delhi, 2007

Reference Books

1. Herbal drug industry by R.D. Choudhary (1996), Ist Edn, Eastern Publisher, New Delhi.
2. Herbal Cosmetics by H.Pande, Asia Pacific Business press, Inc, New Delhi.
3. A.N. Kalia, Textbook of Industrial Pharmacognosy, CBS Publishers, New Delhi, 2005.
4. R Endress, Plant cell Biotechnology, Springer-Verlag, Berlin, 1994.
5. Pharmacognosy & Pharmacobiotechnology. James Bobbers, Marilyn KS, VE Tylor.
6. The formulation and preparation of cosmetic, fragrances and flavours.
7. Remington's Pharmaceutical sciences.
8. Text Book of Biotechnology by Vyas and Dixit.
9. Text Book of Biotechnology by R.C. Dubey.

*** *** ***

Name of the Subject	Pharmaceutical Jurisprudence
Name of the Faculty	Dr. Srikanth Jupudi
Designation, Department	Lecturer, Department of Pharm. Chemistry
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Scope, Course Objectives and Course Outcomes

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

Objectives: The primary objectives of this course are to gain knowledge about:

1. The Pharmaceutical legislations and their implications in the development and marketing
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 Outcomes (COs): At completion of this course it is expected that the students will be able to

CO 1: Define the rules and regulations laid under Drugs and Cosmetics Act, 1940

CO 2: Define the 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.
CO 3: Detail different Schedules of Drugs and Cosmetics and how various acts and rules are administered
CO 4: Understand the pharmacy education regulations, registration process and various rules and regulations implemented on narcotic drugs, medicinal and toilet preparations and Magic remedies.
CO 5: To understand the process of Drug Price Control, Intellectual Property Rights and Right to information.
CO 6: Follow various ethics related to Pharmacy Profession.

LECTURE PLAN

Sessional	No. of Hours of Didactic Lecture	No of Hours of other Activities	Total No. of Lecture Hours
I	**28**	**11**	**39**
II	**38**	**22**	**60**
Total No. of Hours	**66**	**33**	**99**

I SESSIONAL : 25 Lectures + 3 Activity + 8 Tutorials

Lecture No.	Lecture Details	Hours
PHARMACEUTICAL JURISPRUDENCE		
Unit-1:	**Drugs and Cosmetics Act, 1940 and its rules 1945**	**10**
1.	Objectives, Definitions, Legal definitions of schedules to the act and rules	
2.	Import of drugs – Classes of drugs and cosmetics prohibited from import, Import under license or permit. Offences and penalties	
3.	Manufacture of drugs – Prohibition of manufacture and sale of certain drugs,v	
4.	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-2:	**Drugs and Cosmetics Act, 1940 and its rules 1945.**	**09**
1.	Detailed study of Schedule G, H, M, N, P,T,U, V, X, Y, Part XII B, Sch F & DMR (OA)	
2.	Sale of Drugs – Wholesale, Retail sale and Restricted license. Offences and penalties	
3.	Labeling & Packing of drugs- General labeling requirements and specimen labels for drugs and cosmetics, List of permitted colors. Offences and penalties.	

4.	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-3	**Pharmacy Act –1948**	
1.	Objectives, Definitions, Pharmacy Council of India; its constitution and functions, Education Regulations, State and Joint state pharmacy councils; its constitution and functions, Registration of Pharmacists, Offences and Penalties	
Medicinal and Toilet Preparation Act –1955		
1.	Objectives, Definitions, Licensing, Manufacture In bond and Outside bond, Export of alcoholic preparations, Manufacture of Ayurvedic, Homeopathic, Patent & Proprietary Preparations. Offences and Penalties.	
Activity		**03**

II SESSIONAL - 24 Lectures + 14 Activity + 9 Tutorials

Unit 3: Narcotic Drugs and Psychotropic substances Act-1985 and Rules:		
1.	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	**04**
Unit 4:	**Study of Salient Features of Drugs and magic remedies Act and its rules**	
1.	Objectives, Definitions, Prohibition of certain advertisements, Classes of Exempted advertisements, Offences and Penalties	
Prevention of Cruelty to animals Act-1960:		
1.	Objectives, Definitions, Institutional Animal Ethics Committee, 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	**10**
National Pharmaceutical Pricing Authority		
1.	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 5:	**Pharmaceutical Legislations**	
1.	A brief review, Introduction, Study of drugs enquiry committee, Health survey and development committee, Hathi committee and Mudaliar committee	
Code of Pharmaceutical ethics		
1.	D efinition, Pharmacist in relation to his job, trade, medical profession and his profession, Pharmacist's oath **08**	
Medical Termination of pregnancy act		
Right to information Act		
Introduction to Intellectual Property Rights (IPR)		**02**

ACTIVITY	14
Seminars	
Mind mapping	
Flow chart reading	
Assignments	
Tests	
Mind games on schedules and years	

Text Books

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)

Reference Books

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

VI - SEMESTER

Name of the Subject	Medicinal Chemistry III (Theory)
Name of the Faculty	Dr. Srikanth Jupudi
Designation, Department	Lecturer, Department of Pharm. Chemistry
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Scope, Course Objectives and Course Outcomes

Scope: This course 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 emphasized on the chemistry,mechanism of action,metabolism,adverse effects,structure activity relationships (SAR), therapeutic uses and synthesis of important drugs..

Objectives: The primary objectives of this course are to

1. Study the concepts of drug design and QSAR.
2. Learn the mechanism of action and pharmacokinetic properties of drugs.
3. Outline the synthesis of drugs.
4. Learn the SAR of drugs
5. Study the applications of prodrugs

Course Outcomes (COs): At completion of this course it is expected that the students will 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 concept of prodrugs and their applications.
5. Acquire the knowledge about the SAR of drugs.

LECTURE PLAN – Abstract

Sessional	No. of Hours of Didactic Lecture	No of Hours of other Activities	Total No. of Lecture Hours
I	23	-	23
II	22	-	22
Total No. of Hours	45	-	45

I SESSIONAL : 23 Lectures

Lecture No.	Lecture Details	Hours
Unit-1: Antibiotics		**10**
1.	Beta lactam antibiotics-Penicillins	
2.	Beta lactam antibiotics-Cephalosporins	
3.	Beta lactam antibiotics-Cephalosporins	
4.	Beta lactamase inhibitors	
5.	Monobactams	
6.	Amino glycosides	
7.	Streptomycin, Neomycin, Kanamycin	
8.	Tetracyclines	
9.	Tetracycline,Oxytetracycline,	
10.	Chlortetracycline, Minocycline, Doxycycline	
Unit-2: Antibiotics,Prodrugs & Antimalarials		**10**
3.	Macrolides- Erythromycin, Clarithromycin & Azithromycin	
4.	Miscellaneous- Chloramphenicol*, Clindamycin.	
5.	Prodrugs-Basic concepts	
6.	Applications of Prodrugs	
7.	Applications of Prodrugs (cont…)	
8.	Antimalarials- Etiology of Malaria &SAR	
9.	Quinolines- Quinine sulphate, Chloroquine*, Amodiaquine,	

10.	Quinolines- Primaquine phosphate, Pamaquine*, Quinacrine hydrochloride, Mefloquine	
11.	Biguanides and dihydro triazines: Cycloguanil pamoate, Proguanil.	
10.	Miscellaneous- Pyrimethamine, Artesunete, Artemether, Atovoquone	
Unit-3: Anti-tubercular Agents, Urinary tract anti-infective agents, Antiviral agents		**03**
1.	Anti tubercular agents	
2.	Synthetic anti tubercular agents-Isoniozid*, Ethionamide, Ethambutol, Pyrazinamide, Para amino salicylic acid.*	
3.	Anti tubercular antibiotics: Rifampicin, Rifabutin, Cycloserine Streptomycine, Capreomycin sulphate.	

II SESSIONAL : 22 Lectures

Lecture No.	Lecture Details	Hours
Unit-3: Anti-tubercular Agents, Urinary tract anti-infective agents, Antiviral agents (cont…)		**07**
1.	Urinary Tract Anti-infective agents-Quinolones: SAR of quinolones, Nalidixic Acid,Norfloxacin, Enoxacin,	
2.	Quinolones: Ciprofloxacin*, Ofloxacin, Lomefloxacin, Sparfloxacin, Gatifloxacin, Moxifloxacin	
3.	Miscellaneous: Furazolidine, Nitrofurantoin*, Methanamine.	
4.	Antiviral agents: Amantadine hydrochloride, Rimantadine hydrochloride, Idoxuridine trifluoride	
5.	Anti viral agents- Acyclovir*, Gancyclovir, Zidovudine, Didanosine,	
6.	Anti viral agents- Zalcitabine, Lamivudine, Loviride, Delavirding,	
7.	Anti viral agents Ribavirin, Saquinavir, Indinavir, Ritonavir.	
Unit-4: Antifungal agents, Anti-protozoal Agents, Anthelmintics		**08**
8.	Antifungal antibiotics: Amphotericin-B, Nystatin, Natamycin, Griseofulvin.	
9.	Synthetic Antifungal agents: Clotrimazole, Econazole, Butoconazole, Oxiconazole Tioconozole, Miconazole*, Ketoconazole, Terconazole, Itraconazole, Fluconazole, Naftifine hydrochloride, Tolnaftate*.	
10.	Anti-protozoal Agents: Metronidazole*, Tinidazole, Ornidazole, Diloxanide, Iodoquinol, Pentamidine Isethionate, Atovaquone, Eflornithine.	
11.	Anthelmintics: Diethylcarbamazine citrate*, Thiabendazole, Mebendazole*, Albendazole, Niclosamide, Oxamniquine, Praziquantal, Ivermectin	
12.	Sulphonamides and Sulfones Historical development, chemistry, classification and SAR of Sulfonamides:	
13.	Sulphamethizole, Sulfisoxazole, Sulphamethizine, Sulfacetamide*, Sulphapyridine, Sulfamethoxaole*, Sulphadiazine, Mefenide acetate, Sulfasalazine.	
14.	Folate reductase inhibitors: Trimethoprim*, Cotrimoxazole.	
15.	Sulfones: Dapsone*.	
Unit-5: Introduction to Drug Design		
12.	Introduction to drug design- various approaches in drug design	

13.	Physicochemical parameters used in quantitative structure activity relationship (QSAR) such as partition coefficient	**07**
14.	Hammet's electronic parameter, Tafts steric parameter and Hansch analysis.	
15.	Pharmacophore modeling.	
16.	Docking techniques	
17.	Combinatorial Chemistry: Concept and applications chemistry	
18.	Solid phase and solution phase synthesis.	

Text books

1. Wilson and Gisvold's Organic Medicinal and Pharmaceutical chemistry.
2. Foye's Principles of Medicinal Chemistry.

Reference books

1. Burger's Medicinal Chemistry, Vol I to IV istry
2. Introduction to principles of drug design-Smith and Williams
3. Remington's Pharmaceutical Sciences. 4. Martindale's extra pharmacopoeia

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Name of the Subject	Pharmacology III (Theory)
Name of the Faculty	Mr. B. Shivaramakrishnan M.Pharm
Designation, Department	Asst. Professor, Department of Pharmacology
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Scope, Course Objectives and Course Outcomes

Scope: Pharmacology III provides an opportunity for the students to learn about different classes of drugs with regard to classification, pharmacodynamic and pharmacokinetic aspects, adverse effects, uses, dose, routes of administration, precautions, contraindications and interaction with other drugs.

Objectives: The primary objectives of this course are 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 poisonings and
3. Appreciate correlation of pharmacology with related medical sciences.

Course Outcomes (COs): At completion of this course it is expected that the students will be able to

CO 1 : Identify and explain the pharmacodynamics and pharmacokinetic properties of drugs of various categories
CO 2 : Recognize the adverse effects of drugs
CO 3 : Avoid adverse drug reactions
CO 4 : Recognize indications of different drugs and avoid contraindications
CO 5 : Provide vital information to patients about drugs during patient counselling
CO 6 : Design & execute animal experiments to identify the pharmacological properties of known drugs and unknown samples.

LECTURE PLAN – Abstract

Sessional	No. of Hours of Didactic Lecture	No of Hours of other Activities	Total No. of Lecture Hours
I	28	1	29
II	25	5	30
Total No. of Hours	53	06	59

I SESSIONAL: 28 Lectures + 1 Activity

Lecture No.	Lecture Details	Hours
Unit-1: Pharmacology of drugs acting on Respiratory system		**05**
7.	Anti-asthmatic drugs	
8.	Expectorants and Anti-tussives	
9.	Nasal decongestants	
10.	Respiratory stimulants	
Unit-2: Pharmacology of drugs acting on Digestive system		**05**
8.	Anti-ulcer agents	
9.	Drugs for Constipation and Diarrhea	
10.	Appetite stimulants and Suppressants	
11.	Digestants and Carminatives	
12.	Emetics and Anti-emetics	
Unit-3: Chemotherapy		**18**
12.	General Principles of Chemotherapy	
13.	Sulfonamides and Cotrimoxazole	
14.	Antibiotics - Penicillins & Cephalosporins	
15.	Chloramphenicol & Macrolide antibiotics	
16.	Quinolones & Fluoroquinolones	
17.	Tetracylines	
18.	Aminoglycosides	

19.	Antitubercular drugs	
20.	Antileprotic drugs	
21.	Anti-amoebic drugs	
22.	Antiviral drugs	
23.	Antimalarial drugs	
24.	Anti-amoebic drugs	
25.	Antifungal drugs	
Activity1	Class Test	

II SESSIONAL: 25 Lectures + 5 Activities

Lecture No.	Lecture Details	Hours
Unit-4: Chemotherapy & Immunopharmacology		**10**
5.	Anthelmentics	
6.	Urinary tract infections and sexually transmitted diseases	
7.	Chemotherapy of malignancy	
8.	Immunostimulants	
9.	Immunosupressants	
10.	Protein Drugs, Monoclonal Antibodies	
11.	Target drugs to antigen, Biosimilars	
Unit-5: Principles of Toxicology		**07**
16.	Acute, subacute and chronic toxicity- Definitions &Basics	
17.	Genotoxicity, Carcinogenicity, Teratogenicity & Mutagenicity- Definitions &Basics	
18.	General principles of treatment of poisoning, Clinical symptoms and management of Barbiturate poisoning	
19.	Clinical symptoms and management of Morphine, organophosphorus compound poisoning	
20.	Clinical symptoms and management of lead, mercury and arsenic poisoning	
Unit-6 : Chronopharmacology		**03**
19.	Definition of rhythms and cycles	
20.	Biological clock and their significance leading to chronotherapy	
Revision		**05**
Activity-1	MCQ Test	
Activity-2	MCQ Test	
Activity-3	Class Test	
Activity-4	Class Test	
Activity-5	Exam Preparation & Time management skills	

Text Books

3. Rang H. P., Dale M. M., Ritter J. M., Flower R. J., Rang and Dale's Pharmacology, Churchil Livingstone Elsevier
4. Mycek M.J, Gelnet S.B and Perper M.M. Lippincott's Illustrated Reviews- Pharmacology.

Reference Books

5. Katzung B. G., Masters S. B., Trevor A. J., Basic and clinical pharmacology, Tata McGraw-Hill.
6. Goodman and Gilman's, The Pharmacological Basis of Therapeutics
7. K.D.Tripathi. Essentials of Medical Pharmacology. JAYPEE Brothers Medical Publishers (P) Ltd, New Delhi.
8. Sharma H. L., Sharma K. K., Principles of Pharmacology, Paras medical publisher

Name of the Subject	Herbal Drug Technology
Name of the Faculty	Dr. S. Priyadarshini
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Scope, Course Objectives and Course Outcomes

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: The primary objectives of this subject are,

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

Course Outcomes (COs): At completion of this subject, it is expected that the students will be able to

CO1: Define the principal involved in Indian Systems of Medicine, Preparation and standardization of Ayurvedic formulations

CO2: Define the Market, growth, scope of nutraceuticals and significance of herbal-drug and herb-food Interactions

CO 3: Define Herbal Cosmetics, Herbal excipients Herbal formulations

CO 4: Patenting and Regulatory requirements of natural products, Regulatory Issues WHO & ICH guidelines for the assessment of herbal drugs Stability testing of herbal drugs.

CO 5: Present scope and future prospects of Herbal industry, Good Manufacturing Practice of Indian systems of medicine

LECURE PLAN – Abstract

Sessional	No. of Hours of Didactic Lecture	No of Hours of other Activities	Total No. of Lecture Hours
I	21	03	24
II	24	03	27
Total No. of Hours	45	05	51

I SESSIONAL : 21 Lectures + 3 Activities

Lecture No.	Lecture Details	Hours
INDIAN SYSTEMS OF MEDICINE		**(11)**
Unit-1: Herbs as raw materials		**11**
7.	Herbs as raw materials: Definition of herb, herbal medicine, herbal medicinal product, herbal drug preparation	
8.	Source of Herbs	
9.	Selection, identification and authentication of herbal materials	
10	Processing of herbal raw material	
11	Biodynamic Agriculture: Good agricultural practices in cultivation of medicinal plants including Organic farming	
12	Pest and Pest management in medicinal plants	
13	Biopesticides/Bioinsecticides	
14	Basic principles involved in Ayurveda, Siddha, Unani and Homeopathy	
15	Preparation of Ayurvedic formulations	
16	Standardization of Ayurvedic formulations	
17	Standardization of Ayurvedic formulations	
NUTRACEUTICALS		**(07)**
Unit-2: Nutraceuticals and Herbal-Drug and Herb-Food Interactions		**07**
26.	General aspects, market, growth, scope of nutraceuticals	
27.	Health benefits and role of Nutraceuticals in Diabetes, CVS diseases, Cancer	
28.	Health benefits and role of Nutraceuticals in Irritable bowel syndrome and various Gastro intestinal diseases.	
29.	Study of Alfaalfa, Chicory, Ginger, Fenugreek, Garlic as health food	
30.	Study of Honey, Amla, Ginseng, Ashwagandha, Spirulina as health food	
31.	General introduction to Herbal-Drug and Herb-Food Interactions	
32.	Study of Hypercium, kava-kava, Ginkobiloba, Ginseng, Garlic, Pepper & Ephedra and their possible side effects and interactions	
HERBAL COSMETICS		**(10)**
Unit-3: Herbals used in cosmetics		
5.	Sources and description of fixed oils, waxes, gums used in cosmetics	
6.	Sources and description of colours, perfumes used in cosmetics	

7.	Sources and description of protective agents, bleaching agents, antioxidants used in cosmetics	**03**
Activity1	MCQ Test (Indian Systems of Medicine)	
Activity2	MCQ Test (Nutraceuticals)	
Activity3	MCQ Test (Herbal Cosmetics)	

II SESSIONAL : 24 Lectures + 3 Activities

Lecture No.	Lecture Details	Hours
HERBAL COSMETICS		
Unit-3: Herbals used in cosmetics (Continued for II Sessional)		
12.	Significance of substances of natural origin as excipients	
13.	Colorants and sweeteners	
14.	Binders and diluents	
15.	Viscosity builders and disintegrants	
16.	Flavors & perfumes	
17.	Conventional herbal formulations: Syrups, mixtures and tablets	**07**
18.	Novel dosage forms: Phytosomes	
EVALUATION OF DRUGS		**(10)**
Unit-4: Regulatory Issues		
9.	WHO guidelines for the assessment of herbal drugs	
10.	ICH guidelines for the assessment of herbal drugs	
11.	Stability testing of herbal drugs.	**10**
12.	Patenting of natural products	
13.	Regulatory requirements of natural products	
14.	Definition of the terms: Patent, IPR, Farmers right, Breeder's right, Bioprospecting and Biopiracy	
15.	Patenting aspects of Traditional Knowledge and Natural Products.	
16.	Case study of Curcuma	
17.	Case study of Neem	
18.	Cosmetics Act for ASU drugs.	
HERBAL INDUSTRY		**(07)**
Unit-5: Regulatory Issues		
1.	General Introduction to Herbal Industry	
2.	Present scope and future prospects of Herbal Industry	
3.	A brief account of plant based industries and institutions involved in work on medicinal and aromatic plants in India	
4.	Schedule T – Good Manufacturing Practice of Indian systems of medicine	
5.	Components of GMP (Schedule – T) and its objectives	

6.	Infrastructural requirements, working space, storage area, machinery and equipments of Herbal Industry	
7.	Standard operating procedures, health and hygiene, documentation and records of of Herbal Industry	
Activity-1	MCQ Test (Herbal Cosmetics)	
Activity-2	MCQ Test (Evaluation of Drugs)	
Activity-3	MCQ Test (Herbal Industry)	

Text Books

1. W.C.Evans, Trease and Evans Pharmacognosy, 16th edition, W.B. Sounders & Co., London, 2009.
2. Text book of Pharmacognosy by C.K. Kokate, Purohit, Gokhlae (2007), 37th Edition, Nirali Prakashan, New Delhi.
3. Essentials of Pharmacognosy, Dr.SH.Ansari, IInd edition, Birla publications, New Delhi, 2007
4. Pharmacognosy & Phytochemistry by V.D.Rangari

Reference Books

1. Pharmacopoeal standards for Ayurvedic Formulation (Council of Research in Indian Medicine & Homeopathy)
2. Mukherjee, P.W. Quality Control of Herbal Drugs: An Approach to Evaluation of Botanicals. Business Horizons Publishers, New Delhi, India, 2002.

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Name of the Subject	Biopharmaceutics and Pharmacokinetics (Theory)
Name of the Faculty	Mr. Murugappan M , M.Pharm
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Scope, Course Objectives and Course Outcomes

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

Course Outcomes (COs): At completion of this course it is expected that the students will be able to

CO 1 : Define the basic concepts in biopharmaceutics and pharmacokinetics
CO 2: Design theoretical dosage form with high bioavailablity
CO 2 : Critically interpret biopharmaceutic studies including drug product equivalency
CO 3 : Use raw data and derive the pharmacokinetic models and parameters that best describe the process of drug absorption, distribution, metabolism and excretion

LECTURE PLAN – Abstract

Sessional	No. of Hours of Didactic Lecture		No of Hours of other Activities	Total No. of Lecture Hours
	Biopharmaceutics	Pharmacokinetics		
I	20	06	03	29
II	--	19	04	23
Total No. of Hours	20	25	07	52

I SESSIONAL : 20 Lectures + 6 Activities

Lecture No.	Lecture Details	Hours
BIOPHARMACEUTICS		**(20)**
	Unit -1 : Absorption & Distribution	**10**
	Orientation to the subject	
1.	**Introduction to Biopharmaceutics**	
2.	**Absorption -** Introduction, Mechanism of Drug absorption to GIT	
3.	Factors influencing drug absorption through GIT	
4.	Factors influencing drug absorption through GIT (Cont…)	
5.	Absorption of drug from Non-per OS route	
6.	**Distribution -** Tissue Permeability, Binding of drugs	
7.	Apparent volume of Distribution	
8.	Plasma and Tissue protein binding of drugs	
9.	Factors Affecting Protein- Drug binding	
10.	Kinetics of Protein Binding, Clinical Significance of Protein binding of drugs	
	Unit -2 : Elimination/ Bioavailability and Bioequivalence	**10**
1.	**Elimination** - Drug Metabolism and basic understanding of metabolic Pathways	
2.	Renal excretion of drugs, Factors affecting renal excretion of drugs	
3.	Renal Clearance and Non-renal clearance of drug	
4.	**Bioavailability and Bioequivalence –** Definition and objective of Bioavailability, Absolute and Relative Bioavailability	
5.	Measurement of Bioavailability	
6.	Invitro drug dissolution model, *in-vitro-in-vivo* correlation	
7.	*in-vitro-in-vivo* correlation (Cont…)	
8.	Bioequivalence studies	
9.	Bioequivalence Studies	

10.	Methods to enhance the dissolution rates and bioavailability of poorly soluble drugs	
PHARMACOKINETICS		**(10)**
Unit – 3: Pharmacokinetics		
1.	Pharmacokinetics – Definition and introduction to Pharmacokinetics	
2.	Compartment Model	
3.	Non-Compartment model, Physiological Model	**06**
4.	One Compartment Open Model, IV injection Bolus	
5.	IV Injection Bolus (Cont…)	
6.	IV infusion	
Activity 1	Mind Mapping on Selected Topic(s)	
Activity 2	MCQ Test (Biopharmaceutics)	
Activity 3	MCQ Test (Pharmacokinetics)	

II SESSIONAL : 19 Lectures + 4 Activities

Lecture No.	Lecture Details	Hours
Unit – 3: Pharmacokinetics(Cont…)		**04**
7.	Extra-Vascular Administration	
8.	Extra- Vascular Administration	
9.	Pharmacokinetic Parameters - $K_{E,}$ t1/2, $V_{d,}$ AUC, $K_{a,}$ Clt, CL_R – definitions, methods of elimination, understanding their significance and application.	
10.	Pharmacokinetic Parameters - $K_{E,}$ t1/2, $V_{d,}$ AUC, $K_{a,}$ Clt, CL_R – definitions, methods of elimination, understanding their significance and application.	
Unit- 4 MULTICOMPARTMENT MODELS		**(15)**
1.	**Multi-Compartment Models** – Two Compartment Open Model	
2.	**Multi-Compartment Models** – Two Compartment Open Model (Cont…)	
3.	IV Bolus	
4.	IV Bolus	
5.	Kinetics of Multiple Dosing	
6.	Steady State Drug Levels	
7.	Calculation of loading and maintainence doses and their significance in clinical settings	
8.	Calculation of loading and maintainence doses and their significance in clinical settings	
Unit -5 Non-linear Pharmacokinetics		
1.	Introduction	
2.	Factors Causing Non-linearity	
3.	Factors Causing Non-linearity (Cont…)	**07**

4.	Michaelis-menton method of estimating parameters, Explanation with example of drugs	
5.	Michaelis-menton method of estimating parameters, Explanation with example of drugs (Cont…)	
6.	Michaelis-menton method of estimating parameters, Explanation with example of drugs (Cont…)	
7.	Michaelis-menton method of estimating parameters, Explanation with example of drugs (Cont…)	
Activity - 1	MCQ Test (Biopharmaceutics)	
Activity - 2	MCQ Test (Pharmacokinetics)	
Activity - 3	MCQ Test (Biopharmaceutics)	
Activity - 4	Revision Test -1	

Text Books

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 Inernationaledition.USA.
4. Biopharmaceutics and Pharmacokinetics-A Treatise, By D. M. Brahmankar and Sunil B.Jaiswal, VallabhPrakashanPitampura, Delhi.
5. Biopharmaceutics and Pharmacokinetics, V Venkateswarulu, Pharma Book Syndicate.

Reference Books

1. Pharmacokinetics: By Milo Glbaldi Donald, R. Mercel Dekker Inc. 6.
2. Hand Book of Clinical Pharmacokinetics, By Milo Gibaldi and Laurie Prescott by ADIS Health Science Press.
3. Clinical Pharmacokinetics, Concepts and Applications: By Malcolm Rowland and 9.
4. Thomas, N. Tozen, Lea and Febrger, Philadelphia, 1995. 10.
5. Dissolution, Bioavailability and Bioequivalence, By Abdou H.M, Mack, Publishing Company,Pennsylvania 1989.
6. Biopharmaceutics and Clinical Pharmacokinetics-An introduction 4th edition Revised and expanded by Rebort F Notari Marcel Dekker Inn, New York and Basel, 1987.
7. Remington's Pharmaceutical Sciences, By Mack Publishing Company, Pennsylvnia

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Name of the Subject	Pharmaceutical Quality Assurance (Theory)
Name of the Faculty	Dr. Jeyaprakash MR M.Pharm., Ph.D
Designation, Department	Assistant Professor, Department of Pharmaceutical Analysis
Mobile Number	9952335392
e-Mail i.d.	jpvis7@jssuni.edu.in

Scope, Course Objectives and Course Outcomes

Scope: This course conveys the various aspects of quality control and quality assurance aspects of pharmaceutical industries. It also explains the current requirement of Quality standards, cGMP, QC tests, ICH guidelines, Complaints and documentation requirements. It also deals with the packing material quality and requirement as per the regulatory affairs requirement.

Objectives: The primary objectives of this course are to

1. It reveals the basic aspects of quality assurance
2. Explain the various types of quality requirements.
3. It helps the young community to understand the concept of GLP
4. The subject concept detail the raw materials and warehouse management process

Course Outcomes (COs): At completion of this course it is expected that the students will be able to
CO 1: Different types of Quality Management system
CO2: GMP and its individual criterion requirements
CO3: Good Laboratory Practices requirements
CO4: Complaints and Document maintenance and its handling procedure in pharmaceutical industry
CO5: Different types of analytical instruments and calibration procedures

LECTURE PLAN – Abstract

Sessional	No. of Hours of Didactic Lecture Pharmaceutical Quality Assurance	No of Hours of other Activities	Total No. of Lecture Hours
I	20	04	24
II	25	04	29
Total No. of Hours	45	08	53

I SESSIONAL : 31 Lectures + 2 Activities

Lecture No.	Lecture Details	Hours
Unit 1: Quality Assurance and Quality Management concepts, Total Quality Management (TQM), ICH Guidelines, Quality by design (QbD), Quality by design (QbD), ISO 9000 & ISO14000, NABL accreditation		**10**
1	Orientation towards subject and syllabus **(Activity 1)**	
2	Definition and concept of Quality control, Quality assurance and GMP	
3	(TQM):Definition, elements, philosophies	
4	ICH Guidelines: purpose, participants, process of harmonization	
5	Brief overview of QSEM	
6	Special emphasis on Q-series guidelines, ICH stability testing guidelines	
7	QbD: Definition, overview, Elements of QbD program, tools	
8	ISO 9000 & ISO14000: Overview, Benefits, Elements,	
9	Steps for ISO registration	
10	NABL Principles and procedure	
11	Assignment 1	**02**
Unit 2: Organization and personnel, Premises, Equipment's and raw materials		**10**
1	Personnel responsibilities, training,	
2	Hygiene and personal records	
3	Premises:Design, construction and plant layout, maintenance,	
4	Sanitation,	
5	Environmental control,	
6	Utilities and maintenance of sterile areas,	
7	Control of contamination	
8	Equipments selection,	
9	Purchase specifications	
10	Maintenance of stores for raw materials,	
11	ASSIGNMENT 1	**02**

II SESSIONAL : 25 Lectures + 3 Activities

Lecture No.	Lecture Details	Hours
Unit-3: Quality Control and Good Laboratory Practices		**10**
1	Quality control test for containers	

2	Rubber closures and secondary packing materials	
3	GLP General Provisions	
4	Organization and Personnel, Facilities,	
5	Equipment,	
6	Testing Facilities Operation,	
7	Test and Control Articles,	
8	Protocol for Conduct of a Nonclinical Laboratory Study	
9	Records and Reports	
10	Disqualificationof Testing Facilities	
	Assignment 3	**02**
Unit 4: Complaints and Document maintenance in pharmaceutical industry		**08**
1	Complaints and evaluation of complaints,	
2	Handling of return good	
3	Recalling and waste disposal	
4	Batch Formula Record	
5	Master Formula Record	
6	SOP	
7	Quality audit , Quality Review	
8	Quality documentation, Reports and documents, distribution records	
9	Assignment 4	
Unit 5: Calibration and Validation, Warehousing		**07**
1	Introduction, definition and general principles of calibration	
2	qualification and validation, importance and scope of validation	
3	types of validation	
4	validation master plan. Calibration of pH meter	
5	Qualification of UV-Visible spectrophotometer	
6	General principles of Analytical method Validation.	
7	Good warehousing practice, Materials management	
8	Assignment 5	**02**

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

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Name of the Subject	Pharmaceutical Biotechnology (Theory)
Name of the Faculty	Mr. Suresh P
Designation, Department	Lecturer, Department of Pharmaceutical Biotechnology
Mobile Number	+91 97917 48488
e-Mail i.d.	suresh.prabhakaran@jssuni.edu.in

Scope, Course Objectives and Course Outcomes

Scope: This course aims to provide knowledge that includes a multidisciplinary approach in which students can follow the requirements of large-scale industry-related operations as well as high-end independent research on Biotechnology. The course covers a broad range of competencies required to understand different biological concepts of rDNA technology, genomics, proteomics, protein engineering, fermentation and immunology.

Objectives: The primary objectives of this course are to

Explain how genomes are structured in higher species

1. Describe functional classes of the DNA and Gene families.
2. Understand how recombinant DNA technology works
3. Explain the development and implementation of the DNA and cDNA libraries.
4. Get an insight into primary and secondary organs of the Immune system.
5. Describe different technologies for microorganism to produce useful commodity.

Course Outcomes (COs): At completion of this course it is expected that the students will be able to

CO 1: Gain insight into the theory and manipulation of genomes.
CO 2 : Classify and explain the structure and general characteristics of genes.
CO 3 : Understand various basic concepts about fermentation technology
CO 4 : Get insight into the role and function of diverse immune cells
CO 5 : Describe antigenicity and its influencing factors.
CO 6 : Explain immunity mediated by cell, development of monoclonal antibody, and hypersensitivity.

LECTURE PLAN – Abstract

Sessional	No. of Hours of Didactic Lecture	No of Hours of other Activities	Total No. of Lecture Hours
I	28	03	31
II	17	02	19
Total No. of Hours	45	05	50

I SESSIONAL : 28 Lectures + 3 Activities

Lecture No.	Lecture Details	Hours
Unit-1		
	Orientation to the subject	**10**
1.	Brief introduction to Pharmaceutical Biotechnology	
2.	Enzyme Biotechnology-Methods of enzyme immobilization and applications	
3.	Enzyme Biotechnology-Methods of enzyme immobilization and applications (Cont...)	
4.	Biosensors-Working and applications of biosensors in Pharmaceutical Industries	
5.	Biosensors-Working and applications of biosensors in Pharmaceutical Industries (Cont...)	
6.	Brief introduction to Protein Engineering	
7.	Use of microbes in industry-Production of Amylase, Catalase	
8.	Use of microbes in industry-Production of Peroxidase, Lipase	
9.	Use of microbes in industry-Production of Protease, Penicillinase	
10.	Basic principles of genetic engineering	
Unit-2		
13.	Study of cloning vectors	**10**
14.	Study of restriction endonucleases	
15.	Study of DNA ligase	
16.	Application of genetic engineering in medicine	
17.	Interferon by r DNA technology	
18.	Hepatitis -B by r DNA technology	
19.	Insulin by r DNA technology	
20.	Brief introduction to PCR	
21.	Types of immunity and Humoral immunity	
22.	Cellular immunity	
Unit-3		
33.	Structure of Immunoglobulin's	**10**
34.	Structure and Function of MHC	
35.	Hypersensitivity reactions	
36.	Immune stimulation and Immune suppressions	
37.	General method of the preparation of vaccines and other products	
38.	General method of the preparation of vaccines and other products (Cont...)	
39.	General method of the preparation of vaccines and other products (Cont...)	
40.	General method of the preparation of vaccines and other products (Cont...)	
Activity1	MCQ Test	
Activity2	MCQ Test	
Activity3	MCQ Test	

II SESSIONAL: 17 Lectures + 2 Activities

Lecture No.	Lecture Details	Hours
41.	Storage conditions and stability of official vaccines	
42.	Hybridoma technology-Production, Purification and Applications	
Unit-4		
19.	Immuno blotting techniques	**08**
20.	Genetic organization of Eukaryotes	
21.	Genetic organization of Prokaryotes	
22.	Microbial genetics	
23.	Plasmids	
24.	Transposons	
25.	Microbial biotransformation and applications	
26.	Mutation	
Unit-5		
21.	Types of mutation/mutants	**07**
22.	General requirements of fermentation	
23.	General requirements of fermentation (Cont...)	
24.	Large scale production fermenter design and its various controls	
25.	Study of the production of Penicillin's and Griseofulvin	
26.	Study of the production of Citric acid and Glutamic acid	
27.	Study of the production of Vitamin B12	
Activity-1	MCQ Test	
Activity-2	MCQ Test	

Text Books

1. Biotechnology by Singh B.D.
2. B.R. Glick and J.J.Pasternak: Molecular Biotechnology:Principles and Applicationsof RecombinantDNA: ASM Press Washington D.C.
3. Zaborsky: Immobilized Enzymes, CRC Press, Degraland, Ohio

Reference Books

1. S.B. Primrose: Molecular Biotechnology (Second Edition) Blackwell ScientificPublication
2. Stanbury F., P., Whitakar A., and Hall J., S., Principles of fermentation technology,2ndedition, Aditya books Ltd., New Delhi

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PRINCIPAL
J.S.S. COLLEGE OF PHARMACY
Rockland's, Ootacamund - 643 001

JSS Academy of Higher Education & Research, Mysore
(Deemed to be University - Accredited 'A^{+}' Grade by NAAC)

JSS College of Pharmacy, Rocklands, Ooty
(An ISO 9001:2015 Certified Institution)

Lecture Plan

(Academic Year: 2024-2025)

Course: IV. B.PHARM.

Name of the Subject	Instrumental Methods of Analysis (Theory)
Name of the Faculty	Dr. Meyyanathan SN, M.Pharm., Ph.D
Designation, Department	Professor, Department of Pharmaceutical Analysis
Mobile Number	7010551923
e-Mail i.d.	snmeyyanathan@jssuni.edu.in

Scope, Course Objectives and Course Outcomes

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: The primary objectives of this course are 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 Outcomes (COs): At completion of this course it is expected that the students will be able to

CO 1: know the instrumental techniques used in drug analysis

CO 2: analyse the raw materials and formulations by various analytical instruments

LECTURE PLAN - Theory

Sessional	Total Number of Lecture Hours	Tutorial Classes
I	20	05
II	25	05
Total Number of Lecture Hours	45	10

I SESSIONAL : 20 Lectures + 05 Tutorial classes

Lecture No.	Lecture Details	Hours
Unit-1:		**12**
1.	UV Visible spectroscopy - Electronic transitions, chromophores, auxochromes, spectral shifts	
2.	Solvent effect on absorption spectra, Beer and Lambert's law, Derivation and deviations	
3.	Instrumentation - Sources of radiation, wavelength selectors, sample cells	
4.	Detectors-Photo tube, Photomultiplier tube, Photo voltaic cell, Silicon Photodiode	
5.	Applications - Spectrophotometric titrations	
6.	Single component and multi component analysis	
Tutorial - 1	Assignment / Test - 1	
7.	Fluorimetry - Theory, Concepts of singlet, doublet and triplet electronic states	
8.	Internal and external conversions, factors affecting fluorescence	
9.	Quenching, instrumentation	
10.	Applications of fluorimetry	
Tutorial - 2	Assignment / Test - 2	
Unit-2:		**13**
11.	IR spectroscopy- Introduction, fundamental modes of vibrations in poly atomic molecules	
12.	Sample handling, factors affecting vibrations	
13.	Instrumentation - Sources of radiation, wavelength selectors, detectors - Golay cell	
14.	Bolometer, Thermocouple, Thermister, Pyroelectric detector and applications	
Tutorial - 3	Assignment / Test - 3	
15.	Flame Photometry-Principle, interferences	
16.	Instrumentation and applications	

17.	Atomic absorption spectroscopy- Principle, interferences	
Tutorial - 4	Assignment / Test - 4	
18.	Instrumentation and applications	
19.	Nepheloturbidometry- Principle	
20.	Instrumentation and applications	
Tutorial – 5	Assignment / Test – 5	

II SESSIONAL : 25 Lectures + 05 Tutorial classes

Unit 3:		
21.	Introduction to chromatography	
22.	Adsorption and partition column chromatography- Methodology	
23.	Advantages, disadvantages and applications.	
Tutorial – 6	Assignment / Test – 6	
24.	Thin layer chromatography- Introduction, Principle, Methodology	
25.	Introduction to chromatography	
26.	Rf values, advantages, disadvantages and applications.	**12**
27.	Paper chromatography-Introduction, methodology	
28,	Development techniques, advantages, disadvantages and applications	
Tutorial – 7	Assignment / Test – 7	
29.	Electrophoresis– Introduction, factors affecting electrophoretic mobility	
30.	Techniques of paper, gel, capillary electrophoresis, applications	
Unit-4:		
31.	Gas chromatography – Introduction	
32.	Theory, Instrumentation	
33.	Derivatization, Temperature programming	
34.	Advantages, disadvantages and applications	
Tutorial - 8	Assignment / Test - 8	
35.	High performance liquid chromatography (HPLC) - Introduction	**10**
36.	HPLC-Theory	
37.	HPLC-Instrumentation	
38.	HPLC-Advantages and applications	
Tutorial - 9	Assignment / Test - 9	
Unit-5:		
39.	Ion exchange chromatography- Introduction, classification, ion exchange resins, properties	

40.	Mechanism of ion exchange process, factors affecting ion exchange	**08**
41.	Methodology, applications	
42.	Gel chromatography- Introduction, theory	
43.	Instrumentation and applications	
44.	Affinity chromatography- Introduction, theory	
45.	Instrumentation and applications	
Tutorial - 10	Assignment / Test - 10	

Text Books

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

Reference Books

1. Organic Chemistry by I. L. Finar
2. Organic spectroscopy by William Kemp
3. Quantitative Analysis of Drugs by D. C. Garrett
4. Quantitative Analysis of Drugs in Pharmaceutical Formulations by P. D. Sethi
5. Spectrophotometric identification of Organic Compounds by Silverstein

Name of the Subject	Instrumental Methods of Analysis (Practical)
Name of the Faculty	Dr. Meyyanathan SN, M.Pharm., Ph.D
Designation, Department	Professor, Department of Pharmaceutical Analysis
Mobile Number	7010551923
e-Mail i.d.	snmeyyanathan@jssuni.edu.in

LECTURE PLAN - Practicals

Sessional	Number of Practical (Mention the Highest Number Amongst Various Batches)	Total Number of Practical Hours (Number of Practical X 3)
I	09	27
II	08	24
Total Number of Practical/Hours	17	51

I SESSIONAL

Practical No.	Name of the Experiment
1.	Determination of absorption maxima of a compound
2.	Colorimetric estimation of Sulphanilamide using BM reagent
3.	Determination of Ibuprofen and Paracetamol by simultaneous equation method
4.	Assay of paracetamol by UV- Spectrophotometry
5.	IR interpretation of drug samples with different functional groups
6.	Estimation of Quinine sulphate by fluorimetry
7.	Study of quenching effects in fluorimetry by iodide ions
8.	Estimation of Riboflavine by fluorimetry
9.	**I Sessional**

II SESSIONAL

Practical No.	Name of the Experiment
1.	Determination of sodium by flame photometry
2.	Determination of Potassium by flame photometry
3.	Determination of Chloride by Nepheloturbidometry
4.	Determination of sulphate by Nepheloturbidometry
5.	Separation & identification of amino acids by paper chromatography
6.	Separation & identification of alkaloids by TLC
7.	Demonstration experiment on HPLC
8.	**II Sessional**

Name of the Subject	Pharmacy Practice (Theory)
Name of the Faculty	Dr. S. Ponnusankar
Designation, Department	Professor, Department of Pharmacy Practice
Mobile Number	+91 94896 13428
e-Mail i.d.	drsponnusankar@jssuni.edu.in

Scope, Course Objectives and Course Outcomes

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: The primary objectives of this course are 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,detect and assess adverse drug reactions
6. appreciate the concept of Rational drug therapy

Course Outcomes (COs): At completion of this course it is expected that the students will be able to

CO 1 : Demonstrate knowledge and ability to use principles of hospital,community and clinical pharmacy for health promotion.

CO 2 : Apply knowledge of drug distribution methods in hospital in the practice of pharmacy.

CO 3 : Exhibit professional ethics and ensure appropriate medication use by the public.
CO 4 : Deliver pharmaceutical care services like patient counseling using the best evidence.
CO 5 : Apply principles of drug store management and inventory control to medication use.

LECTURE PLAN – Abstract

Sessional	No. of Hours of Didactic Lecture	No of Hours of other Activities	Total No. of Lecture Hours
I	24	2	26
II	21	2	23
Total No. of Hours	45	04	49

I SESSIONAL : 24 Lectures + 2 Activities

Lecture No.	Lecture Details	Hours
UNIT-1		**(10)**
a) Hospital and it's organization		
	Orientation to the subject	
1.	Definition, Classification of hospital- Primary, Secondary and Tertiary hospitals, Classification based on clinical and non- clinical basis	**02**
2.	Organization Structure of a Hospital, and Medical staffs involved in the hospital and their functions	
b) Hospital pharmacy and its organization		
1.	Definition, functions of hospital pharmacy, Organization structure	
2.	Location, Layout and staff requirements, and Responsibilities and functions of hospital pharmacists	**02**
c) Adverse drug reaction		
1.	Classifications - Excessive pharmacological effects, secondary pharmacological effects, idiosyncrasy, allergic drug reactions, genetically determined toxicity, toxicity following sudden withdrawal of drugs	**04**
2.	Drug interaction- beneficial interactions, adverse interactions, and pharmacokinetic drug interactions	
3.	Methods for detecting drug interactions, spontaneous case reports and record linkage studies	
4.	Adverse drug reaction reporting and management.	
d) Community Pharmacy		
1.	Organization and structure of retail and wholesale drug store, types and design.	**02**
2.	Legal requirements for establishment and maintenance of a drug store, Dispensing of proprietary products, maintenance of records of retail and wholesale drug store.	
UNIT-2		**(10)**

a) Drug distribution system in a hospital		**03**
1.	Dispensing of drugs to inpatients, types of drug distribution systems	
2.	Charging policy and labelling, Dispensing of drugs to ambulatory patients	
3.	Dispensing of controlled drugs.	
b) Hospital formulary		**02**
1.	Definition, contents of hospital formulary	
2.	Differentiation of hospital formulary and Drug list, preparation and revision, and addition and deletion of drug from hospital formulary.	
c) Therapeutic drug monitoring		**02**
1.	Need for Therapeutic Drug Monitoring,Indian scenario	
2.	Factors to be considered during the Therapeutic Drug Monitoring	
d) Medication adherence		**01**
1.	Causes of medication non-adherence, pharmacist role in the medication adherence, and monitoring of patient medication adherence	
e) Patient medication history interview		**01**
1.	Need for the patient medication history interview, medication interview forms.	
f) Community pharmacy management		**01**
1.	Finance,materials, staff, and infrastructure requirements.	
UNIT-3		**(10)**
a) Pharmacy and therapeutic committee		**02**
1.	Organization, functions, Policies of the pharmacy and therapeutic committee in the formulary drug classification	
2.	Inpatient and outpatient prescription, automatic stop order, and emergency drug list preparation.	
b) Drug information services		**02**
1.	Drug and Poison information centre.	
2.	Sources of drug information, Computerised services, and storage and retrieval of information.	
Activity1	MCQ Test – (Unit 1& 3)	
Activity1	MCQ Test – (Unit 2)	

II SESSIONAL : 21 Lectures + 2 Activities

Lecture No.	Lecture Details	Hours
c) Patient counseling		
1.	Definition and steps involved in patient counseling	
2.	Special cases that require the pharmacist	**02**
d) Education and training program in the hospital		
1.	Role of pharmacist in the education and training program, Internal and external training program	**02**
2.	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		
1.	Prescribed medication order- interpretation and legal requirements	
2.	Communication skills- communication with prescribers and patients.	**02**
UNIT-4		**(08)**
a) Budget preparation and implementation		
1.	Budget preparation and implementation	**01**
b) Clinical Pharmacy		
1.	Introduction to Clinical Pharmacy, Concept of clinical pharmacy.Functions and responsibilities of clinical pharmacist	
2.	Drug therapy monitoring - medication chart review, clinical review. Pharmacist intervention	**05**
3.	Medication history	
4.	Ward round participation	
5.	Pharmaceutical care.	
c) Over the counter (OTC) sales		
1.	Introduction and sale of over the counter medications	**02**
2.	Rational use of common over the counter medications.	
UNIT-5		**(07)**
a) Drug store management and inventory control		
1.	Organization of drug store, types of materials stocked,stocking and storage conditions.	
2.	Purchase and inventory control: principles, purchase procedure, purchase order, procurement	**03**
3.	Economic order quantity, Reorder quantity level, and Methods used for the analysis of the drug expenditure	
b) Investigational use of drugs		
1.	Description, principles involved, classification, control, identification, role of hospital pharmacist, advisory committee.	**01**
c) Interpretation of Clinical Laboratory Tests		
1.	Blood chemistry	
2.	Hematology	**03**

3.	Urinalysis	
Activity-1	MCQ Test (3,4 & 5)	
Activity-2	Revision Test	

Text Books

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, 1 st 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)

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Name of the Subject	Industrial Pharmacy II (Theory)
Name of the Faculty	Mr. Murugappan M , M.Pharm
Designation, Department	Lecturer, Department of Pharmaceutics
Mobile Number	+91 97900 30215
e-Mail i.d.	murugappan92@jssuni.edu.in

Scope, Course Objectives and Course Outcomes

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 Outcomes (COs): At completion of this course it is expected that the students will be able to

CO 1 : Understand the real time work flow of pharmaceutical manufacturing sector
CO 2 : Face and manage regulatory audit processing
CO 3 : Implement quality management systems in Pharmaceutical industry
CO 4 : Submit regulatory application for GMP approval

CO 5 : Design pharmaceutical manufacturing unit starting from pilot plant to storage area

LECTURE PLAN – Abstract

Sessional	No. of Didactic Lecture	No of Hours of other Activities	Total No. of Lecture Hours
I	23	4	27
II	22	3	25
Total No. of Hours	45	07	52

I SESSIONAL : 23 Lectures + 4 Activities

Lecture No.	Lecture Details	Hours
Unit -1 :Pilot plant scale up techniques		**(10)**
	Orientation to the Subject	**10**
1.	**Pilot Plant Scale-up technique** – General Considerations – including significance of personnel requirements	
2.	**Pilot Plant Scale-up technique** – General Considerations – including significance of personnel requirements(Cont...)	
3.	Space requirements, Raw materials	
4.	Pilot plant scale-up consideration for solid, liquid orals, semisolids and relevant documentation	
5.	Pilot plant scale-up consideration for solid, liquid orals, semisolids and relevant documentation (Cont...)	
6.	Pilot plant scale-up consideration for solid, liquid orals, semisolids and relevant documentation (Cont…)	
7.	SUPAC guidelines	
8.	SUPAC guidelines (Cont…)	
9.	SUPAC guidelines (Cont…)	
10.	Introduction to platform technology	
Unit – 2: Technology development and transfer		**(10)**

1.	**Technology development and Transfer –** WHO guidelines of Tech-Transfer TT, Terminology, Tech transfer Protocol		
2.	**Technology development and Transfer –** WHO guidelines of Tech-Transfer TT, Terminology, Tech transfer Protocol		
3.	Quality Risk Management, Transfer from R & D to production (Process, Packaging and Cleaning)		
4.	Granularity of TT Process (API, Excipients, Finished Products, Packaging Materials) Documentation		
5.	Premises and equipment, qualification and validation	**10**	
6.	Quality Control, Analytical Method transfer		
7.	Approved regulatory bodies and agencies		
8.	Commercialization – Practical aspects and problems (Case studies)		
9.	TT Agencies in India – APCTD, NRDC, TIFAC, BC1L, TBSE/SIDBI		
10.	TT Related documentation – confidentiality agreement, licensing, MoUs, legal issues		
Unit – 3: Regulatory affairs and Regulatory requirements for drug approval		**(10)**	**II SESSIONAL : 22 Lectures + 3 Activities**
1.	**Regulatory Affairs –** Introduction, Historical		
2.	Overview of Regulatory Authorities	**3**	
3.	Role of Regulatory Affairs department, Responsibility of RA Professionals		
Activity -1	MCQ Test		
Activity -2	MCQ Test		
Activity- 3	MCQ Test		
Activity- 4	MCQ Test		
Lecture No.	**Lecture Details**	**Hours**	
Unit – 3: Regulatory affairs and Regulatory requirements for drug approval (Cont...)		**(10)**	
1.	**Regulatory requirements for drug approval:** Drug development teams, Non- Clinical Drug development		
2.	Pharmacology, Drug metabolism and toxicology		
3.	General Considerations of IND Application, Investigator's Brochure	**7**	
4.	NDA, Clinical Research / BE Studies		
5.	Clinical Research Protocols		
6.	Biostatistics in Pharmaceutical Product development		
7.	Data Presentation for FDA Submissions, Management of Clinical Studies.		
Unit – 4: Quality management systems		**(8)**	

1.	Quality management & Certifications: Concept of Quality	**8**
2.	Total Quality Management, Quality by Design (QbD)	
3.	Six Sigma concept, Out of Specifications (OOS),	
4.	Change control	
5.	Introduction to ISO 9000 series of quality systems standards, ISO 14000	
6.	Introduction to ISO 9000 series of quality systems standards, ISO 14000(Cont...)	
7.	NABL	
8.	GLP	
Unit – 5: Indian Regulatory Requirement		**(7)**
1.	**Indian Regulatory Requirements** : Central Drug Standard Control Organization (CDSCO) and State licensing authorities, Responsibilities	**7**
2.	**Indian Regulatory Requirements** : Central Drug Standard Control Organization (CDSCO) and State licensing authorities, Responsibilities (Cont…)	
3.	**Indian Regulatory Requirements** : Central Drug Standard Control Organization (CDSCO) and State licensing authorities, Responsibilities (Cont…)	
4.	Certificate of Pharmaceutical Product (COPP)	
5.	Certificate of Pharmaceutical Product (COPP)	
6.	Regulatory requirements and approval procedures for new drugs	
7.	Regulatory requirements and approval procedures for new drugs	
Activity-1	MCQ Test	
Activity-2	MCQ Test	
Activity- 3	MCQ Test	

Text Books

7. Pilot Plants and Scale-Up By, W. HOYLE
8. The Art & Science of Technology Transfer; By Phyllis L. Speser.
9. Pharmaceutical Regulatory Affairs: An Introduction for Life Scientists, By CF Harrison

Reference Books

6. International Regulatory Affairs Updates, 2005. available at http://www.iraup.com/about.php
7. Douglas J Pisano and David S. Mantus. Text book of FDA Regulatory Affairs A Guide for Prescription Drugs, Medical m

8. Devices, and Biologics' Second Edition.
9. Regulatory Affairs brought by learning plus, inc. available at http.//www.cgmp.com/ra.htm.Remington's Pharmaceutical Sciences, By Mack Publishing Company, Pennsylvnia

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Name of the Subject	Novel Drug Delivery Systems (Theory)
Name of the Faculty	Dr. N. Venkatesh, M.Pharm., Ph.D
Designation, Department	Associate Professor, Department of Pharmaceutics
Mobile Number	+91 89031 23467
e-Mail i.d.	nagasamyvenkatesh@jssuni.edu.in

Scope, Course Objectives and Course Outcomes

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

- To understand various approaches for development of novel drug delivery systems.

- To understand the criteria for selection of drugs and polymers for the development of Novel drug delivery systems, their formulation and evaluation

Course Outcomes (COs): At completion of this course it is expected that the students will be able to

CO 1 : Define the basic concepts in novel drug delivery systems
CO 2 : To study various properties for sustained and controlled drug delivery systems.
CO 2: To study formulation and evaluation of various controlled drug delivery system.
CO 3: To learn mucosal and transdermal drug delivery.
CO 4: To study targeted delivery such as nanoparticles, liposome and neosomes.
CO 5: To study the monoclonal antibody and IUCD.

LECTURE PLAN – Abstract

Sessional	No. of Didactic Lecture	No of Hours of other Activities	Total No. of Lecture Hours
I	23	4	27
II	22	3	25
Total No. of Hours	45	07	52

I SESSIONAL : 23 Lectures + 4 Activities

Lecture No.	Lecture Details	Hours
Unit -1 : Controlled drug delivery systems:		**(10)**
	Orientation to the Subject	
1.	Introduction, terminology/definitions and rationale for CDDS	
2.	Advantages, disadvantages of CDDS	
3.	Selection of drug candidates	
4.	Approaches to design controlled release formulations based on diffusion principles	

5.	Approaches to design controlled release formulations based on dissolution and ion exchange principles.	**10**	
6.	Physicochemical and biological properties of drugs relevant to controlled release formulations		
7.	Polymers: Introduction, classification and properties		
8.	Advantages and application of polymers formulation		
9.	Formulation of controlled release drug delivery systems.		
10.	Formulation of controlled release drug delivery systems.		
Unit – 2: Microencapsulation		**(10)**	
1.	Introduction, terminology/definitions and rationale for CDDS		**II SESSIONAL : 22 Lectures + 3 Activities**
2.	Advantages, disadvantages of CDDS		
3.	Selection of drug candidates		
4.	Approaches to design controlled release formulations based on diffusion principles		
5.	Approaches to design controlled release formulations based on dissolution and ion exchange principles.	**10**	
6.	Physicochemical and biological properties of drugs relevant to controlled release formulations		
7.	Polymers: Introduction, classification and properties		
8.	Advantages and application of polymers formulation		
9.	Formulation of controlled release drug delivery systems.		
10.	Formulation of controlled release drug delivery systems.		
Unit-3: Transdermal Drug Delivery Systems		**(10)**	
3.	Introduction, Permeation through skin, factors affecting permeation		
4.	Permeation enhancers, basic components of TDDS, formulation approaches	**3**	
5.	Gastroretentive drug delivery systems: Introduction, advantages, disadvantages, approaches for GRDDS		
Activity -1	MCQ Test		
Activity -2	MCQ Test		
Activity- 3	MCQ Test		
Activity- 4	MCQ Test		
Lecture No.	**Lecture Details**	**Hours**	
Unit-3: Transdermal Drug Delivery System		**(10)**	

6.	Introduction, Permeation through skin, factors affecting permeation	
7.	Permeation enhancers, basic components of TDDS, formulation approaches	
8.	Gastroretentive drug delivery systems: Introduction, advantages, disadvantages, approaches for GRDDS	**7**
4.	Floating, high density systems,	
5.	Inflatable and gastroadhesive systems and their applications	
6.	Nasopulmonary drug delivery system - Introduction to Nasal route of drug delivery	
7.	Nasopulmonary drug delivery system - Introduction to Pulmonary routes of drug delivery	
Unit-4: Targeted drug Delivery		**(8)**
6.	Concepts and approaches	
7.	Advantages and disadvantages	
8.	Introduction to liposomes	**8**
9.	Introduction to niosomes	
10.	Introduction to nanoparticles	
11.	Introduction to monoclonal antibodies	
12.	Applications	
Unit-5	**Ocular Drug Delivery Systems:**	
1.	Introduction, intra ocular barriers	
2.	Methods to overcome intra ocular barriers –Preliminary study	
3.	Ocular formulations	
4.	Ocuserts	
5.	Intrauterine Drug Delivery Systems: Introduction	**7**
6.	Intrauterine Drug Delivery Systems: Introduction, advantages and disadvantages	
7.	Development of intra uterine devices (IUDs) and applications	
8.	Discussion on how to face examination	
Activity-1	MCQ Test	
Activity-2	MCQ Test	
Activity- 3	MCQ Test	

Text Books

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 WileyInterscience Publication, John Wiley and Sons, Inc, New York. Chichester/Weinheim.
3. N.K. Jain, Controlled and Novel Drug Delivery, CBS Publishers & Distributors,New Delhi, First edition 1997 .
5. S.P. Vyas and R.K. Khar, Controlled Drug Delivery -concepts and advances,VallabhPrakashan, 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

SEM VIII

Name of the Subject	Biostatistics and Research Methodology
Name of the Faculty	Mr. C Jayakumar. MCA., M.Phil., B.Ed., PGDCA., FCED
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Scope, Course Objectives and Course Outcomes

Scope: This course is designed to impart knowledge and skills necessary for understanding the basic concepts, terms and definitions used in biostatistics and health research methodology

Objectives: The primary objectives of this course are to

4. Select a relevant research topic based on contemporary literature and apply Biostatistics concepts.
5. Compare basic quantitative (observational and experimental) study designs, understand their advantages, disadvantages and select the best for a specific research question.
6. Compute, apply and interpret results based on findings,.
7. Test the hypothesis and apply research questions to interpret the results
8. Use design experiments to evaluate the complex methodologies for optimum solutions

Course Outcomes (COs): At completion of this course it is expected that the students will be able to

Course Outcomes (COs): At completion of this course it is expected that the students will be able to

CO 1 : Develop the ability to apply the methods while working on a research project work using DOE
CO 2 : Describe the appropriate statistical methods required for a particular research design
CO 3 : Choose the appropriate research design and develop appropriate research hypothesis for a research project with the help of Biostatistics and Design of experiments
CO 4 : Develop a appropriate framework for research studies using Design experiments

LECTURE PLAN – Abstract

Sessional	No of Hours of other Activities	Total No. of Lecture Hours
I	3	30
II	2	15
Total No. of Hours	5	45

I SESSIONAL : 30Lectures + 3 Activities

Lecture No.	Lecture Details	Hours
Unit -1: INTRODUCTION TO BIOSTATISTICS		
13.	Definition of Statistiics , Biostatistics and basic terms with respect to Biostatistics	**(10)**
14.	Frequency distribution, definition, types of frequency distributions	
15.	Measures of Central tendency : Mean, types of mean, sums related to mean	
16.	Measures of Central tendency : Median, properties, sums related to median	
17.	Measures of Central tendency : Mode, properties, sums related to mode	
18.	Measures of Dispersion: range, Standard deviation, Pharmaceutical problems	
19.	Correlation: Definition, Karl pearson's coefficient of correlation, sums	
20.	Rank correlation: Spearman's rank correlation, sums	
21.	Multiple correlation, Pharmaceutical excamples	
22.	Pharmaceutical examples and sums	

Unit-2: REGRESSION		**(10)**
23.	Curve fitting by the method of least squares, fitting the lines y= a + bx and x= a +by	**(10)**
24.	Multiple regression, Standard Error of regression, Examples	
25.	Definition of probability, binomial , Normal, Poisson's distribution and properties	
26.	Problems related to Probability, binomial distributions	
27.	Problems related Normal and Poisson's distributions	
28.	Testing the hypothesis, introduction, definitions	
29.	Parametric tests, sample t test, pooled t test	
30.	Paired t test, properties and simple sums	
31.	One way and two way ANOVA	
32.	Least significance difference	
Unit-3: Non Parametric Tests, Introduction to Research		**(10)**
		(10)
33.	Wilcoxon Rank sum Test, Mann-Whitney U test	
34.	Kruskal Wallis Test, Friedman Test	
35.	Need for research, need for design of experiments, experiential design technique	
36.	Graphs, histogram, pie chart, cubic graph, Response surface graph	
37.	Contour plot and designing the methodology	
38.	Sample size determination and power of study	
39.	Report wrting and presentation of data, protocol	
40.	Cohort studies, observational studies and Experimental studies	
41.	Designing clinical trial	
42.	Various phases of designing clinical trial	
Activity-1	Unit test 1	
Activity-2	Unit test 2	
Activity-3	Revision test	

II SESSIONAL : 15 Lectures + 2 Activities

Lecture No.	Lecture Details	Hours
Unit -4: DESIGN OF EXPERIMENTS		**(08)**
31.	Blocking and confounding system for Two-level factorials Regression modeling	**(08)**
32.	Hypothesis testing in simple and Multiple regression model	
33.	Introduction to practical components of industrial and clinical trials problems	
34.	Statistical analysis using Excel	
35.	Statistical analysis using SPSS	
36.	Statistical analysis using MINITAB	
37.	Statistical analysis using R language	
38.	Online statistical software's to industrial and clinical trial approach	
Unit-5: DESIGN AND ANALYSIS OF EXPERIMENTS		**(07)**
39.	Factorial designs, definition, 2 x 2 and 2 x 3 design	**(07)**
40.	Advantages of factorial design	
41.	Response surface methodology, use and properties	
42.	Central composite design	
43.	Historical design introduction	
44.	Histrorical design	
45.	Optimization techniques	
Activity-1	Unit test 1	
Activity-2	Unit test 2	

Reference books

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

Name of the Subject	**Social and Preventive Pharmacy (Theory)**
Name of the Faculty	Dr. Sivasankaran PONNUSANKAR M.Pharm., Ph.D
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e-Mail i.d.	drsponnusankar@jssuni.edu.in

Scope, Course Objectives and Course Outcomes

Scope: This course is designed to introduce the students a number of health issues and their challenges; a number of national health programs and the role of pharmacists in these context.

Objectives: The primary objectives of this course are to

1. Discuss the various helath issues / drug related issues / pharmaceutical problems in the country
2. Discuss the challenges involved in health issues of the country and worldwide
3. Help the students to think on curret healthcare development
4. Help the students to understand drug related problems /issues (DRP) and resolve it
5. Enable the students to apply /evaluate alternative ways of solving problems related to health and pharmaceutical issues

Course Outcomes (COs): At the successful completion of this course it is expected that the students shall be able to

CO 1: Acquire high consciousness / realization of current issues related to health and pharmaceutical problems within the contry and worldwide
CO 2: Have a crtical way of thinking based on current healthcare development
CO 3: Evaluated alternative ways of solving problems related to health and pharmaceutical issues

LECTURE PLAN – Abstract

Sessional	Number of Hours of Didactic Lecture	No of Hours of other Activities	Total Number of Lecture Hours
I	23		23
II	22		22
Total No. of Hours	45		45

I SESSIONAL : 23 Lectures

Lecture No.	Lecture Details	Hours
Unit-1: Concept of helath and disease		**10**
1.	Definition, concepts and evalution of public health	
2.	Concept of prevention and control of disease	
3.	Social causes of disease and social problems of the sick	
Social and Healhth Education		
4.	Food in relation to nutrition and health & Balanced diet	
5.	Nutritional deficiencies and vitamin deficiencies	
6.	Malnutrion and its prevention	
Sociology and health		
7.	Socio cultural factors related to health and disease	
8.	Impact of urbanization on health and disease / poverty and health	
Hygiene and health		
9.	Personal hygient and health	
10.	Avoidable habits	
Unit – 2: Preventive Medicine		**10**
1.	Genreal principles and prevention of control of disease	
2.	Cholera / SARs	
3.	Ebola virus / Influenza	
4.	Acute respiratory infections	
5.	Malaria, Dengue and Chicken Guinea	
6.	Lymphatic Filariasis and Pneumonia	
7.	Hypertension	

8.	Diabetes mellitus	
9.	Cancer	
10.	Drug addiction – drug substance abuse	
Unit – 3: National health programs, its objectives, functioning and outcome (Part -1)		**05**
1.	HIV and AIDS control program	
2.	Tuberculosis (TB)	
3.	Integrated Disease Surveillance Program (IDSP)	
4.	National Leprosy Control Program (NLCP)	
5.	National mental health program (NMHP)	

II SESSIONAL : 25 lectures

Lecture No.	Lecture Details	Hours
Unit-3: National Health programs, its objectives, functioning and outcomes – Part 2		**06**
1.	National Program for prevention and control of deafness	
2.	Universal Immunization Program (UIP)	
3.	Universal Immunization Program (UIP)	
4.	National Program for Control of Blindness (NPCB)	
5.	Pulse Polio Program (PPP)	
Unit -4: National Health Intervention Program		**08**
1.	National Health Intervention Program for mother and child	
2.	National Family Welfare Program (NFWP)	
3.	National Tobacco Control Program (NTCP)	
4.	National Malaria Prevention Program	
5.	National Malaria Prevention Program	
6.	National Program for the healthcare of the elderly	
7.	Social health program (State and Central Govt)	
8.	Role of WHO in Indian National program	
Unit – 5: Community Services in Rural, Urban and School Health		**07**
1.	Community services in rural, urban and school health	
2.	Functions of Primary Health Center (PHC)	

3.	Improvement in rural sanitation	
4.	Improvement in rural sanitation	
5.	National Urban Health Mission (NUHM)	
6.	Health promotion in school	
7.	Health 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

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Name of the Subject	Pharmaceutical Marketing (Theory)
Name of the Faculty	Dr. Jeyaprakash MR M.Pharm., Ph.D
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Scope, Course Objectives and Course Outcomes

Scope: The pharmaceutical industry not only needs highly qualified researchers, chemist, 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. Sales & Marketing which grooms the people for taking a challenging role in Sales and Product management.The career in product management starts from having hands on experience in sales and marketing only.

Objectives: The primary objectives of this course are to

1. The course aim is to provide an understanding of marketing concepts and techniques and the application of the same for the pharmaceutical Marketing sector.
2. It develos the idea an impact of intellectual property rights in pharma product
3. It creates idea about government and requlatory procedure to fix the prices
4. The subject content also kick off the learing procedure to sales representative in the upgradations of soft and communications skills.

Course Outcomes (COs): At completion of this course it is expected that the students will be able to

CO 1: To understand the difference between marketing and selling and its research procedure

CO2: Classification of different types Product and its life cycle analysis.
CO3: Different types of promotional procedure for products
CO4: Channal of distributions and roles and responsibilities of PSR
CO5: Pricing methodology and global marketing procedure.

LECTURE PLAN – Abstract

Sessional	No. of Hours of Didactic Lecture Pharmaceutical Quality Assurance	No of Hours of other Activities	Total No. of Lecture Hours
I	20	04	24
II	25	04	29
Total No. of Hours	45	08	53

I SESSIONAL : 31 Lectures + 2 Activities

Lecture No.	Lecture Details	Hours
Unit 1: Marketing & Pharmaceutical market		**10**
1	Definition, general concepts, and scope of marketing	
2	Distinction between marketing & selling; Marketing environment	
3	Industry and competitive analysis	
4	Analyzing consumer buying behavior; industrial buying behavior	
5	Quantitative and qualitative aspects of Pharmaceutical market	
6	size and composition of the market; demographic descriptions and socio-psychological characteristics of the consumer	
7	market segmentation& targeting, Consumer profile	
8	Motivation and prescribing habits of the physician	
9	patients' choice of physician and retail pharmacist	
10	Analyzing the Market;Role of market research.	
11	Assignment 1	**02**

Unit 2: Product decision		**10**
1	Meaning, Classification of Product	
2	Product line	
3	Product mix decisions	
4	Product life cycle	
5	Product portfolio analysis	
6	Product positioning	
7	New product decisions	
8	Product branding	
9	Packaging and labeling decisions	
10	Product management in pharmaceutical industry	
11	Assignment 2	**02**

II SESSIONAL : 25 Lectures + 3 Activities

Lecture No.	Lecture Details	Hours
Unit-3: Promotion		**10**
1	Meaning and methods	
2	determinants of promotional mix	
3	Promotional budget	
4	An overview of personal selling	
5	Journals	
6	Sampling	
7	Retailing	
8	medical exhibition	
9	public relations	
10	online promotional techniques for OTC Products	
	Assignment 3	**02**
Unit 4: Pharmaceutical marketing channels & Professional sales representative (PSR)		**08**
1	Designing channel, channel members	
2	Selecting the appropriate channel	
3	Conflict in channels, Physical distribution management	

4	Strategic importance, tasks in physical distribution management	
5	Duties of PSR	
6	Purpose of detailing, selection and training, supervising	
7	Norms for customer calls, Motivating, evaluating	
8	Compensation and future prospects of the PSR	
9	Assignment 4	
Unit 5: **Pricing & Emerging concepts in marketing**		**07**
1	Meaning, importance, objectives, determinants of price	
2	pricing methods and strategies	
3	Issues in price management in pharmaceutical industry	
4	An overview of DPCO (Drug Price Control Order)	
5	NPPA (National Pharmaceutical Pricing Authority).	
6	Vertical & Horizontal Marketing; Rural Marketing	
7	Consumerism; Industrial Marketing Global Marketing	
8	Assignment 5	**02**

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.

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Name of the Subject	Pharmaceutical Regulatory Science (BP804ET)
Course/ Semester	B.Pharm, Vth Semester
Name of the Faculty	Dr Vivek Reddy
Designation, Department	Lecturer, Pharmaceutics
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Scope, Course Objectives and Course Outcomes

Scope: This course is designed to impart the fundamental knowledge on the regulatory requirements for approval of new drugs, drug products in regulated countries like US, EU, Japan, Australia and Canada. It prepares the students to learn in detail on the regulatory requirements, documentation requirements, and registration procedures for marketing the drug products in regulated countries.

Objectives: Upon completion of the course the 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 Outcomes (COs): At completion of this course it is expected that the students will be able to

CO1: To know the process of drug discovery, development and generic product development

CO2: Describe the regulatory approval process and registration procedures for API and drug products in various countries

CO3: Learn the basic understanding of regulations of India with other global regulated markets

CO4: To know the basic understanding of developing clinical trial protocols

CO5: To Understand the concept of pharmacovigilance and its significance

CO6: Explain the Registration of Indian drug product in overseas market

LECTURE PLAN – Abstract

Sessional	No. of Hours of Didactic Lecture	No of Hours of other Activities	Total No. of Lecture Hours
I	23	3	23
II	22	3	22
Total No. of Hours	45	6	51

LECTURE PLAN

I SESSIONAL 23 Lectures+ 3 Activities

Lecture No.	Lecture Details	
UNIT-1	New Drug Discovery and development (10)	**Hours**
1.	Introduction	10
2.	Stages of drug discovery.	
3.	Drug development process, pre-clinical studies	
4.	non-clinical activities, clinical studies	
5.	Concept of generics, Innovator and generics,	
6.	Generic drug product development	
UNIT-2	Regulatory Approval Process (10)	10
7.	Introduction-Approval processes	
8.	Approval processes and timelines involved in Investigational New Drug (IND)	
9.	New Drug Application (NDA)	
10.	Abbreviated New Drug Application (ANDA)	
11.	Changes to an approved NDA / ANDA.	
12.	Regulatory authorities and agencies-India, United States, European Union	
13.	Regulatory authorities and agencies- Australia, Japan, Canada	

Activity1	MCQ Test	
Activity2	MCQ Test	
UNIT-3 Registration of Indian drug product in overseas market (10)		
14.	Introduction	03
15.	Procedure for export of pharmaceutical products,	
16.	Technical documentation, Drug Master Files (DMF)	
17.	Common Technical Document (CTD),	
Activity 3 MCQ Test		

II SESSIONAL : 22 Lectures + 3 Activities

18.	electronic Common Technical Document (eCTD)	02
19.	ASEAN Common Technical Document (ACTD)research	
UNIT-4 Clinical trials (10)		
20.	Developing clinical trial protocols	10
21.	IRB / Independent Ethics committee - formation and working procedures	
22.	Informed consent process and procedures,	
23.	GCP obligations of Investigators, sponsors & Monitors	
24.	Managing and Monitoring clinical trials,	
25.	Pharmacovigilance - safetymonitoring in clinical trials	
UNIT-5 Regulatory Concepts (10)		
26.	Introduction- Regulatory Concepts	10
27.	Basic terminology	
28.	guidance, guidelines, regulations	
29.	Laws and Acts	
30.	Orange book,	
31.	Federal Register	
32.	Code of Federal Regulatory, Purple book	
Activity1	MCQ Test	
Activity1	MCQ Test	
Activity1	MCQ Test	

Recommended Books: (Latest Editions)

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 / SandyWeinberg. 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

Name of the Subject	Pharmacovigilance (Theory)
Name of the Faculty	Dr. Keerthana D
Designation, Department	Lecturer, Department of Pharmacy Practice
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Scope, Course Objectives and Course Outcomes

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. Importance of drug safety monitoring
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

Course Outcomes (COs): At completion of this course it is expected that the students will be able to:

- Search, compile, analyse and evaluate reports about adverse drug reactions in scientific literature and databases.
- Explain the importance of pharmacogenomics for individual variation in adverse drug reactions.
- Analyse methods for pharmacovigilance.
- Analyse and assess warnings, risk management and risk communication about adverse drug reactions.
- Analyse and assess the effects and safety of drugs.
- Give an account for pharmacovigilance from a regulatory perspective.

CO 1 :Demonstrate knowledge and ability to identify,report and monitor adverse drug reactions.
CO 2 : Classify drugs and diseases in individual case safety reports.
CO 3 :Apply pharmacovigilance methods to post marketing surveillance of drugs .
CO 4 :Employ pharmacogenetics to develop personalized medicine.
CO 5 : Recognize regulatory requirements for pharmacovigilance in various countries.

LECTURE PLAN – Abstract

Sessional	No. of Hours of Didactic Lecture	No of Hours of other Activities	Total No. of Lecture Hours
I	23	2	25
II	22	2	24
Total No. of Hours	45	04	49

I SESSIONAL : 23 Lectures + 2 Activities

Lecture No.	Lecture Details	Hours
UNIT-1		**(10)**
c) Introduction to Pharmacovigilance		**03**
	Orientation to the subject	
3.	History and development of Pharmacovigilance ,Importance of safety monitoring of Medicine	
4.	WHO international drug monitoring programme,	
5.	Pharmacovigilance programme of India (PvPI)	
b) Introduction to adverse drug reactions		**05**
5.	Definitions and classification of ADRs	
6.	Detection and reporting	
7.	Methods in Causality assessment	
8.	Severity and seriousness assessment, Predictability and preventability assessment	
9.	Management of adverse drug reactions	
c) Basic terminologies used in pharmacovigilance		**02**
1.	Terminologies of adverse medication related events	
2.	Regulatory terminologies	
UNIT-2		**(10)**
a) Drug and disease classification		
4.	Anatomical, therapeutic and chemical classification of drugs	

5.	International classification of diseases	**04**
6.	Daily defined doses	
7.	International Non -proprietary Names for drugs	
d) Drug dictionaries and coding in pharmacovigilance		**02**
1.	**Drug dictionaries and coding in pharmacovigilance -** WHO adverse reaction terminologies, MedDRA and Standardized MedDRA queries,	
2.	WHO drug dictionary, Eudravigilance medicinal product dictionary	
c) Information resources in pharmacovigilance		**01**
1.	Basic drug information resources, Specialized resources for ADR	
d) Establishing pharmacovigilance programme		**03**
3.	Establishing in a hospital, Establishment & operation of drug safety department in industry	
4.	Contract Research Organisations (CROs)	
5.	Establishing a national programme	
UNIT-3		**(10)**
a) Vaccine safety surveillance		**03**
1.	Vaccine Pharmacovigilance	
2.	Vaccination failure	
3.	Adverse events following immunization	
Activity1	MCQ Test – (Unit 1& 3)	
Activity2	MCQ Test – (Unit 2)	

II SESSIONAL : 22 Lectures + 2 Activities

Lecture No.	Lecture Details	Hours
b) Pharmacovigilance methods		**04**
1.	Passive surveillance – Spontaneous reports and case series.Stimulated reporting	
2.	Active surveillance – Sentinel sites, drug event monitoring and registries	
3.	Comparative observational studies – Cross sectional study, case control study and cohort study	
4.	Targeted clinical investigations	
c) Communication in pharmacovigilance		**03**
1.	Effective communication in Pharmacovigilance	
2.	Communication in Drug Safety Crisis management	
3.	Communicating with Regulatory Agencies, Business Partners, Healthcare facilities & Media	
UNIT-4		**(08)**
a) Statistical methods for evaluating medication safety data		**01**
1.	Statistical methods for evaluating medication safety data	
b) Safety data generation		**01**
1.	Pre -clinical phase, Clinical phase, Post approval phase(PMS)	
c) ICH Guidelines for Pharmacovigilance		**06**
3.	Organization and objectives of ICH	
4.	Expedited reporting ,Post approval expedited reporting	
5.	Individual case safety reports	
6.	Periodic safety update reports	
7.	Pharmacovigilance planning	
8.	Good clinical practice in pharmacovigilance studies	
UNIT-5		**(07)**
a) Pharmacogenomics of adverse drug reactions		**01**
4.	Genetics related ADR with example focusing PK parameters	
b) Drug safety evaluation in special population		**03**
1.	Paediatrics	
2.	Pregnancy and lactation	
3.	Geriatrics	
c) CIOMS		

4.	CIOMS Working Groups, CIOMS Form	**01**
d) CDSCO (India) and Pharmacovigilance		
1.	D&C Act and Schedule Y	**02**
5.	Differences in Indian and global pharmacovigilance requirements	
Activity-1	MCQ Test (3,4 & 5)	
Activity-2	Revision Test	

Text Books

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

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Name of the Subject	Quality Control and Standardization of Herbals
Name of the Faculty	Ms S.Priyadharshini M.Pharm
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Scope, Course Objectives and Course Outcomes

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, the 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

Course Outcomes (COs): At completion of this course it is expected that the students will be able to

CO 1 : Standardize medicinal plant materials and dosage forms according to WHO guidelines

CO 2 : Apply GMP, GAP,GLP, GACP in traditional system of medicine

CO 3 : Understand EU and ICH guidelines for quality control of herbal drugs and Research Guidelines for Evaluating the Safety and Efficacy of Herbal Medicines

CO 4 :Define Stability testing of herbal medicines and also the application of various chromatographic techniques in standardization of herbal products.

CO 5 :To ptepare documents for new drug application and export registration

CO 6 : Understand Regulatory requirements for herbal medicines and various chemical and biological markers required in standardization.

LECTURE PLAN

Sessional	No. of Hours of Didactic Lecture	No of Hours of other Activities	Total No. of Lecture Hours
I	**28**	**02**	**28**
II	**16**	**02**	**16**
Total No. of Hours	**44**	**04**	**44**

I SESSIONAL : 28 lectures + 2 activity

Lecture No.	Lecture Details	Hours
Quality Control and Standardization of Herbals		
Unit-1 – Basic tests for drugs		**09**
1.	Basic tests for Pharmaceutical substances, Medicinal plants materials and dosage forms	
2.	WHO guidelines for quality control of herbal drugs.	
3.	Evaluation of commercial crude drugs intended for use	
4.	**Activity** – Comparing and standardizing commercially available herbal dosage forms	**01**
Unit-2: Quality assurance in herbal drug industry		**09**
10.	Quality assurance in herbal drug industry of cGMP, GAP, GMP and GLP in traditional system of medicine.	
11.	WHO Guidelines on current good manufacturing Practices (cGMP) for Herbal Medicines	
12.	WHO Guidelines on GACP for Medicinal Plants.	
4.	**Activity** – Seminars on standardising medicinal product	**01**
Unit-3 - Guidelines for quality control		

9.	EU and ICH guidelines for quality control of herbal drugs.	**10**
10.	Research Guidelines for Evaluating the Safety and Efficacy of Herbal Medicines	

II SESSIONAL – 16 lectures + 4 activity

Unit-4 - Techniques in standardization of herbal products.		
1.	Stability testing of herbal medicines.Application of various chromatographic techniques in standardization of herbal products..	**08**
2.	Preparation of documents for new drug application and export registration	
3.	GMP requirements and Drugs & Cosmetics Act provisions	
4.	**Activity –** export document preparations	**02**
Unit - 5		
1.	Regulatory requirements for herbal medicines	**08**
2.	WHO guidelines on safety monitoring of herbal medicines in pharmacovigilance systems	
3.	Comparison of various Herbal Pharmacopoeias.	
4.	Role of chemical and biological markers in standardization of herbal products	
5.	**Activity –** Seminars	**02**

Text Books

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.

Reference Books

1. 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.
2. WHO. The International Pharmacopeia, Vol. 2: Quality Specifications, 3rd edn. World Health Organization, Geneva, 1981.
3. WHO. Quality Control Methods for Medicinal Plant Materials. World Health Organization, Geneva, 1999.
4. 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.
5. WHO. Guidelines on Good Agricultural and Collection Practices (GACP) for Medicinal Plants. World Health Organization, Geneva, 2004.

Name of the Subject	Computer Aided Drug Design (Theory)
Name of the Faculty	Dr.Jubie S M.Pharm., Ph.D
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Scope, Course Objectives and Course Outcomes

Scope: This course is designed to provide detailed knowledge of rational drug design process and various techniques used in rational drug design process.

Objectives: The primary objectives of this course are to

9. Design and discovery of lead molecules.
10. The role of drug design in drug discovery process.
11. The concept of QSAR and docking.
12. Various stragegies to develop new drug like molecules.
13. The design of new drug molecules using molecular modeling software.

Course Outcomes (COs): At completion of this course it is expected that the students will be able to

1. Explain the methodology involved in design and discovery of lead molecules.
2. Identify the objectives of QSAR,molecular modeling and virtual screening methods.
3. Discuss the concepts of QSAR and docking.
4. Apply the strategies of drug design to develop new molecules with therapeutic activity.

5. Design new drugs using informatics and databases.

LECTURE PLAN – Abstract

Sessional	No. of Hours of Didactic Lecture	No of Hours of other Activities	Total No. of Lecture Hours
I	23	-	23
II	22	-	22
Total No. of Hours	45	-	45

I SESSIONAL : 23 Lectures

Lecture No.	Lecture Details	Hours (10)
Unit-1: Introduction to Drug Discovery		
1.	Stages of Drug discovery &development	
2.	Rational approaches to drug discovery	
3.	Random screening	
4.	Non random screening	
5.	Serendipitous drug discovery	
6.	Lead discovery based on drug metabolism	**10**
7.	Lead discovery based on clinical observation	
8.	Biosterism & its classification	
9.	Bioisosteric replacement	
10.	Any three Case studies of Bioisosteric replacement	
Unit-2: Quantitative Structure Activity Relationships		
11.	SAR versus QSAR	
12.	History and development of QSAR	
13.	Types of physicochemical parameters	
14.	Experimental and theretical approach-Partition co-efficient	
15.	Experimental and theretical approach-Hammett substituent	
16.	Experimental and theretical approach-Taft's substituent constant	**10**
17.	Hansch Analysis	

18.	Freewilson's analysis	
19.	COMFA Analysis	
10.	COMSIA Anaysis	
Unit-3: Molecular Modeling and Virtual Screening techniques		**03**
1.	Drug likeness screening	
2.	Drug likeness screening-Methods	
3.	Concept of Pharmacophore mapping	

II SESSIONAL : 22 Lectures

Lecture No.	Lecture Details	Hours
Unit-3: Molecular Modeling and Virtual Screening techniques		**07**
1.	Pharmacophore based screening	
2.	Introduction to molecular docking	
3.	Theory involved in molecular docking	
4.	Rigid docking,flexible docking	
5.	Manual based docking	
6.	Docking based screening	
7.	De novo drug design	
Unit-4: Informatics & Methods in drug design		**08**
5.	Introduction to Bioinformatics	
6.	Introduction to Bioinformatics (Cont…)	
7.	Introduction to Cheminformatics	
8.	ADME databases	
9.	ADME databases (Cont…)	
10.	Chemical databases	
11.	Biochemical datatbases	
12.	Pharmaceutical databases	
Unit-5: Molecualar Modeling		
6.	Molecular Mechanics	
7.	Quantum mechanics	
8.	Energy minimization methods	

9.	Conformational analysis	**07**
10.	Conformational analysis (Cont…)	
11.	Global conformational minima determination	
12.	Global conformational minima determination (cont…)	

Text books

1. The Organic Chemistryof the Drug DesignandDrug action byRichard B. Silverman, Elsevier Publishers.
2. Medicinal Chemistry by Burger, Wiley Publishing Co.
3. An Introduction to Medicinal Chemistry –Graham L. Patrick, Oxford University Press.
4. Wilson and Gisvold's Text book of Organic Medicinal and Pharmaceutical Chemistry, Lippincott Williams & Wilkins.
5. Comprehensive Medicinal Chemistry – Corwin and Hansch, Pergamon Publishers.
6. Computational andstructural approaches to drug design edited byRobert M Stroud and Janet. F Moore

Reference books

1. Computational and structural approaches to drug discovery, Robert M Stroud and Janet. F Moore, RCS Publishers.
2. Introduction to Quantitative Drug DesignbyY.C. Martin, CRCPress, 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.

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Name of the Subject	Cell and Molecular Biology (Theory)
Name of the Faculty	Dr. Rajeshkumar R M.Pharm., Ph.D
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Scope, Course Objectives and Course Outcomes

Scope: This course aims to provide detailed information about cell and molecular biology, which is the minimum requirements to conduct research in microbiology and biotechnology. The course covers a range of molecular biology concepts such as transcription, translation, replication, cellular process, genetics, signal transduction etc

Objectives: The primary objectives of this course are to

1. Explain different concept of cell biology
2. Obtain detailed insights into cellular processes
3. Describes different cell pathways
4. Describes how DNA and RNA are involved in cellular processes
5. Get insights into different cell chemistry reactions

Course Outcomes (COs): At completion of this course it is expected that the students will be able to

CO 1 : Gain insight into the cell cycle and mitotic and meiotic cell division
CO 2 : Understand Cell Membrane structure and organization
CO 3 : Get insights on the process of membrane transport and membrane models
CO 4 : Explain Protein structure and general characteristics
CO 5 : Principle of enzyme activity and enzyme inhibition
CO 6 : Describe different cellular metabolic pathways

LECTURE PLAN – Abstract

Sessional	No. of Hours of Didactic Lecture	No of Hours of other Activities	Total No. of Lecture Hours
I	26	03	29
II	19	02	21
Total No. of Hours	45	05	50

I SESSIONAL: 26 Lectures + 3 Activities

Lecture No.	Lecture Details	Hours
Unit-1		**10**
	Orientation to the subject	
1.	Definitions theory and basics and Applications	
2.	History and Summation	
3.	Properties of cells	
4.	Properties of cell membrane.	
5.	Brief on Prokaryotic and Eukaryotic	
6.	Prokaryotic vs Eukaryotic	
7.	Cellular Reproduction in Prokaryotic cell	

8.	Cellular Reproduction in eukaryotic cell	
9.	Chemical Foundations and Reactions Types	
10.	Chemical Foundations and Reactions Types (Cont…)	
Unit-2		
13.	Structure of DNA	
14.	Character of the DNA	
15.	Types of DNA	
16.	DNA Functioning	
17.	Replication of DNA	**10**
18.	Replication of DNA (Cont…)	
19.	Structure and Types of RNA	
20.	Structure and Types of RNA (Cont…)	
21.	Transcription	
22.	Translation	
Unit-3		
20.	Definition and types of amino Acids	
21.	Protein Structure	
22.	Identification and characterisation of proteins	**10**
23.	Identification and characterisation of proteins (Cont…)	
24.	Regularities in Protein Pathways	
25.	Regularities in Protein Pathways (Cont…)	
Activity1	MCQ Test	
Activity2	MCQ Test	
Activity3	MCQ Test	

II SESSIONAL: 19 Lectures + 2 Activities

Lecture No.	Lecture Details	Hours
26.	Cellular Processes	
27.	Cellular Processes (Cont…)	
28.	Cellular Processes (Cont…)	

29.	Significance of Protein Synthesis	
Unit-4		
9.	Science of Genetics	**08**
10.	Science of Genetics (Cont…)	
11.	Transgenics and Genomic Analysis	
12.	Cell Cycle analysis	
13.	Mitosis	
14.	Meiosis	
15.	Cellular Activities and Checkpoints	
16.	Cellular Activities and Checkpoints (Cont…)	
Unit-5		
13.	Cell Signals	**07**
14.	Receptors for Cell Signals	
15.	Signalling Pathways	
16.	Signalling Pathways (Cont…)	
17.	Signalling Pathways (Cont…)	
18.	Misregulation of Signalling Pathways	
19.	Protein-Kinases: Functioning	
Activity-1	MCQ Test	
Activity-2	MCQ Test	

Text Books

1. Probisher, Hinsdill et al: Fundamentals of Microbiology, 9th ed. Japan
2. Pelczar, Chan Kreig, Microbiology, Tata McGraw Hill edn.
3. Essential Cell Biology (4th Edition) by Bruce Alberts, Dennis Bray
4. Cell Biology, Genetics, Molecular Biology (1st Edition) by P.S.Verma

Reference Books

1. HF Lodish, Berk, Arnold, and S. Lawrence Zipursky. Molecular cell biology. Vol. 4. New York: WH Freeman, 2000.
2. Molecular Biology of the Cell (6th Edition) by Bruce Alberts, Alexander Johnson
3. The Cell: A Molecular Approach (7th Edition) Geoffrey M. Cooper, Robert E. Hausman
4. Alberts, Bruce, et al. "Molecular biology of the cell." Garland Science, New York 4 (2002)
5. Brown, Terence A. Genomes. Garland science, 2006.

Name of the Subject	Cosmetic Science (Theory)
Name of the Faculty	Dr. N.Jawahar, M.Pharm., Ph.D
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Scope, Course Objectives and Course Outcomes

Scope: This subject is designed to provide knowledge on cosmetics, and related sciences, cosmeceuticals (cosmetics with skin, hair and oral care benefits) and personal care and hygiene products.

Objectives: Upon completion of the course student shall be able

- This course is designed to provide foundation knowledge of cosmetic principles to addressthe needs of cosmetic industry.
- Provide practical skills in the area of biology, formulation science and analytical techniquesrequired to scientifically design and develop products.

Course Outcomes (COs): At completion of this course it is expected that the students will be able to

CO 1 : know the multidisciplinary scientific knowledge to gain expertise in the field and to respond the industry challenges effectively.

CO 2 : To create a workforce in application of principles of cosmetic science

CO 3: Provide in depth learning in cosmetic science, which will serve as a focus for research into the field of cosmetic scienc

LECTURE PLAN – Abstract

Sessional	No. of Didactic Lecture	No of Hours of other Activities	Total No. of Lecture Hours
I	23	4	27
II	22	3	25
Total No. of Hours	45	07	52

I SESSIONAL : 23 Lectures + 4 Activities

Lecture No.	Lecture Details	Hours
Unit -1 : Introduction to Cosmetics		**(10)**
	Orientation to the Subject	**10**
1.	Classification of cosmetic and cosmeceutical products	
2.	Cosmetic excipients	
3.	Surfactants, rheology modifiers,	
4.	humectants, emollients,	
5.	preservatives- Classification and application	
6.	Skin: Basic structure	
7.	functions of skin	
8.	Basic structure of hair	
9.	Hair growth cycle	

10.	Oral Cavity: Common problem associated with teeth and gums	
Unit – 2: Principles of formulation and building blocks of skin care products		**(10)**
1.	Face wash,Moisturizing cream, Cold Cream,Vanishing cream	**10**
2.	Advantages and disadvantages	
3.	Applications.	
4.	Conditioning shampoo,Hair conditioners	
5.	Antidandruff shampoo, Hair oils.	
6.	Chemistry and formulation of Para-phylene diamine based hair dye	
7.	Formulation and building blocks of oral care products	
8.	Toothpaste for bleeding gums,	
9.	Toothpaste for sensitive teeth	
10.	Teeth whitening, Mouthwash	
Unit-3: Sun protection- Herbal cosmetics- Analtical cosmetics		**(10)**
30.	Sun protection	**3**
31.	Classification of Sunscreens	
32.	SPF	
Activity -1	MCQ Test	
Activity -2	MCQ Test	
Activity- 3	MCQ Test	
Activity- 4	MCQ Test	
Lecture No.	**Lecture Details**	**Hours**
Unit-3: Sun protection- Herbal cosmetics- Analtical cosmetics		**(10)**
33.	Skin Care: Aloe and turmeric	

II SESSIONAL : 22 Lectures + 3 Activities

34.	Hair care: Henna and amla	**7**
35.	Oral care: Neem and clove	
4.	Analytical cosmetics: BIS specification	
5.	Analytical methods for shampoo	
6.	Analytical methods for skin cream	
7.	Analytical methods for Toothpaste	
Unit-4: Cosmetic Regulations and Evaluations		**(8)**
43.	Definition of cosmetics as per Indian and EU regulations	**8**
44.	Evolution of cosmeceuticals from cosmetics	
45.	Cosmetics as quasi and OTC drugs	
46.	Principles of sebumeter	
47.	Principles of corneometer	
48.	Measurement of TEWL, Skin Color	
49.	Hair tensile strength, Hair combing properties	
50.	Soaps,and syndet bars. Evolution and skin beneits.	
Unit-5	**Skin and Hair Problems- Deodrants and Antiperspirants**	
9.	Soaps,and syndet bars. Evolution and skin beneits.	**7**
10.	Oily and dry skin	
11.	Causes leading to dry skin-skin moisturisation	
12.	Basic understanding of the terms Comedogenic, dermatitis.	

13.	Cosmetic problems associated with Hair and scalp	
14.	Dandruff, Hair fall causes	
15.	skin: blemishes, wrinkles, acne, prickly heat and body odor.	
16.	Antiperspirants and Deodorants- Mechanism of action	
Activity-1	MCQ Test	
Activity-2	MCQ Test	
Activity- 3	MCQ Test	

Text Books :

- Harry's Cosmeticology, Wilkinson, Moore, Seventh Edition, George Godwin.
- Cosmetics – Formulations, Manufacturing and Quality Control, P.P. Sharma, 4th Edition, Vandana Publications Pvt. Ltd., Delhi.
- Text book of cosmelicology by Sanju Nanda & Roop K. Khar, Tata Publishers.

Name of the Subject	Experimental Pharmacology (Elective)
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Scope, Course Objectives and Course Outcomes

Scope: This subject is designed to impart the basic knowledge of preclinical studies in experimental animals including design, conduct and interpretations of results.

Course Outcomes (COs): At completion of this course it is expected that the students will 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 research methodology
- Design and execute a research hypothesis independently

LECTURE PLAN – Abstract

Sessional	No. of Hours of Didactic Lecture	No of Hours of other Activities	Total No. of Lecture Hours
I	28	2	30
II	21	4	25
Total No. of Hours	49	06	55

I SESSIONAL: 28 Lectures + 2 Activity

Lecture No.	Lecture Details	Hours
Unit-1: Laboratory Animals		**08**
1.1	Study of CPCSEA and OECD guidelines for maintenance	
1.2	Breeding and conduct of experiments on laboratory animals	
1.3	Common lab animals: Description and applications of different species and strains of animals.	
1.4	Popular transgenic and mutant animals	

1.5	Techniques for collection of blood	
1.6	Common routes of drug administration in laboratory animals	
1.7	Techniques of blood collection	
1.8	Anaesthesia & Euthanasia	
Unit-2: Introduction to Preclinical screening & Screening Models -1		
2.1	Introduction: Dose selection, calculation and conversions	
2.2	Preparation of drug solution/suspensions, grouping of animals	
2.3	Importance of sham negative and positive control groups	
2.4	Rationale for selection of animal species and sex for the study	**10**
2.5	Screening of Antiasthmatics	
2.6	Screening of Nootropics & Alzheimer's disease	
2.7	Screening of Anti-Parkinson drugs & Antipsychotics	
2.8	Screening of analgesic, antipyretic, anti-inflammatory drugs	
2.9	Screening of General anaesthetics, Sedative and Hypnotics, Antidepressants	
2.10	Screening of antiepileptics	
Unit-3, Screening Models -2		**06**
3.1	Sympathomimetics-1	
3.2	Sympathomimetics-2	
3.3	Sympatholytics-1	
3.4	Sympatholytics-2	
3.5	Parasympathomimetics-1	

3.6	Parasympathomimetics-2	
Activity-1	Test -1	
Activity-2	Test -2	

II SESSIONAL: 21 Lectures + 4 Activities

Lecture No.	**Lecture Details**	**Hours**
Unit-3, Screening Models -2		**04**
3.7	Parasympatholytics-1	
3.8	Parasympatholytics-2	
3.9	Skeletal muscle relaxants	
3.10	Drugs acting on eye	
Unit- 4, Screening Models -3		**10**
4.1	Antihypertensive drugs	
4.2	Diuretics	
4.3	Anti-arrhythmic drugs	
4.4	Anti-hyperlipidemia drugs	
4.5	Antiplatelet drugs	
4.6	Coagulants & Anticoagulants	
4.7	Anti-ulcer drugs	
4.8	Anti-diabetic drugs	
4.9	Anti-cancer drugs	

4.10	Anti-cancer drugs	
Unit-5, Research methodology and Bio-statistics		**07**
5.1	Selection of research topic	
5.2	Review of literature	
5.3	Research hypothesis	
5.4	Study design	
5.5	Pre-clinical data analysis	
5.6	Statistical interpretation using Student's T test and One-way ANOVA	
5.7	Graphical representation of data	
Activity-3	Test -3	
Activity-4	Test -4	
Activity-5	Test -5	
Activity-6	Test -6	

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

Name of the Subject	Advanced Instrumentation Techniques (Theory)
Name of the Faculty	Dr. Krishna Veni N M.Pharm., Ph.D
Designation, Department	Professor & Head, Department of Pharmaceutical Analysis
Mobile Number	9442083447
e-Mail i.d.	krisath@jssuni.edu.in

Scope, Course Objectives and Course Outcomes

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

14. Understand the advanced instruments used and its applications in drug analysis.
15. Understand the chromatographic separation and analysis of drugs.
16. Understand the calibration of various analytical instruments.
17. Know analysis of drugs using various analytical instruments.

Course Outcomes (COs): At completion of this course it is expected that the students will be able to

CO 1 : Record and determine the structure of organic substances using NMR and Mass Spectra's
CO 2 : Use the basic knowledge on radio immune assays in carrying out immunological tests
CO 3 : Perform and interpret the results obtained during the calibration of analytical instruments
CO 4 : Develop Practical skills in the analysis of biological samples
CO 5 : Understand the Theoretical Aspects of the latest hyphenated techniques for nano analysis of drugs

LECTURE PLAN – Abstract

Sessional	No. of Hours of Didactic Lecture Advanced Instrumentation Techniques	No of Hours of other Activities	Total No. of Lecture Hours
I	23	1	24
II	22	--	22
Total No. of Hours	45	--	46

I SESSIONAL : 23 Lectures + 1 Activity

Lecture No.	Lecture Details	Hours
	Orientation of the subject	**01**
Unit-1:		**10**
Nuclear Magnetic Resonance Spectroscopy		
6.	Principles of H-NMR and C-NMR	
7.	Chemical Shift, Factors affecting chemical shift	
8.	Coupling constant, Spin -Spin coupling, Relaxation	
9.	Instrumentation – Continuous wave instruments & FT NMR	
10.	Applications	
Mass Spectrometry		
11.	Principle, Instrumentation	

12.	Ionization techniques – Electron impact, Chemical ionization, MALDI, FAB	
13.	Analyzers – Time of Flight and Quadrupole, Detectors	
14.	Mass Fragmentation and Fragmentatio rules	
15.	Applications	
Unit-2		
Thermal Methods of Analysis		
23.	Principle of Thermogravimetric Analysis (TGA)	
24.	Instrumentation & Applications of Thermogravimetric Analysis (TGA)	
25.	Principle, Instrumentation & Applications of Differential Thermaol Analysis (DTA)	
26.	Principle & Instrumentation of Differential Scanning Calorimetry (DSC)	**10**
27.	Instrumentation (DSC)	
28.	Applications of Differential Scanning Calorimetery	
X Ray Diffraction Methods		
29.	Origin of X Rays	
30.	Basic aspects of crystals, X Ray crystallography- Braggs Law	
31.	Rotating crystal technique, Single Crystal Diffraction, Powder Diffraction	
32.	Structural elucidation and Applications	
Unit-3:		
Calibration and Validation		
36.	Validation of analytical method as per ICH Guidelines	
37.	Validation of analytical method as per ICH Guidelines (cont…)	**03**
38.	Validation of analytical methods as per USFDA guidelines	

II SESSIONAL : 22 Lectures

Lecture No.	Lecture Details	Hours
Unit-3:		
Calibration of following Instruments		
51.	Electronic balance	
52.	UV Visible spectrophotometer	

53.	UV Visible spectrophotometer	**07**
54.	IR Spectrophotometer	
55.	Fluorimeter, Flame photometer	
56.	HPLC	
57.	GC	
Unit-4:		**08**
Radio immune assay		
17.	Importance, Various components	
18.	Principe	
19.	Different Methods & Limitations	
20.	Applications of Radio Immuno Assay	
Extraction Techniques		
21.	General Principle and Procedure involved in Solid Phase Extraction	
22.	General Principle and Procedure involved in Solid Phase Extraction (cont…)	
23.	General Principle and Procedure involved in Liquid Liquid Extraction	
24.	General Principle and Procedure involved in Liquid Liquid Extraction (cont…)	
Unit-10:		**07**
Hyphenated Techniques		
20.	LC-MS/MS	
21.	LC-MS/MS (cont…)	
22.	LC-MS/MS (cont…)	
23.	GC-MS/MS	
24.	GC-MS/MS (cont…)	
25.	GC-MS/MS (cont…)	
26.	HPTLC-MS	

Text Books

10. Instrumental Methods of Chemical Analysis; by B K Sharma
11. Organic Spectroscopy; by Y R Sharma
12. Text book of Pharmaceutical Analysis; by Kenneth A Connors
13. Vogel's Text Book of Quantitative Chemical Analysis; bu A L Vogel
14. Practical Pharmaceutical Chemistry; by A H Beckett and J B Stenlake
15. Organic Chemistry; by I L Finar

16. Organic Spectroscopy; by William Kemp
17. Quantitative analysis of drugs; by D C Garrett
18. Quantitative Analysis of Drugs and Pharmaceutical Formulations; by P D Sethi
19. Spectrophotometric identification of organic compounds; by Robert M Silverstein

Reference Books

1. Introduction to Spectroscopy; by Donald L Pavia
2. Principles of Instrumental Analysis; by Douglas A Skoog
3. www.ich.org; ICH Q2 (R1) Validation of analytical procedures: text and methodology.
4. www.fda.gov; Analytical Procedures and Methods Validation for Drugs and Biologics

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PRINCIPAL
J.S.S. COLLEGE OF PHARMACY
Rockland's, Ootacamund - 643 001

JSS Academy of Higher Education & Research, Mysuru
(Deemed to be University, Accredited 'A+' Grade by NAAC)

JSS College of Pharmacy, Rocklands, Ooty – 643 001

(An ISO 14001:2015 & ISO 50001:2018 Certified Institute)

Class Room Allotment for the Academic Year 2024 - 2025 (First Half)

LECTURE HALL – II (Wagner's Hall)

Day	III. B.Pharm					IV. B.Pharm		
	9-10 am	**10-11 am**	**11-12 noon**	**12 -1 pm**	**1-2 pm**	**2-3 PM**	**3-4 PM**	**4-5 PM**
Monday	IMA (Tu) **(SNM)**	PC-II (T) **[SRK]**	PJ (T) **[SJ]**	IP (T) **[MVR]**	LUNCH BREAK	PP (T) **[SV]**	NDDS (T) **[DNV]**	IMA (T) **[SNM]**
Tuesday	MC-II (T) **[GS]**	PJ (Tu) **[SJ]**	MC II (Tu) **[GS]**	IP (T) **[MVR]**		PP (T) **[SV]**	NDDS (T) **[DNV]**	IP (T) **[MM]**
Wednesday	PCOG (Tu) **[SP]**	MC-II (T) **[GS]**	PCOG (T) **[SP]**	MC-II (T) **[GS]**		PP (T) **[SV]**	IP (T) **[MM]**	NDDS (T) **[DNV]**
Thursday	NDDS (Tu) **(DNV)**	PC-II (T) **[SRK]**	PJ (T) **[SJ]**	PCOG (T) **[SP]**		Library	IP (T) **[MM]**	IMA (T) **[SNM]**
Friday	-	PCOG (T) **[SP]**	PC-II (Tu) **[SRK]**	IP (T) **[MVR]**		IMA (T) **[SNM]**	GPAT CLASSES	
Saturday	**-**	PC-II (T) **[SRK]**	PJ (T) **[SJ]**	IP(Tu) **[MVR]**		-		

T- Theory, P- Practical, Tu-Tutorial

Subject-in-Charge (III.B.Pharm)
Medicinal Chemistry-II **(MC-II)** : Dr. Gomathi Swaminathan **(GS) (T)**
Industrial Pharmacy-I **(IP)** : Mr. M Vivek **(MVR) (T&P)**
Pharmacology-II**(PC-II)** : Mr. B. Shiva Rama Krishnan **(SRK) (T&P)**
Pharmacognosy & Phytochemistry II **(PCOG)** : Ms. S. Priyadharshini **(SP) (T&P)**
Pharmaceutical Jurisprudence **(PJ)** : Dr. Srikanth Jupudi **[SJ] (T)**

Class Teacher : Mr. B. Shivaramakrishnan

Subject In-charges: (IV.B.Pharm)
Instrumental Methods of Analysis **(IMA)** : Dr. S.N.Meyyanathan **(SNM)**
Industrial Pharmacy**(IP)** : Mr. M. Murugappa **(MM)**
Pharmacy Practice**(PP)** : Dr. Vikashini **(VS)**
Novel Drug Delivery Systems**(NDDS)** : Dr. D . Nagasamy venkatesh **[DNV]**
Practice School**(PS)** : Heads of the respective

Class Teacher : Dr.D Nagasamy Venkatesh

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Class Room Allotment for the Academic Year 2024 - 2025 (Second Half)

LECTURE HALL – II (Wagner's Hall)

Day	III. B.Pharm					IV. B.Pharm		
	9-10 am	10-11 am	11-12 noon	12 -1 pm	1-2 pm	2-3 PM	3-4 PM	4-5 PM
Monday	PB **(Tu)** **[]**	PC-III(T) **[SRK]**	HDT(T) **[SP]**	QA(T) **[MRJ]**	LUNCH BREAK	ES-I (T)	Library	BSRM (T) **[JK]**
Tuesday	MC-III(Tu) **[DAK]**	BP (T) **[MM]**	MC-III(T) **[SJ]**	HDT(T) **[SP]**		Library	ES-II (T)	SPP (T) **[DK]**
Wednesday	QA(Tu) **[MRJ]**	BP(T) **[MM]**	MC-III(T) **[SJ]**	QA(T) **[MRJ]**		SPP (T) **[DK]**	ES-II (T)	ES-I (T)
Thursday	BP(Tu) **[MM]**	PC-III(T) **[SRK]**	PB **(T)** **[]**	HDT(T) **[SP]**		BSRM (T) **[JK]**	ES-II (T)	ES-I (T)
Friday	HDT(Tu) **[SP]**	QA(T) **[MRJ]**	PB **(T)** **[]**	PC-III(T) **[SRK]**		BSRM (T) **[JK]**	Library	SPP (T) **[DK]**
Saturday	BP(T) **[MM]**	MC-III(T) **[SJ]**	PC-III(T) **[SRK]**	PB **(T)** **[]**		-	-	-

T- Theory, P- Practical, Tu-Tutorial

Subject-in-Charge: (III. B.Pharm)
Medicinal Chemistry-III **(MC-III)** **:** Dr. Srikanth Jupudi **[SJ]** (T&P)
Pharmacology -III **(PC-III)** :Mr. B. Shivaramakrishnan **[SRK]** (T&P)
Herbal Drug Technology **(HDT)** : Ms. S . Priyadharshini **[SP]** (T&P)
Biopharmaceutics and Pharmacokinetics **(BP)** : Mr. Murugappan M **[MM]**
Quality Assurance **(QA)** : Dr. M. R. Jeyaprakash **[MRJ]** (T)
Pharmaceutical Biotechnology **(PB)** : NEW FACULTY(T)
Class Teacher : Mr. B. Shivaramakrishnan

Subject In-charges: (IV.B.Pharm)
Social and Preventive Pharmacy **(SPP)** - Dr. D. Keerthana **[DK]**
Biostatistics &Research Methodology **(BSRM)** - Mr. Jayakumar C **[JK]**

Class Teacher : Dr.N.Jawahar

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Class Room Allotment for the Academic Year 2024 - 2025 (First Half)

LECTURE HALL – I (Remington Hall)

Day	I. B.Pharm					II. B.Pharm		
	9-10 am	10-11 am	11-12 noon	12 -1 pm	1-2 pm	2-3 PM	3-4 PM	4-5 PM
Monday	HAP-I (Tu) **[AJ]**	HAP-I (T) **[AJ]**	PA (T) **[JSK]**	PIC (T) **[BG]**	LUNCH BREAK	PE (T) ***[MM]***	POC-II (T) ***[GS]***	PP-I (T) ***[KS]***
Tuesday	RB (P) **[RS]**	HAP-I (T) **[AJ]**	PIC (T) **[BG]**	RB/RM (T) **[RS/CJ]**		PE (T) ***[MM]***	POC-II (T) ***[GS]***	*Library*
Wednesday	PA (Tu) **[JSK]**	HAP-I (T) **[AJ]**	PC (T) **[GNK]**	PIC (T) **[BG]**		PMB (T) ***[RR]***	POC-II (T) ***[GS]***	*Library*
Thursday	PIC (Tu) **[BG]**	PC (T) **[GNK]**	PA (T) **[JSK]**	RB/RM (T) **[RS/CJ]**		PMB (T) ***[RR]***	PP-I (T) ***[KS]***	*Library*
Friday	PC (Tu) **[GNK]**	PC (T) **[GNK]**	PA (T) **[JSK]**	RB (P) **[RS]**		PMB (T) ***[RR]***	PE (T) ***[MM]***	PP-I (T) ***[KS]***
Saturday	CS (T) **[SM]**	CS(T) **[SM]**	CS(P) **[SM]**					

T- Theory, Tu-Tutorial

Subject-in-Charge (I.B.Pharm)

Human Anatomy and Physiology-I **(HAP-I)**	- Dr. A. Justin **[AJ]**
Pharmaceutics **(PC)**	- Dr. G.N.K. Ganesh **[GNK]**
Pharmaceutical Inorganic Chemistry **(PIC)**	- Dr. B. Gowramma **[BG]**
Pharmaceutical Analysis **(PA)**	- Dr. JSK Nagarajan **[JSK]**
Remedial Biology / Remedial Mathematics **(RB/RM)**	- Dr. R. Shanmugham **[RS]** / Dr. C. Jayakumar **[CJ]**
Communication Skills **(CS)**	- Mrs. Sadhana M **[SM]**

Class Teacher: Dr. A. Justin

Subject In-charges: (II.B.Pharm)

Pharmaceutical Organic Chemistry-II **(POC-II)**	- Dr. Gomathi Swaminathan **[GS]**
Physical Pharmaceutics-I **(PP-I)**	- Dr. Kousalya S **[KS]**
Pharmaceutical Microbiology **(PMB)**	- Dr. Raman Rajeshkumar **[RR]**
Pharmaceutical Engineering **(PE)**	- Mr. Murugappan M **[MM]**

Class Teacher : Dr. Vadivelan R

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Class Room Allotment for the Academic Year 2024 - 2025 (Second Half)

LECTURE HALL – I (Remington Hall)

Day	I. B.Pharm					II. B.Pharm		
	9-10 am	10-11 am	11-12 noon	12 -1 pm	1-2 pm	2-3 PM	3-4 PM	4-5 PM
Monday	HAP-II (Tu) **[AJ]**	HAP-II (T) **[AJ]**	BIOCHEM (T) **[SG]**	POC-I (T) **[BG]**	LUNCH BREAK	PC-I (T) **[RV]**	MC-I (T) **[SG]**	POC-III (T) **[GS]**
Tuesday	POC(Tu) **[BG]**	HAP-II (T) **[AJ]**	CAP (T) **[CJ]**	POC-I (T) **[BG]**		PC-I (T) **[RV]**	MC-I (T) **[SG]**	POC-III (T) **[GS]**
Wednesday	BIOCHEM(Tu) **[SG]**	HAP-II (T) **[AJ]**	ES (T) **[PD]**	Library		PC-I (T) **[RV]**	POC-III (T) **[GS]**	PP-II (T) **[KS]**
Thursday	POC-III (Tu) ***[GS]***	PP (T) **[DK]**	CAP (T) **[CJ]**	BIOCHEM (T) **[SG]**		PG-I (T) **[RG]**	MC-I (T) **[SG]**	PP-II (T) **[KS]**
Friday	PP (Tu) **[DK]**	PP (T) **[DK]**	POC-I (T) **[BG]**	ES (T) **[PD]**		PG-I (T) **[RG]**	PC-I (Tu) **[RV]**	PP-II (T) **[KS]**
Saturday	PG-I (T) ***[RG]***	PP (T) **[DK]**	BIOCHEM (T) **[SG]**	Library		-	-	-

T- Theory, Tu-Tutorial

Subject-in-Charge (I.B.Pharm)

Human Anatomy and Physiology-II **(HAP-II)** - Dr. A. Justin **[AJ]**
Biochemistry **(BIOCHEM)** - Dr. S. Gomathi **[SG]**
Pharmaceutical Organic Chemistry –I **(POC-I)** - Dr. B. Gowramma **[BG]**
Pathophysiology **(PP)** - Dr. D. Keerthana **[DK]**
Computer Applications in Pharmacy **(CAP)** - Mr. C. Jayakumar **[CJ]**
Environmental Sciences **(ES)** - Ms. S. Priya Dharshini **[PD]**

Class Teacher : Dr. A. Justin

Subject In-charges: (II.B.Pharm)

Pharmaceutical Organic Chemistry-III **(POC-III)** - Dr. Gomathi Swaminathan **[GS]**
Medicinal Chemistry-I **(MC-I)** - Dr. Gomathy Subramani **[SG]**
Physical Pharmaceutics-II **(PP-II)** - Dr. Kousalya S **[KS]**
Pharmacology-I **(PC-I)** - Dr. Vadivelan R **[RV]**&Dr. S Divakar**[SD]**
Pharmacognosy and Phytochemistry I **(PG-I)** - Mr. Ramu G **[RG]**

Class Teacher : Dr. Vadivelan R

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