JSS Academy of Higher Education and Research

JSS College of Pharmacy

Sri Shivarathreeshwara Nagara, Mysuru-570015

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An ISO 9001:2015 Certified Institution

(DEEMED TO BE UNIVERSITY) MYSURU

IIIrd Pharm D

Course Handout

2023-24

Academic Calendar 2023-2024

Tentative Dates of Examinations

I Sessional Examinations for II to V Pharm D & I Pharm D	6th September 2023 & 23rd September 2023
II Sessional Examinations for I to V Pharm D	18th Dec 2023
III Sessional Examinations for I to V Pharm D	18th March 2024
University Examination	1st April 2024

(III Pharm.D.)

Teacher's Incharge

Class	Class Teacher	Batch No.	Batch Teacher
III Pharm. D	Dr. H Yogish Kumar	I	Dr. H Yogish Kumar
		II	Dr. Asha Spandana KM

CURRICULAR & CO-CURRICULAR ACTIVITIES & COORDINATORS FORTHE ACADEMIC YEAR 2023-24

Sl. No	Activities	Coordinator/s	Tentative scheduleof meeting/activity
1.	Induction, learning skills, and personality development programs for freshers' day	Coordinator: AKT Members: BRJ, DT	July/August 2023
2.	Anti-ragging cell	Coordinators: JS, KSN, & Committee members	July/August 2023
3.	Grievance and redressal cell	Coordinator: GVP & Committee members	Meetings - twice/year
4.	Gender Sensitization Committee	Coordinator: SNM & Committee members	Meetings - twice/year
5.	Industrial Visits, Training, and placements	Coordinator: ABP Members: MGS, SM, SD, LR, UM	September 2023- June 2024

6.	Internal Quality Assurance Cell (IQAC) Team	Chairman- GVP Coordinator- HVG Member Secretary: SP Members: RSC, MPV, KSN, CIA, HP	4 meetings/year
7.	Guest lecture & Seminar/ Conference/ Training / Workshop/Webinar organized at college / delivered/ attended by staff- Validation of college data.	IQAC Team	Throughout the academic year
8.	Governing council meeting	GVP + IQAC Team AAO & Asha B	July 2023 and Feb 2024
9.	Preparation of documents and submission for NIRF, NAAC, NBA, PCI or any other agency	Team IQAC	• Throughout the academic year
10.	Internal Assessment Committee (IAC)	Coordinator: GVP Members: All program Coordinators (M Pharm, B. Pharm, D Pharm, Pharm D)	Meetings - twice/year Schedule as per the academic calendar
11.	ACPE committee- Interim report and others	Coordinator: MR /RSS Member: SP & UM	• As required
12.	Academic Council Board (ACB) • Student Progression (Advanced/ Medium/ Slow learners) • Mentors Diary- Student profile	Class teachers and Program Coordinators	• After each sessional exam • Regular monitoring of Mentee

13.	Ethics committee	• IAEC-SBC • IEC-CSH	• Twice a year
14.	Class Timetable committee	Coordinator: VJ Member: BRP, NPK, URR, DT	• Twice a year (June & Nov 2023)
15.	Women's cell/Prevention of Sexual Harassment Cell/Internal Complaints committee (ICC)	SNM & committee members	• Meetings twice a year (June & Nov • 2023)
16.	Scholarship Bureau	Coordinator: RSC Member: SRD	Soon after the announcement of the Scholarships
17.	Compilation of publications (Research papers/ books/chapters)	Coordinator: SRD	1st of Every month
18.	Research Coordination & Consultancy Committee Compilation of Ph.D. details and funded projects Review of publications Collaboration with Industries/organizations Interdepartmental/ Interdisciplinary research	Chairman-SBC Members-All HoDs	At least 3 meetings/year
19.	Department Academic Integrity Panel (DAIP) - Plagiarism Check for PhD & M Pharm thesis	Chairman-TMP Member Secretary: BRP Member-VJ	During the submission of thesis by the students
20.	Pharmacy Education Unit – for CCLPE activities	MSS	At least 5 activities/ year
21.	Annual result analysis and List of merit students	Class teachers and M Pharm Course Coordinators	Soon after the exam results
22.	GPAT and other competitive exams (TOEFL, GRE etc.)	Coordinator: SNM Members: RAO, RJ	Planning of coaching Throughout the academic year
23.	Library orientation	Librarian	July/August 2023
24.	Library staff coordinator	Coordinator: HYK Members: PP, AAR, RG, DT, and AAP	Two meetings/year Yearly textbook requirements
25.	Soft Skills Training	Coordinator: ABP Member: MGS	At least 3 activities/year
26.	International Student Rotation	CSH	As and when
27.	Hackathon	RAO	At least two events/ year

28.	Golden Jubilee-Souvenir, press and publicity	Chairman- TMP/ GVP Members-BS, KSN, RJ, RG, CIA	August 2022- August 2023
29.	SDG- Activities and Compendium	CIA, PP	• Compendium- August 23 • Regular activity under each SDG
30.	Course handouts/ Teachers' diary/ Student Handbook/Faculty Handbook.	NPK & HYK	• July/ August 2023
31.	National Pharmacy Week (NPW) & Pharmacists Day	Coordinator: UM & IPA office bearers	• Nov-Dec 2023
32.	Alumni association	Coordinator: HVG Member: SM	• August/September 2023
33.	Herbal and College Garden	NPK	• Regular monitoring
34.	ISO 9001:2015	Coordinator: SNM Member: SM	• 2 Internal audits (July and December) • Surveillance/ Recertification audit
35.	Press and publicity	Coordinator: BRP Member: TS	During the Conferences/ workshop organized
36.	Foreign students' cell	MPV	At least 2 meetings
37.	Monthly/Annual report of college and JSSU Newsletter & Annual report of JSS AHER and other agencies	Coordinator: KM Members: PP, HP, AAP, DT, AAR	Monthly report
38.	College website updating	Coordinator: HKS Members: AKT, DT, RG, URR, MGS	Throughout the year
39.	JSSUonline.com Student promotion, Timetable, teacher allotment, and others	Coordinator - SRD	Throughout the year
40.	Annual group photo session	HP, RG	Feb 2024
41.	Lab coat and Blazers	JS and Ningaraju	August/Sep 2023
42.	Notice Board (SNB, LNB, and IIPC), Departmental staff list	Shadakshari	Throughout the year
43.	Stock verification	Ningaraju	April/May 2024
44.	Student Liaison	Coordinator: AAO Member: TS	Throughout the year
45.	Student ID Cards /Attendance entry	Shivanna & Kumar	Aug/Sep 2023
46.	Retreat for Pharmacy Students	AKT	Nov/Dec 2023
47.	Retreat for Teachers	JS	November 2023/May 2024

48.	Feedback	VJ & SA	April/May 2023
49.	Institute Innovation Cell	Coordinator: RAO Member: DT	Throughout the year
50.	Practice School	Coordinator: ST Member: KSN, PS, MSS, PP	Throughout the year
51.	MOUs-Collate College initiation activities	HP	June 2023 & Jan 2024
Extracurricular activities			
Sl. No.	**Activities**	**Coordinator/s**	**Tentative schedule of meeting/activity**
52.	Selection of Class Representatives, Pharmaceutical society members Annual planning and execution of Student-centered and professional activities including the inauguration of IPS	Coordinator: MPV Member: MSS	July 2023
53.	JASPHARM- College magazine	Coordinator: BS Member: AAP	July 2024
54.	STUMAG- College wall magazine	TSK, LR	At least 3 issues/year
55.	Sports coordinators	HYK, SND	Feb 2024
56.	NSS coordinators	Program Officer- URR Assistant PO - SND	Regular activities and special camp
57.	Cultural & Literary coordinators	PS, MGS, LR	Nov 2023
58.	Annual Day Celebration & Graduation Day	CIA, ASP	March 2024, July 2024
59.	Foreign languages	CIA, PP	Throughout the year
60.	College Calendar & Events	RSC, MPV	June / July 2023

Program Committee			
Sl. No.	**Program committees**	**Chairperson**	**Member Secretary**
61.	D. Pharm	GVP	MSS
62.	B. Pharm	GVP	MPV
63.	Pharm. D	TMP	CSH
64.	M. Pharm	TMP	RSC
65.	Diploma programs	GVP	RJ
Sl. No.	**M. Pharm Program**		**Coordinator**
66.	Pharmaceutics		RAO
67.	Industrial Pharmacy		ASP
68.	Pharmaceutical Regulatory Affairs		MPV
69.	Pharmaceutical Quality Assurance		HKS
70.	Pharmaceutical Chemistry		HYK
71.	Pharmaceutical Analysis		AKT
72.	Pharmacology		SM
73.	Pharmacognosy		NPK
74.	Pharmacy Practice		UM
75.	Pharmaceutical Biotechnology		RG
Sl. No.	**PG Diploma Program**		**Coordinator**
76.	Pharmacovigilance		CSH
77.	Medicine & Poison Information		UM
78.	Clinical Research		SP
79.	Pharmaceutical Quality Assurance		TS
80.	Pharmaceutical Regulatory Affairs		MPV
81.	Medical Devices		MGS
82.	Intellectual Property Rights		ARR/ HYK
83.	Computer-Aided Drug Design		SD
84.	Food and Drug Analysis		RJ
85.	Regulatory Toxicology		SBC
86.	Phytopharmaceutical and Industrial Applications		NPK
87.	Quality control		AKT
Sl. No.	**Certificate Course**		**Coordinator**
88.	Pharmaceutical Quality Assurance		HKS
89.	Herbal Drug Standardization		HP

90.	Medicine Information	BRJ
91.	Clinical Research	SP
92.	Global Regulatory Affairs	MPV
93.	Food & Nutraceuticals	RJ
94.	Telemedicine	BRJ

TEACHING STAFF LIST

Sl. No	NAME	QUALIFICATION	DESIGNATION	DEPARTMENT
1.	Dr. T.M. Pramod Kumar (TMP)	M.Pharm., Ph.D.	Professor & Principal	Pharmaceutics
2.	Dr. Gurubasavaraj V Pujar (GVP)	M.Pharm., Ph.D.	Professor & Vice Principal	Pharma. Chemistry
3.	Dr. Balamuralidhara V. (BMV)	M.Pharm., Ph.D.	Assoc. Professor & Head	Pharmaceutics
4.	Dr.K. Bangarurajan (KBR)	M.Pharm., Ph.D.	Professor	Pharmaceutics
5.	Dr. Gangadharappa H.V. (HVG)	M.Pharm., Ph.D.	Assoc. Professor	Pharmaceutics
6.	Dr. M.P. Venkatesh (MPV)	M.Pharm., Ph.D.	Assoc. Professor	Pharmaceutics
7.	Dr. Vikas Jain (VJ)	M.Pharm., Ph.D.	Assoc. Professor	Pharmaceutics
8.	Dr. Amit B Patil (ABP)	M.Pharm., Ph.D.	Assoc. Professor	Pharmaceutics
9.	Dr. Hemanth Kumar S (HKS)	M.Pharm., Ph.D.	Asst. Professor	Pharmaceutics
10.	Dr. Osmani Mir Riyaz Ali MahafezAli (RAO)	M.Pharm., Ph.D.	Asst. Professor	Pharmaceutics
11.	Dr. Asha Spandana K M (ASP)	M.Pharm., Ph.D.	Lecturer	Pharmaceutics
12.	Dr. Shailesh T(TS)	M.Pharm., Ph.D.	Lecturer	Pharmaceutics
13.	Ms. Preethi S (PS)	M.Pharm	Lecturer	Pharmaceutics
14.	Ms. Akhila AR (AAR)	M.Pharm	Lecturer	Pharmaceutics
15.	Mr. Trideva Sastri K (TSK)	M.Pharm	Lecturer	Pharmaceutics
16.	Dr.Meghana G S(MGS)	M.Pharm., Ph.D.	Lecturer	Pharmaceutics
17.	Dr. Savitha R S (RSS)	M.Pharm.	Assoc. Professor & Head	Pharmacy Practice
18.	Dr. M. Ramesh (MR)	M.Pharm., Ph.D.	Professor	Pharmacy Practice
19.	Ms. Shilpa Palaksha (SP)	M.Pharm.	Assoc. Professor	Pharmacy Practice
20.	Mr. D.H. P. Gowda (DHP)	M.Sc., PGDCA.	Asst. Professor	Pharmacy Practice
21.	Dr. M Umesh (UM)	Pharm D.	Asst. Professor	Pharmacy Practice
22.	Dr. Sri Harsha Chalasani (CSH)	M.Pharm., Ph.D.	Asst. Professor	Pharmacy Practice
23.	Dr. Jaidev Kumar B R (BRJ)	M.Pharm.	Lecturer	Pharmacy Practice
24.	Dr. Srikanth M S (MSS)	M.Pharm., Ph.D.	Lecturer	Pharmacy Practice
25.	Mr Balaji S (BS)	M.Pharm	Lecturer	Pharmacy Practice
26.	Dr. U R Rakshith (URR)	Pharm D	Lecturer	Pharmacy Practice
27.	Dr. Acsah Annie Paul (AAP)	Pharm D	Lecturer	Pharmacy Practice

28.	Dr Siddartha N Durappanavar (SND)	Pharm D	Resident	Pharmacy Practice
29.	Dr. B.M. Gurupadayya (BMG)	M.Pharm., Ph.D.	Professor & Head	Pharma. Chemistry
30.	Dr. R. S. Chandan (RSC)	M.Pharm., Ph.D.	Assoc. Professor	Pharma. Chemistry
31.	Dr. Prashantha Kumar B R (BRP)	M.Pharm., Ph.D.	Assoc. Professor	Pharma. Chemistry
32.	Dr. Anand Kumar Tengli (AKT)	M.Pharm., Ph.D.	Assoc. Professor	Pharma. Chemistry
33.	Dr. H. Yogish Kumar (HYK)	M.Pharm., Ph.D.	Lecturer	Pharma. Chemistry
34.	Dr. Sheshagiri Dixit (SD)	M.Pharm., Ph.D.	Lecturer	Pharma. Chemistry
35.	Dr Rupshee Jain (RJ)	M.Pharm., Ph.D.	Lecturer	Pharma. Chemistry
36.	Mr. Chetan.I.A(CIA)	M.Pharm	Lecturer	Pharma. Chemistry
37.	Dr. Prabitha P (PP)	M.Pharm., Ph.D.	Lecturer	Pharma. Chemistry
38.	Dr. J. Suresh (JS)	M.Pharm., Ph.D.	Professor & Head	Pharmacognosy
39.	Dr. K Mruthunjaya (KM)	M.Pharm., Ph.D.	Professor	Pharmacognosy
40.	Dr. N Paramakrishnan (NPK)	M.Pharm., Ph.D.	Asst. Professor	Pharmacognosy
41.	Ms. Haripriya G (HG)	M Pharm	Lecturer	Pharmacognosy
42.	Dr. Logesh R (LR)	M.Pharm., Ph.D.	Lecturer	Pharmacognosy
43.	Mr. Rajaguru A (RG)	M.Pharm	Lecturer	Pharmaceutical Biotechnology
44.	Mr. Siva Armugam (SA)	M.Pharm	Lecturer	Pharmaceutical Biotechnology
45.	Dr. K L Krishna (KLK)	M.Pharm., Ph.D.	Assoc. Professor& Head	Pharmacology
46.	Dr. S. N. Manjula (SNM)	M.Pharm., Ph.D.	Professor	Pharmacology
47.	Dr. Saravana Babu C (SB)	M.Pharm., Ph.D.	Professor	Pharmacology
48.	Dr. Seema Mehdi (SM)	M.Pharm., Ph.D.	Lecturer	Pharmacology
49.	Dr. Nagashree K S (KSN)	M.Pharm ., Ph.D	Lecturer	Pharmacology
50.	Dr. Dithu Thekkekkara (DT)	M.Pharm ., Ph.D	Lecturer	Pharmalogy
39.	Dr. K Mruthunjaya (KM)	M.Pharm., Ph.D.	Professor	Pharmacognosy
40.	Dr. N Paramakrishnan (NPK)	M.Pharm., Ph.D.	Asst. Professor	Pharmacognosy
41.	Ms. Haripriya G (HG)	M Pharm	Lecturer	Pharmacognosy
42.	Dr. Logesh R (LR)	M.Pharm., Ph.D.	Lecturer	Pharmacognosy
43.	Mr. Rajaguru A (RG)	M.Pharm	Lecturer	Pharmaceutical Biotechnology
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48.	Dr. Seema Mehdi (SM)	M.Pharm., Ph.D.	Lecturer	Pharmacology
49.	Dr. Nagashree K S (KSN)	M.Pharm ., Ph.D	Lecturer	Pharmacology
50.	Dr. Dithu Thekkekkara (DT)	M.Pharm ., Ph.D	Lecturer	Pharmacology

PHARM.D

Program outcomes:

Outcome 1 - Development of patient centered knowledge and skills: The student should understand and possess the knowledge and skills required to demonstrate the ability to provide patient centered pharmaceutical care services.

Outcome 2 - Development of pharmaceutical care plan: The student should be able to formulate a pharmaceutical care plan by working in close relation with healthcare professionals, and patient/care taker in order to ensure the enhanced therapeutic outcome in the patient. Also, the pharmaceutical care plan includes maximization of therapeutic benefit by detecting, preventing and resolving drug related problems. The student should be able to recommend pharmaceutical care plan based on evidence, and follow-up and document the outcomes of the pharmaceutical care service.

Outcome 3 – Hospital and community pharmacy management: The student should be able to accurately interpret prescriptions, dispense medications and manage drug distribution system adhering to patient needs, in compliance with policies and guidelines of the hospital pharmacy, good community pharmacy practice and the recommendations of regulatory agencies. Also able to prepare inventory, procure, and use appropriate methods of drug storage and adopt appropriate techniques of drug distribution to ensure correct dispensing of medicines.

Outcome 4 – Promote public healthcare program: The student should be able to participate in various public health care programs of the nation including disease prevention initiatives to improve public health. Contribute to the development and promotion of national health policies including rational drug use program and essential drug policy.

Outcome 5 – Ethics and professional integrity: The student should deliver the duties in accordance with legal, ethical, social, economic, and professional guidelines with integrity. Able to provide patient care services by making rational and ethical decisions that represent the best interest of the patient and the society, and respect the patient, healthcare professionals, and the privacy and confidentiality of health information.

Outcome 6 - Analytical, critical and decision making skills: The student should be able to retrieve,understand, interpret, apply, analyze, synthesize, and evaluate information. Able to apply critical thinking and interpretational skills to identify, manage, and prevent problems and make appropriate decisions.

Outcome 7 - Communication skills: The student should be able to communicate effectively withpatients/caretakers, healthcare professionals. Able to effectively counsel, provide medicines information, and educate patients, caretakers & healthcare professionals about

medication therapy and other health related issues. Effective communication includes use of both oral and written communications skills and various communication techniques.

Outcome 8 - Leadership and entrepreneurship skills: The student should be able to achieve leadership skills through team work and by involving in organizing various community outreach programs with sound decision making skills. Also the student should enhance the entrepreneurial skills by finding or creating new prospects in challenging professional environments.

Outcome 9 - Interprofessional collaborative practice: Student should be able to identify unique opportunities for professional collaboration towards patient-centered pharmaceutical care services and demonstrate the ability to interact and work with multidisciplinary healthcare teams.

Outcome 10 - Design and conduct of need based research: The student should be able to understand theresearch needs of the region/nation, and design and conduct the research that would add value to the healthcare requirements of the patients and community/ society.

Outcome 11 - Digital literacy: Students should be able to use computers and gadgets to search, retrieve, analyze, store, create, present and exchange information, and interact and participate in interactive networks through the Internet or through any other digital platform to enrich pharmaceutical care services.

Outcome 12 - Life-long learning: The student should be able to recognize knowledge and skill deficits that exist in the effective delivery of health care needs of the patient/society. As a life-long learner, student should be able to identify and analyze issues emerging in the advancing healthcare delivery, and set learning goals, locate, interpret appropriate resources, and assess progress toward meeting learning goals.

COURSE HAND OUT 2023-24 Class: III Pharm. D.

I Course Details

S.No.	Name of Subject	No. of hours of Theory	No. of hours of Practical	No. of hours of Tutorial
(1)	**(2)**	**(3)**	**(4)**	**(5)**
3.1	Pharmacology-II	3	3	1
3.2	Pharmaceutical Analysis	3	3	1
3.3	Pharmacotherapeutics-II	3	3	1
3.4	Pharmaceutical Jurisprudence	2	-	-
3.5	Medicinal Chemistry	3	3	1
3.6	Pharmaceutical Formulations	2	3	1
	Total hours	**16**	**15**	**5**
	Grand Total	**36 hrs/ week**		

2. Evaluation:

Theory: Internal assessment Marks: 30. Three periodic theory sessional examinations will be conducted in theory for 30 marks (*duration 1.5 Hour*) and average of best two will be considered for evaluation.

Practical: Internal assessment Marks: 30. Three periodic practical sessional examinations will be conducted for 20 marks and average of best two will be considered for evaluation, plus 10 marks are awarded for regularity, promptness, viva-voce and record maintenance. JSS University will conduct annual examination for 70 marks in theory & practical at end of the academic session.

Classes will be awarded on the basis of total (sessional and annual examination) marks secured.

Class	Marks
Distinction	75% and above
First class	60% and above and less than 75%
Second class	50% and above and less than 60%
Pass class	Passed examination in more than one attempt.

3 **Sessional Examination schedule:** I, II and III sessional dates will be announced separately.

4 **Attendance:** Minimum of 80% attendance is necessary to appear for both Sessional and Annual examination.

5 **Chamber consultation hours:** Any time during College hours.

6 **Tutorial Class**

Objective of the tutorial is to enhance the learning ability and help students in better understanding of the subject. This provides a best opportunity for the students to clarify their subject doubts. This involves discussions, presentations on specified topics, assignments and evaluation.

3.1 PHARMACOLOGY–II (THEORY)

Theory: 3 Hrs. /Week

Responsible member/s of the academic staff: Dr. K. L. Krishna (KLK)

Scope and Objectives: This subject will provide an opportunity for the student to learn about the drug with regard to classification, pharmacodynamic and pharmacokinetic aspects, adverse effects, uses, dose, route of administration, precautions, contraindications and interaction with other drugs. In this subject, drugs acting on autacoids, respiratory system, GIT, immune system, hormones, pharmacology of autocoids and different aspects of genes will be concentrated. In addition, pharmacology of chemotherapeutic agents and principles of toxicology are also taught. In addition to theoretical knowledge, the basic practical knowledge relevant to therapeutics will be imparted.

Course Outcomes:

1. Identify and explain the pharmacodynamics and pharmacokinetic properties of drugs of various categories
2. To learn pharmacology of various class of drugs and thereby ability to recongnise category, ADR, contraindication and used of each class of drugs
3. Understand the basics involved in treatments of infectious diseases
4. Design toxicity studies and various bioassay methods
5. Recognize indications and proper use of various class of antimicrobial agents
6. To understand the proper use of antibiotics through learning etiology of infectious diseases
7. Understand the basics of cellular and molecular pharmacology
8. To learn the basic principles involved in Pharmaceutical biotechnology
9. To understand the genomic tolls employed in the drug discovery process

Teaching/learning methodologies used:

1. Lecture
2. Practical/Lab

Course materials:

TEXT BOOKS

1. Tripathi, K. D. Essentials of medical pharmacology. 6th edition, 2008. Publisher: Jaypee, Delhi.
2. Satoskar, R.S. and Bhadarkar, S.D. Pharmacology and pharmacotherapeutics. 20th edition (single volume), 2008. Publisher: Popular, Mumbai.
3. Rang, H.P. and Dale, M.M. Pharmacology. 5th edition, 2003. Publisher: Churchill Living stone.
4. Alberts, B., Bray, D., Lewis, J., Raff M., Roberts, K and Watson, JD Molecular Biology of the Cell by, 5rd edition, 2008, Publisher: Garland Science.

REFERENCE BOOKS

1. Goodman Gilman, A., Rall, T.W., Nies, A.I.S. and Taylor, P. Goodman and Gilman's The pharmacological basis of therapeutics. 11th edition, 2006. Publisher: McGraw Hill, Pergamon press.
2. Craig, C.R. and Stitzel, R.E. Modern Pharmacology. 5th edition 1997. Publisher: Little Brown and company.
3. Katzung, B.G. Basic and clinical pharmacology. 9th edition 2004. Publisher: Prentice Hall, International.
4. Gupta, P.K. and Salunkhe, D.K. Modern Toxicology. Volume I, II and III. 1985. Publisher: B.V. Gupta, Metropolitan Book Co. (p) Ltd, New Delhi.
5. Crommelin, DJA and Sindelar RD. Pharmaceutical Biotechnology. 3rd edition 2008. Publisher: Infarma Healthcare.
6. Watson, JD., Gilman, M., et al. Recombinant DNA. 2nd edition 1992. Publisher: Scientific America.
7. Walsh, G. Biopharmaceutical: Biochemistry and Biotechnology. 2nd edition 2007. Publisher: John Wily.
8. Derelanko MG. Handbook of toxicology. 2nd edition 2002; Publisher: CRC Press.

Lecture wise Programme

Topic	Hrs
Pharmacology of drugs acting on Blood and blood forming agents	**06**
a) Anticoagulants	
b) Thrombolytics and antiplatelet agents	
c) Haemopoietics and plasma expanders	
Pharmacology of drugs acting on Renal System	**03**
a) Diuretics	
b) Antidiuretics	
Pharmacology of drugs acting on Gastrointestinal Tract	**06**
a) Antiulcer drugs, Antacids	
b) Laxatives and purgatives	
c) Emetics and antiemetics	
d) Appetizers, digestants and carminatives	
Chemotherapy	**22**
a) Introduction	
b) Sulfonamides and co-trimoxazole	
c) Penicillins and Cephalosporins	
d) Tetracyclins and Chloramphenicol	
e) Macrolides, Aminoglycosides, Polyene & Polypeptide antibiotics	
f) Quinolines and Fluroquinolines	
g) Antifungal antibiotics	
h) Antiviral agents	
i) Chemotherapy of tuberculosis and leprosy	
j) Chemotherapy of Malaria	
k) Chemotherapy of protozoal infections (amoebiasis, giardiasis)	
l) Pharmacology of Anthelmintic drug	
m) Chemotherapy of cancer (Neoplasms)	
Immunopharmacology	**03**

Pharmacology of immunosuppressants and stimulants

Principles of Animal toxicology 02

a) Acute, subacute and chronic toxicity.
b) Principles involved in the various toxicity screening methods available for drugs in the laboratory animals.

The dynamic cell: The structures and functions of the components of the cell 11

a) Cell and macromolecules: Cellular classification, sub-cellular organelles, macromolecules, large macromolecular assemblies
b) Chromosome structure: Pro and eukaryotic chromosome structures, chromatin structure, genome complexity, the flow of genetic information.
c) DNA replication: General, bacterial and eukaryotic DNA replication.
d) The cell cycle: Restriction point, cell cycle regulators and modifiers.
e) Cell signaling: Communication between cells and their environment, ion-channels, signal transduction pathways (MAP kinase, P38 kinase, JNK, Ras and PI3-kinase pathways, biosensors.

The Gene: Genome structure and function: 18

a. Gene structure: Organization and elucidation of genetic code.
b. Gene expression: Expression systems (pro and eukaryotic), genetic elements that control gene expression (nucleosomes, histones, acetylation, HDACS, DNA binding protein families.
c. Transcription and Transcription factors: Basic principles of transcription in pro and eukaryotes. Transcription factors that regulate transcription in pro and eukaryotes.
d. RNA processing: rRNA, tRNA and mRNA processing.
e. Protein synthesis: Mechanisms of protein synthesis, initiation in eukaryotes, translation control and post-translation events
f. Altered gene functions: Mutations, deletions, amplifications, LOH, translocations, trinucleotide repeats and other genetic abnormalities. Oncogenes and tumor suppressor genes.
g. The gene sequencing, mapping and cloning of human disease genes.
h. Introduction to gene therapy and targeting.
i. Recombinant DNA technology: principles. Processes (gene transfer technology) and applications

Bio-assay methods 4

Scope, principles involved in general methods, bioassay designing, applications and limitations

Theory Sessional examination syllabus

Sessional No.	Syllabus Chapters no.
I	1, 2, 3, 5, 6, 9
II	4, 7a, 7b
III	7c to 7e, 8

3.1 PHARMACOLOGY – II (PRACTICALS)

Theory: 75 Hours (3 Hrs/ Week)
Responsible member/s of the academic staff: Dr. K. L. Krishna (KLK)

Course Outcomes:

1. Define the basic concept of experimental Pharmacology
2. Identify the basic equipments used in experimental pharmacology, study the importance of physiological salt solution, euthanasia and general anesthetics used in experimental pharmacology
3. To learn the advantages of various routes of drug administration and dose calculation, selection of routes of drug administration,
4. To understand the procedure involved in recording of DRC and its reporting
5. To learn the various bioassay methods used in experimental pharmacology
6. To understand the principal involved in in-vivo pharmacological experiments
7. To learn the principle and methods of evaluation of analgesics, antiepilptics, antiinflammatory, sadative hypnotics etc class of drugs using suitable animal models
8. To study the effects of various drugs on isolated frog heart preparation, Rabbit eye preparation

List of Experiments:

1. Study of laboratory animals and their handling (a. Frogs, b. Mice, c. Rats, d. Guinea pigs, e. Rabbits).
2. Study of physiological salt solutions used in experimental pharmacology.
3. Study of laboratory appliances used in experimental pharmacology.
4. Study of use of anesthetics in laboratory animals.
5. To record the dose response curve of Acetylcholine using isolated rat ileum/rectus abdominis muscle preparation.
6. To carry out bioassay of Ach using isolated rat ileum/rectus abdominis muscle preparation by interpolation method.
7. To carry out bioassay of Ach using isolated ileum/rectus abdominis muscle preparation by three point method.
8. To record the dose response curve of Histamine using isolated guinea-pig ileum preparation.
9. To carry out bioassay of Histamine using isolated guinea-pig ileum preparation by interpolation method.
10. To carry out bioassay of Histamine using guinea-pig ileum preparation by three point method.
11. Study of agonistic and antagonistic effects of drugs using isolated guinea-pig ileum preparation.
12. To study different routes of administration of drugs in animals (Rats, Mice, Rabbits).
13. Study of theory, principle, procedure involved and interpretation of given results for the following experiments:
    a) Analgesic property of drug using analgesiometer (tail flick and hotplate).
    b) Antiinflammatory effect of drugs using rat-paw edema method.
    c) Anticonvulsant activity of drugs using maximal electroshock and pentylene tetrazole methods.
    d) Antidepressant activity of drugs using pole climbing apparatus.
    e) Pentobarbitone induced sleeping time in mice.
    f) Locomotor activity of drugs using actophotometer.
    g) Cardiotonic activity of drugs using isolated frog heart and mammalian heart preparations.

g) Skeletal muscle relaxant activity of the drugs using rotarod.
h) Drugs effect on the blood pressure, heart rate and respiratory rate of dog.

14. Simulated experiments
a) Effect of drugs on frog's isolated heart.
b) Effect of drugs on rabbit eye.
c) Effect of drugs on ciliary motility of frog's esophagus.

Scheme of Practical Examination

	Sessional	**Annual**
Identification	04	10
Synopsis	04	10
Major Experiment (Bioassay)	06	30
Minor Experiment (Interpretation of given Graph/ simulated Experiment)	04	10
Viva	02	10
Max Marks	**20**	**70**
Duration	**3 hrs**	**4 hrs**

Note: Total sessional marks is 30 (20 for practical sessional plus 10 marks for regularity, promptness, viva-voce and record maintenance).

3.2 PHARMACEUTICAL ANALYSIS (THEORY)

Theory: 3 Hrs. /Week

Responsible member/s of the academic staff: Dr. R S Chandan (RSC)

Scope and objectives: This course is designed to impart a fundamental knowledge on the art and science of testing drugs by various instrumental methods of analysis. This focuses on various modern instruments that are used for testing the purity of drugs in various dosage forms. This course also gives idea about modern instruments that are used for drug testing like NMR, IR, Mass, HPLC, HPTLC forms. etc,. It prepares the students for most basics of the applied field of pharmacy.

Course Outcomes:

1. Gain knowledge of the importance of analysis of Drugs and Pharmaceuticals
2. Gain knowledge about assay of pharmaceutical substance and products
3. Acquire basic practical skills using instrumental techniques
4. Understand theoretical knowledge on various instrumental techniques adopted for analysis of pharmaceuticals
5. Execute various methodologies for assay of drugs and pharmaceuticals with the help of skills and knowledge gained
6. Understand and gain knowledge on trouble shooting in adopting various methodologies using instrumental techniques
7. Gain knowledge of the importance of quality control and quality assurance of pharmaceuticals
8. Gain knowledge between quality control and quality assurance

Teaching/learning methodologies used:

1. Lecture
2. Practical/Lab

Course materials:

TEXT BOOKS

a. Instrumental methods of analysis by Willard, Merrit, Dean and Settlle 6th edition
b. Practical Pharmaceutical Chemistry Vol-II- Beckett and Stenlake 3rd edition

REFERENCE BOOKS

a. Text book of quantitative chemical analysis by A.I. Vogel
b. Text book of Pharmaceutical Analysis by K.A. Cannors
c. Pharmaceutical analysis by Skoog and West.
d. William Kemp- Spectroscopy methods.

Lecture wise Programme

TOPICS	Hrs
1. Quality Assurance:	
a. Introduction, sources of quality variation, control of quality variation.	**03**
b. Validation methods- quality of equipment, validation of equipment and validation of analytical instruments and calibration.	
2. Chromatography: Introduction, history, classification, separation techniques, choice of methods. The following techniques be discussed with relevant examples of pharmaceutical products involving principles and techniques of separation of drugs from excipients.	**01**
a. **Column Chromatography**: Adsorption column chromatography, Operational technique, frontal analysis and elution analysis. Factors affecting column efficiency, applications and partition chromatography.	**03**
b. **TLC**: Introduction, principle, techniques, R_f value and applications.	**02**
c. **PC:** Introduction, principle, types of paper chromatography, preparation techniques, development techniques, applications.	**02**
d. **Ion-exchange chromatography**: Introduction, principles, types of ion exchange synthetic resins, physical properties, factors affecting ion exchange, methodology and applications.	**03**
e. **HPLC**: Introduction, theory, instrumentation, and applications.	**03**
f. **HPTLC**: Introduction, theory, instrumentation, and applications.	**02**
g. **Gas Chromatography**: Introduction, theory, instrumentation-carrier gases, types of columns, stationary phases in GLC & GSC. Detectors-Flame ionization	**04**

detectors, electron capture detector, thermal conductivity detector. Typical gas chromatogram, derivatisation techniques, programmed temperature gas chromatography, applications.

h. **Electrophoresis**: Principles of separation, equipment for paper and gel electrophoresis, and application. **02**

i. **Gel filtration** and **affinity chromatography**: Introduction, technique, applications. **03**

3. Electrometric Methods:

Theoretical aspects, instrumentation, interpretation of data/spectra and analytical applications be discussed on the following topics.

a. **Potentiometry**: Electrical potential, electrochemical cell, reference electrodes, indicator electrodes, measurement of potential and pH, construction and working of electrodes, Potentiometric titrations, methods of detecting end point, Karl Fischer titration. **05**

b. **Conductometry**: Introduction, conductivity cell, conductometric titrations and applications. **03**

c. **Amperometric Titrations:** Introduction, types of electrodes used, reference and indicator electrode, instrumentation, titration procedure, advantages and disadvantages of Amperometry over Potentiometry. Pharma applications. **04**

4. Spectroscopy:

Theoretical aspects, instrumentation, elements of interpretation of data/spectra and application of analytical techniques be discussed on:

a. Absorption Spectroscopy: **08**

Theory of electronic, atomic and molecular spectra. Fundamental laws of photometry, Beer-Lambert's Law, application and its deviation, limitation of Beer law, application of the law to single and multiple component analysis, measurement of equilibrium constant and rate constant by spectroscopy. Spectra of isolated chromophores, auxochromes, batho-chromic shift, hypsochromic shift, hyperchromic and hypochromic effect, effect of solvent on absorption spectra, molecular structure and infrared spectra.

Instrumentation – Photometer, U.V.-Visible spectrophotometer – sources of U.V.-Visible radiations, collimating systems, monochromators, samples cells and following detectors-Photocell, Barrier layer cell, Phototube, Diode array, applications of U.V.-Visible spectroscopy in pharmacy and spectrophotometric titrations. **05**

b.Infrared Spectroscopy: Vibrational transitions, frequency – structure correlations, Infrared absorption bands, Instrumentation–IR spectro-meter – sources of IR, Collimating systems, monochromators, sample cells, sample **06**

handling in IR spectroscopy and detectors–Thermocouple, Golay Cells, Thermistor, Bolometer, Pyroelectric detector, Applications of IR in pharmacy.

c. Fluorimetric Analysis: Theory, luminescence, factors affecting fluorescence, quenching. Instrumentation, Applications, fluorescent indicators, study of pharmaceutically important compounds estimated by fluorimetry. **04**

d.Flame Photometry: Theory, nebulisation, flame and flame temperature, interferences, flame spectrometric techniques and instrumentation and pharmaceutical applications. **04**

e.Atomic Absorption Spectrometry: Introduction, Theory, types of electrodes, instrumentation and applications. **02**

f.Atomic Emission Spectroscopy: Spectroscopic sources, atomic emission spectrometers, photographic and photoelectric detection. **02**

g.NMR (introduction only): Introduction, theoretical aspects and applications **02**

h.**Mass Spectroscopy**: (**Introduction only**) – Fragmentation, types of ions produced, mass spectrum and applications. **02**

Theory Sessional examination syllabus

Sessional No.	Syllabus Chapters no.
I	2
II	3, 4a
III	1, 4b – 4h

3.2 PHARMACEUTICAL ANALYSIS (PRACTICALS)

Theory: 75 Hours (3 Hrs/ Week)
Responsible member/s of the academic staff: Dr. R S Chandan (RSC)

Course Outcomes:

1. Gain knowledge of the importance of analysis of Drugs and Pharmaceuticals
2. Gain knowledge about assay of pharmaceutical substance and products
3. Acquire basic practical skills using instrumental techniques
4. Understand theoretical knowledge on various instrumental techniques adopted for analysis of pharmaceuticals
5. Execute various methodologies for assay of drugs and pharmaceuticals with the help of skills and knowledge gained
6. Understand and gain knowledge on trouble shooting in adopting various methodologies using instrumental techniques
7. Gain knowledge of the importance of quality control and quality assurance of pharmaceuticals
8. Gain knowledge between quality control and quality assurance

General Requirements: Graph paper, pencil, Scale, Scissors, Butter Paper, Observation Book-200 pages (plain), Gum Tube or stick, Matchbox, Laboratory Napkin

List of Experiments:

1. Separation and identification of Amino Acids by Paper Chromatography*.
2. Separation and identification of Dyes by radial paper chromatography*.
3. Separation and identification of Sulpha drugs by TLC technique*.
4. Effect of pH and solvent on the UV spectrum of given compound*.
5. Determination of dissociation constant of indicators using UV-Visible spectroscopy*.
6. Conductometric titration of mixture of acids with a strong base**.
7. Potentiometric titration of strong acid with a strong base**.
8. Estimation of drugs by Fluorimetric technique**.
9. Study of quenching effect in fluorimetry**.
10. Colorimetric estimation of Supha drugs using BMR reagent**.
11. Simultaneous estimation of two drugs present in given formulation**.
12. Assay of Dextrose by colorimetry**
13. Colorimetric estimation of Ferrous ions using 1,10-Phenonthroline**.
14. UV spectroscopic estimation of Paracetamol tablets*
15. Determination of Chlorides and Sulphates in Calcium gluconate by Nepheloturbidimetric Method**.
16. Determination of Na/K by Flame Photometry**.
17. Determination of pKa using pH meter*.
18. Infrared spectral graphs/ peak identiofication of samples with different functional groups (-COOH, -COOR, -NH_2, -NHR, -OH, -CHO, -C=O)
19. Demonstration of HPLC.

SCHEME OF PRACTICAL EXAMINATION:

	Sessional	Annual
Synopsis	04	10
Major Experiment(Experiment indicated by**)	08	30
Minor Experiment(Experiment indicated by*)	04	20
Viva-Voce	04	10
Max. Marks	**20#**	**70**

#Note: Total sessional marks is 30 (20 for practical sessional and 10 marks for regularity, promptness, viva-voce and record maintenance)

3.3 PHARMACOTHERAPEUTICS–II (THEORY)

Theory: 3 Hrs. /Week

Responsible member/s of the academic staff: Mr Balaji S (BS)

Scope and Objectives: This course is designed to impart knowledge and skills necessary for contribution to quality use of medicines. Chapters dealt cover briefly pathophysiology and mostly therapeutics of various diseases. This will enable the student to understand the pathophysiology of common diseases and their management.

Course Outcomes:

1. Describe the pathophysiology and management of various disease conditions.
2. Identify and analyse various factors that influence medication therapy in general and special populations.
3. Interpret laboratory data, diagnostic test results and other clinical data to optimize drug therapy.
4. Apply critical thinking and problem-solving skills to resolve drug-related problems.
5. Communicate effectively with health care professionals and patients.
6. Promote rational and quality use of medications.
7. Develop an individualized therapeutic care plan for the optimum management of diseases.

Teaching/learning methodologies used:

1. Lecture
2. Practical/Lab
3. Discussion
4. Case Study

Course materials

TEXT BOOKS

a. Clinical Pharmacy and Therapeutics - Walker and Whittlesea, Churchill Livingstone publication

REFERENCE BOOKS

a. Pharmacotherapy: A Pathophysiologic approach - Joseph T. Dipiro et al. Appleton & Lange
b. Clinical Pharmacy and Therapeutics - Eric T. Herfindal, Williams and Wilkins Publication
c. Applied Therapeutics: The clinical Use of Drugs. Lloyd Young and Koda-Kimble

Lecture wise Program

Etiopathogenesis and pharmacotherapy of diseases associated with following systems/ diseases .

Topic	Hrs
Infectious diseases:	**37**

Guidelines for the rational use of antibiotics and surgical Prophylaxis, Tuberculosis, Meningitis, Respiratory tract infections, Gastroenteritis, Endocarditis, Septicemia, Urinary tract infections, Protozoal infection- Malaria, HIV & Opportunistic infections, Fungal infections, Viral infections, Gonorrhoea and Syphilis

Musculoskeletal disorders **12**

Rheumatoid arthritis, Osteoarthritis, Gout, Spondylitis, Systemic lupus erythematous

Renal system **10**

Acute Renal Failure, Chronic Renal Failure, Renal Dialysis, Drug induced renal disorders

Oncology: **10**

Basic principles of Cancer therapy, General introduction to cancer chemotherapeutic agents, Chemotherapy of breast cancer, leukemia. Management of chemotherapy induced nausea and emesis

Dermatology: **06**

Psoriasis, Scabies, Eczema, Impetigo

Theory Sessional examination syllabus

Sessional No.	Syllabus Chapters No.
I	1 (14 hours), 2
II	1 (14 hours), 3
III	1 (9 hours), 4,5

3.3 PHARMACOTHERAPEUTICS-II (PRACTICALS)

Theory: 75 Hours (3 Hrs/ Week)
Responsible member/s of the academic staff: Mr Balaji S (BS)

Hospital postings for a period of at least one month is required to understand the principles and practice involved in ward round participation and clinical discussion on selection of drug therapy. Students are required to maintain a record of 15 cases observed in the ward and the same should be submitted at the end of the course for evaluation.

Course Outcomes:

1. Gather and analyse patient medical records
2. Interpret and analyse the laboratory results of specific disease states
3. Develop individualized therapeutic plans based on the diagnosis.
4. Perform treatment chart review and identify medication-related problems (MRPs).
5. Communicate and resolve MRPs with concerned healthcare professionals.
6. Conduct medication history interview and patient medication counselling

ASSIGNMENTS

Students are required to submit written assignments on the topics given to them. Topics allotted should cover recent developments in drug therapy of various diseases. A minimum of THREE assignments [1500 – 2000 words] should be submitted for evaluation.

Format of the assignment

- Minimum & Maximum number of pages.
- Reference(s) shall be included at the end.
- Assignment can be a combined presentation at the end of the academic year
- It shall be computer draft copy
- Name and signature of the student
- Time allocated for presentation may be 8+2 min

Scheme of Practical Examination

	Sessional	Annual
Synopsis	05	15
Major Experiment	10	25
Minor Experiment	03	15
Viva	02	15
Max Marks	**20**	**70**
Duration	**03 hrs**	**04 hrs**

* ***Total Sessional marks is 30 (20 for practical Sessional plus 10 marks for regularity, promptness, viva-voce and record maintenance)***

3.4 PHARMACEUTICAL JURISPRUDENCE (THEORY)

Theory: 2Hrs/Week

Responsible member/s of the academic staff: Dr.Meghana G S(MGS)

Scope and Objectives: This course exposes the student to several important legislations related to the profession of pharmacy in India. The Drugs and Cosmetics Act, along with its amendments is the core of this course. Other acts, which are covered, include the Pharmacy Act, dangerous drugs, medicinal and toilet preparation Act etc. Besides this the new drug policy, professional ethics, DPCO, patent and design Act will be discussed.

Course Outcomes:

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

2. Understand the pharmacy education regulations, registration process and various rules and regulations implemented on narcotic drugs, medicinal and toilet preparations, and Magic remedies.

3. Detail the different Schedules of Drugs and Cosmetics and how various acts and rules are administered.

4. Understand the way how a pharmacist should conduct himself to physicians, co-workers and public and gives them knowledge about role of Pharmacist in society.

5. Understand the process of Drug Price Control on various essential medicine and new drugs

6. Discuss the salient features of drugs and magic remedies act, prevention of cruelty to animals' act and drugs price control order.

Teaching/learning methodologies used:

1. Lecture
2. Oral presentation

Course materials

TEXT BOOKS

Mithal , B M. Textbook of Forensic Pharmacy. Calcutta: National; 1988.

REFERENCE BOOKS

a. Singh, KK, editor. Beotra's the Laws of Drugs, Medicines & cosmetics. Allahabad: Law Book House; 1984.

b. Jain, NK. A Textbook of forensic pharmacy. Delhi: Vallabhprakashan ; 1995.

c. Reports of the Pharmaceutical enquiry Committee

d. I.D.M.A., Mumbai. DPCO 1995

e. Various reports of Amendments.

f. Deshapande, S.W. The drugs and magic remedies act 1954 and rules 1955. Mumbai: Susmit Publications; 1998.

g. Eastern Book Company .The narcotic and psychotropic substances act 1985, Lucknow: Eastern; 1987.

Lecture wise program

No.	Topic	Hrs
1	**Pharmaceutical Legislations –** A brief review. - Introduction, Study of drugs enquiry committee, Health survey and development committee, Hathi committee and Mudaliar committee	02
2	**Code of Pharmaceutical ethics** - Definition, Pharmacist in relation to his job, trade, medical profession and his profession, Pharmacist's oath	02
3	**Drugs and Cosmetics Act, 1940 and its rules 1945.** - Objectives, Definitions, Legal definitions of schedules to the act and rules - Import of drugs – Classes of drugs and cosmetics prohibited from import, Import under license or permit. Offences and penalties. - Manufacture of drugs – Prohibition of manufacture and sale of certain drugs, Conditions for grant of license and conditions of license for manufacture of drugs, Manufacture of drugs for test, examination and analysis, manufacture of new drug, loan license and repacking license. Detailed study of schedule M, N and Y. Offences and penalties - Sale of Drugs – Wholesale, Retail sale and Restricted license. Offences and penalties - Labeling & Packing of drugs- General labeling requirements and specimen labels for drugs and cosmetics, List of permitted colors. Offences and penalties - Administration of the act and rules – Drugs Technical Advisory Board, Central drugs Laboratory, Drugs Consultative Committee, Government analysts, Licensing authorities, controlling authorities, Drug Inspectors	22
4	**Pharmacy Act –1948**. 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.	05
5	**Medicinal and Toilet Preparation Act –1955**. Objectives, Definitions, Licensing, Manufacture In bond and Outside bond, Export of alcoholic preparations, Manufacture of Ayurvedic, Homeopathic, Patent&Proprietory Preparations. Offences and Penalties	04

6	**Narcotic Drugs and Psychotropic substances Act-1985 and Rules**. Objectives, Definitions, Authorities and Officers, Constitution and Functions of narcotic & Psychotropic Consultative Committee, National Fund for Controlling the Drug Abuse,Prohibition, Control and Regulation, opium poppy cultivation and production of poppy straw, manufacture, sale and export of opium, Offences and Penalties	**04**
7	**Study of Salient Features of Drugs and magic remedies Act and its rules.** Objectives, Definitions, Prohibition of certain advertisements, Classes of Exempted advertisements, Offences and Penalties	**02**
8	**Drug Price control Order & National Drug Policy (Current).** - Objectives, Definitions, Sale prices of bulk drugs, Retail price of formulations, Retail price and ceiling price of scheduled formulations, Implementation of prices Fixed/ revised. **Pharmaceutical Policy 2002:** Objectives, Approaches in the review, Salient features of Pharmaceutical Policy 2002.	**02**
9	**Prevention Of Cruelty to animals Act-1960.** 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	**03**
10	**Patents & design Act-1970.** - Objectives, definitions, Types of patent, PCT, Patentable and not patentable inventions, Applications for patents, Term of patent, revocation of patents, compulsory licensing, Offences and penalties. - Registration of designs, copyright, prohibition of certain designs, cancellation of designs, Offences and penalties.	**03**
11	**Brief study of prescription and Non-prescription Products.**	**01**

Assignments: Format of the assignment

1. Minimum & Maximum number of pages
2. It shall be a computer draft copy
3. Reference(s) shall be included at the end.
4. Name and signature of the student
5. Assignment can be a combined presentation at the end of the academic year.
6. Time allocated for presentation may be 8+2 Min

Case studies relating to

1. Drugs and Cosmetics Act and rules along with its amendments, Dangerous Drugs Act, Medicinal and Toilet preparation Act, New Drug Policy, Professional Ethics, Drugs (Price control) Order, Patent and Design Act.
2. Various prescription and non-prescription products.
3. Medical and surgical accessories.

4. Diagnostic aids and appliances available in the market.

Theory Sessional examination syllabus

Sessional No.	Syllabus
	Chapters no.
I	1 to 3
II	3 to 5
III	6 to 11

3.5 MEDICINAL CHEMISTRY (Theory)

Theory: 3 Hrs. /Week

Responsible members of the academic staff: Dr H Yogish Kumar (HYK)

1. Scope and Objectives: This course is designed to impart a fundamental knowledge on the structure and functions of the different drugs. The course gives details of Chemistry, Mechanism of action, metabolism, adverse effects, Structure Activity Relationships (SAR) and uses of Chemotherapeutic Agents, Cardiovascular Drugs and synthesis of some important drugs. The course also covers modern techniques of drug design, which include Prodrug concept and combinatorial chemistry.

Course Outcomes:

1. Explain the basic concepts of rational drug design such as combinatorial chemistry, prodrug approach and drug metabolism.
2. Understand the chemistry, mechanism of action, metabolism, adverse effects, structure activity relationships (SAR) and uses of chemotherapeutic agents and antibiotics.
3. Develop the chemical synthesis of some important drugs.
4. Understand the chemistry, mechanism of action, metabolism, adverse effects, structure activity relationships (SAR) hypoglycemic drugs.
5. Understand the chemistry, mechanism of action, metabolism, adverse effects, structure activity relationships (SAR) and uses of thyroid-antithyroid drugs, diagnostic agents and steroidal hormones.
6. List the brand names of important marketed drugs

Teaching/learning methodologies used:

1. Lecture
2. Practical/Lab

2. Course materials:

TEXT BOOKS

a. Wilson and Giswolds, Text book of Organic and pharmaceutical chemistry
b. Principles of Medicinal chemistry- William O. Foye

REFERENCE BOOKS

a. A I Vogel Text book of Practical Organic Chemistry
b. Text Book of organic chemistry by I. L. Finar
c. S.N. Pandeya, A Text Book of Medicinal Chemistry, S.G. Publisher, Varanasi, Vol I & II.

3. **Lecture wise Programme:**

	Topic	Hrs
I	**Modern concept of rational drug design:** A brief introduction to prodrug & Drug latentiation, combinatorial chemistry, general pathways & factors affecting drug metabolism.	**04**
II	A study of the development of the following classes of drugs including SAR,mechanism of action, synthesis of important compounds (marked with asteric*), brand names of important marketed products and their side effects.	**15**

1. **Anti-infective agents:**

a)Local anti-infective agents: Alcohols, Phenols, Cationic surfactants, Nitrofurans.
b)Antifungal agents: Azoles, Miscellaneous & Antifungal Antibiotics.
c)Urinary tract anti-infectives: SAR of quinolone antibacterial agents, Norfloxacin, ciprofloxacin*, sparfloxacin, ofloxacin,
d) Antitubercular agents: Management of tuberculosis**.**
Synthetic anti TB agents: INH*, Pyrizinamide, Ethambutol.
Anti TB antibiotics: Rifampin, Capreomycin
e) Antiviral agents and Anti AIDS agents: Amantadine, Acyclovir, Trifluridine, Zidovudine, stavudine.
f) Antiprotozoal agents: Introduction to protozoal diseases and causative Organisms. Metronidazole, diloxanide furoate, dehydroemetine, nifurtimox
g) Anthelmentics: Benzimidazoles & miscellaneous.

2	**Sulfonamides and sulfones** History and development of sulfonamides, SAR and mechanism of action of Sulfonamides. Sulfamethoxazole, sulfisoxazole, sulfacetamide*, sulfasalazine, Folate reductase inhibitors, trimethoprim*, synergistic action of cotrimoxazole. Sulfones: Dapsone	**05**
3.	**Antimalarials:** Etiology of malaria, SAR and mechanism of action of quinoline Antimalarials. Chloroquine, pamaquine*, quinacrine, pyrimethamine, cycloguanil	**05**
4.	**Antibiotics** Historical background and classification of antibiotics. **Beta lactam antibiotics:** Development of acid resistant and extended spectrum Penicillins. Penicillin G, ampicillin, amoxicillin, cloxacillin. **Beta lactamase inhibitors:** Clavulanic acid, Thienamycin. **Cephalosporins:** Cephelexin, Cefadroxil, Cefuroxime. **Aminoglycosids:** Streptomycin, Neomycin, Amikacin, Gentamicin. **Tetracyclines:** Chemistry and SAR of tetracyclines, chlortetracycline, doxycycline, Minocycline. **Macrolides:** Erythromycin, Azithromycin	**12**

Miscellaneous: Clindamycin, Bacitracin, Chloramphenicol*.

5. **Antineoplastic agents** **06**

Historical background and classification of antineoplastic agents.
Alkylating agents: Cyclophosphamide, Mechlorethamine, Cholrambucil.
Antimetabolites: Mercaptopurine, Flurouracil, Methotrexate.
Antibiotics: Dactinomycin, Mitomycin, Streptozocin.
Plant products: Etoposide, Taxol, Vincristine and Vinblastine.
Miscellaneous: Cisplatin, Interferons.

6 Cardiovascular agents **12**

a) Antianginal agents and vasodilators
Nitrovasodilators: Amyl nitrite, Isosorbide dinitrate
Calcium channel blockers: Verapamil, Diltiazem

b) Antiarrhythmic agents:
Class I: Quinidine, Phenytoin, Lidocaine, Encainide
Class II: Beta blockers- Propranolol
Class III: Amiodarone
Class IV: Calcium channel blockers: Verapamil, Diltiazem.

c) Antihypertensive agents:
Betablockers: Propranolol*,
ACE inhibitors: Captopril, Enalapril
Angiotensin antagonists: Losartan
Calcium channel blockers: Nifedipine, Amlodepine
Adrenergic agents: Clonidine, Methyl Dopa
Adrenergic antagonists: Prazosin, Reserpine

d) Antihyperlipidemic agents: Types of hyperlipoproteinemia. clofibrate, fenofibrate, cholestyramine, lovastatin, simvastatin.

e) Anticoagulants: Warfarin, Dicumarol, Anisindione

7. **Hypoglycemic agents:** **03**

History, development and SAR of sulfonylureas: Tolbutamide*, Chlorpropamide, Glipizide
Metaglinides: Repaglinide
Thiazolindiones: Rosiglitazone, Pioglitazone
Biguanides: Metformin, Phenformin
Miscellaneous: Acarabose, Miglitol

8. **Thyroid and Antithyroid agents:** L-thyroxine, L-threonine, methimazole Propyl thiouracil. **01**

9. **Diuretics:** **05**

Carbonic anhydrase inhibitors: Acetazolmide*
Thiazide diuretics: SAR of thiazide diuretics, Chlorthiazide, Benzthiazide, Xipamide, Chlorthalidone.
Loop diuretics: Frusemide*, Ethacrynic Acid
Potassium sparing diuretics: Spiranolactone, Amiloride
Miscellaneous: Mannitol.

10. **Diagnostic agents** **02**

Iodipamide, Diatriazoate Sodium amino hippurate, Sulfobromphthalein, Fluorescein sodium.

11 Steroidal Hormones and Adrenocorticoids **05**

Estrogens: Estradiol, DES
Progestines: Progesterone, Norethindrone, Testosterone, Nandralone
Betamethasone, Prednisolone, Beclomethasone

Theory Sessional examination syllabus

Sessional No.	Syllabus
	Chapters no.
I	I & II (1 & 2)
II	3 to 5
III	6 to 11

3.5 MEDICINAL CHEMISTRY (PRACTICALS)

Theory: 75 Hours (3 Hrs/ Week)
Responsible member/s of the academic staff: Dr Yogish Kumar H (HYK)

Course Outcomes:

1. Perform the synthesis of medicinally important compounds or intermediates
2. Demonstrate the various synthetic mechanisms.
3. Comprehend the methods for determination of QSAR parameters Analysis such as partition coefficient etc.,
4. Estimate the amount & percentage purity of important drugs from the course content.
5. know the chemical tests for the monograph analysis of the individual drugs
6. Understand the process of recrystallization in organic synthesis

General Requirements: Observation Book, Match Box, Napkin, Butter paper, Marker pen, Self sealing pouch.

List of experiments

A. Assays of important drugs from the course content. 8

1. Assay of ascorbic acid by cerimetry
2. Assay of ascorbic acid by Iodimetry
3. Assay of metronidazole by NAT
4. Assay of chloroquine phosphate by NAT
5. Assay of dapsone by diazotization
6. Assay of INH by bromometry
7. Assay of analgin by iodimetry
8. Assay of diclofenac by alkalimetry

B. Preparation of medicinally important compounds or intermediates required for synthesis of drugs 10

1. Preparation of 2,3 diphenyl quinoxaline from OPDA
2. Preparation of benztriazole from OPDA
3. Preparation of benzimidazoles from OPDA
4. Preparation of 7-hydroxy 4-methyl coumarin
5. Preparation of benzyl from benzoin
6. Preparation of phenytoin from benzil

7. Preparation of phenothiazine from diphenyl amine
8. Preparation of chlorbutanol
9. Preparation of eosin from resorcinol
10. Preparation of fluorescein from eosin
11. Preparation of triphenyl imidazole from benzoin

C. Monograph analysis of important drugs. 5

1. Monograph analysis of ibuprofen
2. Monograph analysis of aspirin
3. Monograph analysis of caffeine
4. Monograph analysis of a sulfa drug
5. Monograph analysis of paracetamol

D. Determination of partition coefficients, dissociation constants of drug substances 2

Scheme of Practical Examination:

	Sessionals	**Annual**
Synopsis	04	10
Major Experiment	06	30
Minor Experiment	06	20
Viva	04	10
Max Marks	**20**	**70**
Duration	**03 hrs**	**04 hrs**

**** Total sessional marks is 30 (20 for practical sessional plus 10 marks for regularity, promptness, viva-voce and record maintenance).***

3.6 PHARMACEUTICAL FORMULATIONS (THEORY)

Theory: 2 Hrs. /Week

Responsible member/s of the academic staff: Dr. Asha Spandana K M (ASP)

Scope and Objective: This subject is designed to impart knowledge and skills necessary for formulation and evaluation of various pharmaceutical dosage forms. Chapters dealt cover briefly about solid, liquid, semi-solid dosage forms and injectable preparations. Advancements in drug delivery systems, novel drug delivery systems are also dealt in the subject.

Course Outcomes:

1. Explain the principles and concepts of pharmaceutical formulations, including different dosage forms such as tablets, capsules, solutions, suspensions, emulsions, creams, ointments, and gels.
2. Describe about the different components of pharmaceutical formulations, including active pharmaceutical ingredients (APIs), excipients, and additives, and their role in drug delivery and stability.
3. Familiarize with the different manufacturing processes used to produce pharmaceutical formulations, including granulation, compression, coating, and encapsulation.
4. Demonstrate the quality control and quality assurance aspects of pharmaceutical formulations
5. Explore the challenges and opportunities in the development and optimization of novel drug formulations, including the use of novel drug delivery systems and emerging technologies
6. Explain the product labeling and packaging for pharmaceutical formulations

Teaching/learning methodologies used:

1. Lecture
2. Practical/Lab
3. Discussion

Course materials

TEXT BOOKS

a. Pharmaceutical dosage forms, Vol, I, II and III by Liberman & Lachman

b. Tutorial Pharmacy – Cooper & Gun

c. Rowlings Text book of Pharmaceutics

REFERENCE BOOKS

a. Remington's Pharmaceutical Sciences

b. United States Pharmacopoeia / British Pharmacopoeia /IP

Lecture wise Programme:

No.	Topic	Hrs
1	**Pharmaceutical dosage form:** Concept and classification	03
2	**Tablets**: Formulation of different types of tablets, tablet excipients, granulation techniques, Tablet coating, Type of coating, quality control tests and evaluation for uncoated and coated tablets.	10
3	**Capsules:** Production and filling of hard gelatin capsules, Raw materials for shell, finishing. Production and filling of soft gelatin capsules, Importance of base adsorption, quality control tests for hard and soft gelatin capsules.	07
4	**Liquid orals**: Formulation, Manufacturing and evaluation of suspensions, emulsions and solutions. Instability problems in suspensions and emulsions.	06
5	**Parenterals**: Definition, types, advantages and limitation, general formulation, vehicles, production procedure, production facilities, and controls. Formulation of injections, sterile powders, implants and long acting parenterals, emulsions and suspensions. Containers and closures pertinent to sterile preparations, Pharmacopoeial quality control tests for parenterals, Sterilization and evaluation.	10
6	**Semi-Solids**: Introduction and classification Factors affecting absorption, Packaging, storage and labeling. Ointments: Types of Ointment Base Preparation of ointment. Gels: Types and formulation of Gels	06
7	**Definition and concept of Controlled and novel Drug delivery systems**	08

with available examples, viz. transdermal, buccal, vaginal, nasal, implantable, ocular drug delivery systems.

Theory Sessional examination syllabus

Sessional No.	Syllabus
	Chapters no.
I	1 to 3 (Hard Gelatin Capsules)
II	3, (Soft gelatin capsules), 4 & 5
III	6 to 7

3.6 PHARMACEUTICAL FORMULATIONS (PRACTICALS)

Practicals: 3 Hrs. /Week

Responsible member/s of the academic staff: Dr. Asha Spandana K M (ASP)

Course Outcomes:

1. Understand the principles of pharmaceutical formulation design, including the selection of excipients, drug delivery systems, and manufacturing processes.
2. Ability to formulate different types of pharmaceutical dosage forms, such as tablets, capsules, creams, and liquids.
3. Proficiency in measuring and analyzing the physical and chemical properties of pharmaceutical formulations
4. Ability to troubleshoot and optimize formulations, based on the evaluation of their physical and chemical properties.
5. Ability to interpret and analyze data from experiments and to draw conclusions about the effectiveness of different formulations.
6. Understand the role of formulation design in enhancing drug efficacy and patient compliance.
7. Develop collaborative skills that require students to work together to develop and test formulations.

List of Experiments:

1. **Manufacture of Tablets**
   - **a.** Ordinary compressed tablet-wet granulation
   - **b.** Tablets prepared by direct compression.
   - **c.** Soluble tablet.
   - **d.** Chewable tablet.
2. **Formulation and filling of hard gelatin capsules**
3. **Manufacture of parenterals**
   - **a.** Ascorbic acid injection
   - **b.** Calcium gluconate injection

c. Sodium chloride infusion.
d. Dextrose and Sodium chloride injection/ infusion.

4. Evaluation of Pharmaceutical formulations (QC tests)
a. Tablets
b. Capsules
c. Injections

5. Formulation of two liquid oral preparations and evaluation by assay
a. Solution: Paracetamol Syrup
b. Antacid suspensions- Aluminum hydroxide gel

6. Formulation of semisolids and evaluation by assay
a. Salicyclic acid and benzoic acid ointment
b. Gel formulation Diclofenac gel

7. Cosmetic preparations
a. Lipsticks
b. Cold cream and vanishing cream
c. Clear liquid shampoo
d. Tooth paste and tooth powders.

8. Tablet coating (demonstration)

Scheme of Practical Examination:

	Sessionals	**Annual**
Synopsis	04	15
Major Experiment	08	25
Minor Experiment	06	15
Viva	02	15
Max Marks	**20**	**70**
Duration	**03 hrs**	**04 hrs**

Note: Total sessional marks is 30 (20 for practical sessional plus 10 marks for regularity, promptness, viva-voce and record maintenance).

JSS Academy of Higher Education & Research
JSS College of Pharmacy
Sri Shivarathreeshwara Nagara, Mysore-570015
CLASS TIME TABLE- 2023-24

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Class: PHARM. D –THIRD YEAR

Lunch Break: 1.00 to 2.00 PM
Tea Break: 10.40 to 11.10 AM
3.50 PM to 4.05 PM

Time / Day	9.00-9.50AM	9.50-10.40AM	TEA BREAK	11.10-12.05PM	12.05–1.00PM	LUNCH BREAK	2.00-2.55PM	2.55-3.50PM	TEA BREAK	4.05-5.00PM	5.00-5.55 PM
Monday	Medicinal Chemistry HYK	Pharm. Juris. **MGS**		Pharm. Formulation ASP	Pharm. Analysis RSC		←--BII -------ASP--------- Pharm. ←BI -- KLK --- Pharmacology			Formulation--→ -II----------→	---------
Tuesday	----------	←BII------ BS ←BI ---- ASP--		---Pharmaco Therapeutics-II-----→ --- ---- Pharm. Formulation-------→			Pharmaco Therapeutics-II BS	Pharm. Analysis RSC		Pharmaco Therapeutics-II BS	---------
Wednesday	Medicinal Chemistry **HYK**	Pharm. Juris. **MGS**		Pharmacology –II KLK	Pharm. Formulation(Tu) ASP		Medicinal Chemistry HYK	Pharmacology – II KLK		Pharm. Analysis RSC	---------
Thursday	----------	←BII-- KLK-- ←BI ----- HYK		----------Pharmacology –II---------→ --------Medicinal Chemistry -------			Pharmacolo–II (Tut) KLK	Pharm. Analysis (Tu) RSC		Pharmacology – II KLK	---------
Friday	----------	←-BI--- BS ←BII------ RSC		-------- Pharm. Therapeutic-II -----→ --------- Pharm. Analysis-------→			Pharmaco Therapeutics-II BS	Medicinal Chemistry (Tut) HYK		Pharmaco Therapeutics-II BS	---------
Saturday	Pharm. Formulation ASP	**←BI------- RSC**– ←BII --- HYK --		---------- Pharm. Analysis -----→ ------ Medicinal Chemistry -------→			----------				

***Effective from: 19th June 2023**

Note: 1. No tea break for practicals

Time table Coordinator

Principal

Copy: SNB/LNB/SCF/e.copy – teachers/ Office in charge – time table / Time table coordinator