Jagadguru Sri Shivarathreeshwara University

JSS College of Pharmacy

Sri Shivarathreeshwara Nagar, Mysuru-570015

Ph: 0821-2548353, Fax: 0821-2548359, Email: jsscpmy@jssuni.edu.in

Website: www.jssuni.edu.in

An ISO 9001:2008 Certified Institution

Accredited
'A' Grade by NAAC

Course Handout

2017-18

Class: IV B. Pharm

Name : _____

Roll No. : _____

Accredited
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VISION

To be a leader in pharmaceutical sciences & pharmacy practice education, training, research and continuous professional development for pharmacists and Pharmaceutical Scientists providing competent patient care and nurturing drug discovery and development.

MISSION

- To impart knowledge, develop skills and competencies in students in pharmaceutical sciences and pharmacy practice.
- Develop and advance the knowledge, attitude and skills of pharmacists and faculty members who can provide comprehensive pharmaceutical care to patients, improve patient outcomes, and meet societal needs for safe and effective drug therapy.
- To develop, promote and nurture research activities in pharmaceutical sciences and pharmacy practice and translating research into healthcare

CORE VALUES

- Innovation, Leadership, Excellence, Integrity, Respect, Professionalism

Academic Calendar 2017-18
(IV B.Pharm)

1. **Commencement of Classes**

   IV B.Pharm - 21st June 2017

2. **Sessional Examination Schedule**

I	II
26, 28, 30, 31st Aug & 1st Sep 2017	26, 27, 28, 30 & 31st Oct 2017

3. **Closure of Term** - 31st October, 2017
4. **Annual Examination** - 15th November, 2017
5. **Annual Vacation** - From 24th Dec' 2017 to 16th Jan' 2018

Teacher's Incharge

Class	Class Teacher	Batch No.	Batch Teacher
IV B.Pharm	Dr. R.S. Chandan	I	Dr. Anand Kumar Tengli
		II	Dr. B. Vishwanathan
		III	Dr. Rupshee Jain
		IV	Ms. Nagashree

ACTIVITIES AND COORDINATORS 2017-18

Curricular & Co curricular activities

Sl. No	Activities	Coordinators	Schedule
1.	Induction, learning skills and personality development programmes for fresher's	DHPG	First Week of Commencement of First year of each course
2.	Anti ragging cell	JS/AMM/JUS	June 17 - May 18
3.	Grievance and redressal cell	PKK	June 17 - May 18
4.	Industrial Visits, Training and placements	MNP/ABP	June 17 - May 18
5.	Guest lectures &Seminars/conferences/training/workshop • organized at college • delivered/attended by staff	HVG	June 17 - May 18
6.	Internal Assessment Committee Chairperson Members	 GVP KM/RSS/SNM/BMV	June 17 - May 18
7.	• Academic Council Board • Identification of Advanced/ Medium/ Slow learners	Class Teachers	June 17 - May 18
8.	Ethics committee Meeting • Animal • Human	 KLK MR	June 17 - May 18
9.	Time table	MSV/RSS/AKT/HKS/AMR/NPK	June 17 - May 18
10.	IQAC	MNP/VKG/VJ/AMM/JL	June 17 - May 18
11.	Women's cell (Prevention of Sexual Harassment Cell)	MNN	June 17 - May 18
12.	Scholarship Bureau	RSC	June 17 - May 18
13.	Compilation of publications (Research papers/books/chapters)	BMG	June 17 - May 18
14.	Research Review Committee -Compilation of Ph.D details and funded projects - Plagiarism - Review of publications	Chairperson – DVG Members – BMG/BRP/HVG/KU	June 17 - May 18
15.	Pharmacy Education Unit (CCLPE)	PKK/KU/AMR	June 17 - May 18
16.	Admission Facilitation Cell	TMP/BV/JS/HP	June 17 - May 18
17.	Annual result analysis List of merit students	Exam section/ Program committee	June 17 - May 18

18.	GPAT and other competitive exams (TOEFL, GRE etc.)	AMM	June 17 - May 18
19.	Innovative Pedagogy	Pharmacy Education Unit	June 17 - May 18
20.	Library orientation	NS	June 17 - May 18
21.	Soft Skills Training	VKG	June 17 - May 18

Program Committee

Sl. No.	Program	Chairperson	Member Secretary	Schedule
22.	D.Pharm	GP	BMV	June 17 - May 18
23.	B.Pharm	PKK	KM	June 17 - May 18
24.	Pharm.D	MR	RSS	June 17 - May 18
25.	M.Pharm	GP	SNM	June 17 - May 18

Extracurricular activities

Sl. No.	Activities	Coordinators	Schedule
26.	• Selection of Class Representatives, Pharmaceutical society members • Annual planning and execution of Student centered and professional activities including inauguration of IPS	AKT	Within a month of Commencement of course June 17 - May 18
27.	JASPHARM	BMV	June 17 - May 18
28.	STUMAG	JUS	June 17 - May 18
29.	Sports coordinators	KLK/JK/NPK	June 17 - May 18
30.	NSS coordinators	BRJ/MPG	June 17 - May 18
31.	Cultural & Literary coordinators	MNN/SP/RSC	June 17 - May 18

Other Institutional activities

Sl. No.	Activities	Coordinators	Period
32.	Annual Day celebration	HVG/SM	March 2018
33.	Course handouts/ Teachers diary/ Student handbook/faculty handbook	MPV/RSC	June 2017
34.	National Pharmacy Week (NPW) & Pharmacists Day	UM + IPA team	Nov 2017
35.	Alumni association	PKK/HVG/SM/BS	June 17 - May 18
36.	Herbal and College Garden	JS	June 17 - May 18
37.	ISO	MSV/DHPG	June 17 - May 18
38.	Press and publicity	BMV	June 17 - May 18
39.	Foreign students cell	MPV	June 17 - May 18
40.	Governing council meeting	Principal's Office	June 17 - May 18

41.	Monthly/Annual report of college activities to JSSU and other agencies	HoDs/JL	June 17 - May 18
42.	College website	HKS/VKG	June 17 - May 18
43.	Research & Consultancy Co-ordinator • Collaboration with Industries/organizations • Interdepartment/Interdisciplinary research	SBC	June 17 - May 18
44.	Co-ordinator - JSSUonline.com	VKG/ABP	June 17 - May 18
45.	JSSU Newsletter	BMV	June 17 - May 18
46.	Annual group photo session	KM/Shivanna	June 17 - May 18
47.	Lab coat and Blazers	JS	June 17 - May 18
48.	Notice Board (SNB, LNB and IIPC), Departmental staff list	Nagaraju	June 17 - May 18
49.	Stock verification	Office staff/Librarian	June 17 - May 18
50.	Student Liaison	Ms. Divya S	June 17 - May 18
51.	Feedback	VJ/Class teachers/ Course Coordinators	June 17- May 18

B.PHARM

Program Educational Objectives (PEOs):

PEO 1: To acquire the theoretical knowledge of pharmaceutical sciences

PEO 2: To acquire practical skills in

- isolation of medicinal compounds from natural sources
- synthesis and analysis of medicinal compounds
- screening medicinal compounds for pharmacological activities
- formulation of pharmaceutical dosage forms and their evaluation

PEO 3: To develop competent Pharmacists with ethical attitude, research intuition, leadership qualities, to participate in public health programs and engage in life-long learning

Program Outcomes (POs):

1. Ability to acquire knowledge of pharmaceutical sciences
2. Ability to design and conduct experiments, to analyze and interpret data
3. Ability to demonstrate effective planning, develop and implement plans within time frame.
4. Ability to function effectively individually and on teams, including diverse and multidisciplinary, to accomplish a task.
5. Ability to understand and appreciate the role of pharmacist in healthcare services.
6. Understanding of professional, ethical, legal, security and social issues and responsibilities.
7. Ability to understand contemporary issues relating to pharmacy profession and challenges ahead.
8. Awareness of ethical and professional responsibilities.
9. Possess the necessary interpersonal and communication skills to be a productive member of the team in work environment.
10. Ability to use current techniques, skills, and modern tools.
11. A strong background and motivation to pursue life-long learning

COURSE HAND OUT 2017-18 Class: IV B. Pharm

1. Course Details

Sl. No.	Subject	Theory hours / week	Practical hours / week
4.1	Medicinal Chemistry -II	03	03
4.2	Pharmacology - II	03	03
4.3	Formulative and Industrial Pharmacy	03	03
4.4	Instrumental Method of Analysis	03	03
4.5	Pharmacy Practice	03	-
4.6	Pharmaceutical Marketing and Management	03	-
	Total number of Working hours	18	12
	Grand Total	**30 hours/week**	

2. Evaluations:

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 shall constitute the sessional award in theory.

Practical: Internal assessment Marks: 30. Three periodic practical sessional examinations will be conducted for 20 marks and average of best two average of best two shall constitute the sessional award in practical. 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
Second class	50% and above
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.

4.1 MEDICINAL CHEMISTRY –II

Teacher/s: Dr. Anandkumar R. Tengli (AKT) 75 Hours (3 hrs/ week)

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

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

Theory:

1. describe the various tools of rational drug design
2. explain the importance of a drug with respect to its chemical class, pharmacological activity and therapeutic value.
3. summarize the classification of various categories of therapeutic agents based on their chemical nature/mechanism of action
4. describe the mode of action, drug target and structure & activity relationship (SAR)of a drugs belonging to chemical class.
5. explain the possible metabolic pathways of the drugs and the adverse effects
6. write the principle and reaction associated with the synthesis of selected drug molecules

Practical:

1. summarize the principle involved in the synthesis of selected heterocyclic compounds/intermediates used in the synthesis of drugs
2. synthesis the selected heterocyclic compounds/intermediates/drugs
3. perform assay/monograph analysis of the drug substance/its pharmaceutical formulation
4. explain the principle involved in the volumetric analysis of drug substances
5. draw the structure of designed compounds/drugs and calculate various physicochemical properties using software

3. Course materials:

Recommended Books

1. Wilson and Giswold's Organic medicinal and Pharmaceutical Chemistry, 11th edition.
2. Foye's Principles of Medicinal Chemistry, 5th edition.
3. Burger's Medicinal Chemistry, Vol I to IV.
4. Introduction to principles of drug design- Smith and Williams.
5. Remington's Pharmaceutical Sciences, 20th edition.
6. Martindale's extra pharmacopoeia.
7. Organic Chemistry by I.L. Finar, Vol. II.
8. The Organic Chemistry of Drug Synthesis by Lednicer, Vol. 1-5.
9. Indian Pharmacopoeia 1996 and 2007 editions.

10. Text book of practical organic chemistry- A.I.Vogel, 5th edition.

Lecture wise program:

	Topic	Hrs
I.	**Introduction to Drug Design**	**07**
A.	**Principles of Drug Design** 1. Various approaches used in drug design 2. Physicochemical parameters used in quantitative structure activity relationship (QSAR) such as partition coefficient, Hammets electronic parameter, Tafts steric parameter and Hansch analysis. 3. Pharmacophore and docking technique	**03**
B.	**Prodrugs:** Basic concepts and application of prodrugs design	**03**
C.	**Combinatorial Chemistry:** Concept and applications of combinatorial chemistry: solid phase and solution phase synthesis	**01**
II.	**Anti-infective agents**	**16**
A.	**Local anti-infective agents:** Ethyl alcohol, Isopropyl alcohol, Formaldehyde, Sodium glutaraldehyde solution, Liquified phenol, Hexachlorophene*, Eugenol, Hexyl resorcinol, Anthralin, Hydrous benzoylperoxide, Halazone*, Benzalkonium chloride*, Methylbenzethorium chloride*, Cetylpyridinium chloride, Chlorhexidine gluconate*, Gentianviolet, Methylene blue, Thiomersal, Methyl paraben and Sodium benzoate.	**03**
B.	**Antifungal agents:** **Antifungal antibiotics:** Amphotericin-B, Nystatin, Natamycin and Griseofulvin **Synthetic Antifungal agents:** Clotrimazole, Econazole nitrate, Butoconazole, Oxiconazole nitrate, Tioconozole, Miconazole*, Ketoconazole, Terconazole, Itraconazole, Fluconazole, Naftifine hydrochloride, Tolnaftate*, Cyclopiroxolamine.	**03**
C.	**Urinary tract anti-infective agents** **Quinolones:** SAR of quinolones, Nalidixic Acid*, Cinoxacin, Norfloxacin, Enoxacin, Ciprofloxacin, Ofloxacin, Lomefloxacin, Sparfloxacin. **Miscellaneous:** Furazolidine, Nitrofurantoin* and Methanamine.	**03**
D.	**Anti-tubercular Agents** **Synthetic anti tubercular agents:** INH*, Ethionamide, ethambutol, Pyrazinamide, Para amino salicylic acid* **Anti tubercular antibiotics:** Rifampicin, Rifabutin, Cycloserine* and sterile Capreomycin sulphate.	**03**
E.	**Anti-protozoal Agents:** Metronidazole*, Diloxanide*, Iodoquinol, Pentamidine Isethionate, Atovaquone, Eflornithine	**01**
F.	**Anthelmintics:** Piperazine salts*, Diethylcarbamazine citrate*, Thiabendazole*, Mebendazole*, Albendazole, Niclosamide, Oxamniquine, Praziquantal and Ivermectin.	**02**
G.	**Anti-scabious and Anti-pedicular Agents:** Benzyl Benzoate*, Lindane* (Gamaxene), Crotamiton* and Permethrin.	**01**

III.	**Antimalarials:** Etiology of malaria, SAR **Quinolines:** Quinine sulphate, Chloroquine phosphate*, Hydroxy chloroquine sulphate, Amodiaquine hydrochloride*, Primaquine phosphate, Quinacrine hydrochloride, Mefloquine **Biguanides and dihydro triazines:** Cycloguanil pamoate, Proguanil **Miscellaneous:** Pyrimethamine, Trimethoprim and Sulfadoxine	**04**
IV.	**Antibiotics** Historical background, Nomenclature, stereochemistry, Structure activity relationship, chemical degradation classification and important products of the following classes. **β-Lactam antibiotics:** Penicillin, Cepholosporins, β- Lactamase inhibitors, Monobactams **Aminoglycosides:** Streptomycin, Neomycin **Tetracyclines:** Tetracycline, Chlortetracycline, Menocycline, Doxycycline **Macrolide:** Erythromycin and Azithromycin **Miscellaneous:** Chloramphenicol*, Clindamycin	**14**
V.	**Antiviral agents:** Types of virus, stages of viral infection, targets for prevention of viral infections. Amantadine hydrochloride, Rimantadine hydrochloride, Idoxuridine trifluoride, Acyclovir*, Gancyclovir, Zidovudine, Didanosine, Zalcitabine, Lamivudine, Ribavirin, Saquinavir, Indinavir and Ritonavir	**03**
VI.	**Anti-neoplastic agents:** **Alkylating agents:** Meclorethamine*, Cyclophosphamide, Melphalan, Chlorambucil, Busulfan, Thiotepa **Antimetabolites:** Mercaptopurine*, Thioguanine, Fluorouracil, Floxuridine, Cytarabine, Methotrexate*, Azathioprine **Antibiotics:** Dactinomycin, Daunorubicin, hydrochloride, Doxorubicin hydrochloride, Bleomycin **Plant products:** Etoposide, Vinblastin sulphate, Vincristin sulphate **Miscellaneous:** Cisplatin and Mitotane	**05**
VII.	**Sulphonamides and Sulphones** Historical development, chemistry, classification and SAR of Sulfonamides: Sulphamethizole, Sulfisoxazole, Sulphamethizine, Sulfacetamide Sodium*, Sulphapyridine, Sulfamethoxaole*, Sulphadiazine, Mixed Sulfonamides, Mefenide Acetate, Silver Sulfadiazine, Sulfasalazine Folate reductase inhibitors: Trimethoprim*, Cotrimoxazole. Sulfones: Dapsone*	**03**
VIII.	**Antihistaminic agents** Histamine, receptors and their distribution in the human body **H1 – antagonists:** **Amino alkyl ethers:** Diphenhydramine*, Dimenhydrinate, Doxylamine **Ethylene diamines:** Tripelennamine, Thonzylamine **Piperazine derivatives:** Meclizine, Buclizine, Chlorcyclizine, Cetirizine	**05**

Propylamine derivatives: Chlorpheniramine*, Pheniramine
Tricyclic derivatives: Promethazine*, Trimeprazine, Phenidamine, Cyproheptadine, Azatidine
Second generation non sedating: Astemizole, Loratadine, Cetirizine, Acrivastine
H2-antagonists: Development of selective H2 antagonists - Cimetidine*, Famotidine, Ranitidine
Gastric Proton pump inhibitors: Omeprazole and Lansoprazole.

IX. **Prostaglandins and other eicosanoids:** History and discovery; eicosanoid biosynthesis; drug action mediated by eicosanoids; design of eicosanoid drugs; eicosanoids approved for human clinical use. **05**

X. **Sex hormones:** **04**
Androgens: testosterone
Estrogens: Esterodiol, Estrone, Estriol, Diethyl Stilbestrol
Progesterone and Oral contraceptives

XI. **Non Steroidal Anti-inflammatory Drugs & antigout** **04**
Anti-inflammatory agents: Sodium salicylate, Aspirin, Salsalate*, Mefenamic acid, Meclofenamate sodium, Indomethacin*, Sulindac, Tolmetin sodium, Zomepriac sodium, Diclofenac sodium, Ketorolac, Ibuprofen*, Naproxen*, Piroxicam, Phenacetin,
Acetaminophen, Antipyrine, Aminopyrine, Phenylbutazone* and Oxyphenbutazone

XII. **Narcotic analgesic:** **05**
Morphine and related drugs: SAR of Morphine analogues, Morphine sulphate, Codeine phosphat, Hydromorphone hydrochloride, Meperidine hydrochloride*, Alphaprodine hydrochloride, Anilerdine hydrochloride, Diphenoxylate hydrochloride, Loperamide hydrochloride, Fentanyl citrate*, Methadone hydrochloride*, Propoxyphene hydrochloride, Pentazocine, Levorphanol tartarate.
Narcotic antagonists: Nalorphine hydrochloride, Levallorphan tartarate and Naloxone hydrochloride,
Anti-tussives: Noscapine, Dextromethorphan hydrobromide and Benzonatate, Carbetapentane.

Theory Sessional examination syllabus

Sessional No.	Syllabus Chapters no.
I	I – II
II	III – VI
III	VII – XII

4.1 MEDICINAL CHEMISTRY–II (PRACTICALS)

Teacher/s: Dr. Anandkumar R. Tengli (AKT) & Dr. Rupshee Jain (RJ)

75 Hours (3 hrs/ week)

	Title of the experiment	Expts.
I	**Assay of medicinal compounds** 1. Chloroquine by non aqueous titration. 2. Ascorbic acid by iodimetry 3. Isonicotinic acid hydrazide by bromometry 4. Benzyl penicillin by iodometry. 5. Metronidazole by non-aqueous titration. 6. Dapsone by diazotisation 7. Phenols by formaldehyde	**05**
II	**Preparation of medicinally important compounds or intermediates required for synthesis of drugs.** 1. 2-Methyl benzimidazole from o-Phenylene diamine. 2. 2,3-Diphenyl quinoxaline from o-Phenylene diamine 3. Paracetomol from P-Amino phenol 4. Benzotriazole from O-phenylene diamine. 5. PAS from p-nitro salicylic acid 6. Fluorescein from Pthalic anhydride 7. Eosin from Fluorescein 8. p- Acetamido benzene sulphonyl chloride from Acetanilide 9. Sulphanilamide from p- Acetamido benzene sulphonyl chloride 10. Benzyl alcohol by Cannizoro's reaction 11. Chlorobutanol from Chloroform 12. Acedoben from PABA 13. Halazone from 4-(Aminosulfonyl)benzoic acid 14. Nitrofurazone from 2-Formyl-5-nitrofuran	**10**
III	**Preparation of medicinally important compounds or intermediates by Microwave irradiation technique**	**2**
IV	**Monograph analysis of selected drugs from course content** 1. Aspirin 2. Paracetamol 3. INH	**2**
V	**Determination of partition co-efficient and dissociation constant of compounds**	**3**
VI	**Determination of physicochemical properties such as logP, clogP, MR, Molecular weight, Hydrogen bond donors and acceptors for class of drugs course content using drug design software**	**3**

Recommended Books

1. Wilson and Giswold's Organic medicinal and Pharmaceutical Chemistry, 11th edition.
2. Foye's Principles of Medicinal Chemistry, 5th edition.
3. Burger's Medicinal Chemistry, Vol I to IV, 4th edition.
4. Introduction to principles of drug design- Smith and Williams.
5. Remington's Pharmaceutical Sciences, 20th edition.
6. Martindale's extra pharmacopoeia.
7. Organic Chemistry by I.L. Finar, Vol. II.
8. The Organic Chemistry of Drug Synthesis by Lednicer, Vol. 1-5.
9. Indian Pharmacopoeia 1996 and 2007 editions.
10. Text book of practical organic chemistry- A.I.Vogel, 5th edition.

	Sessionals	**Annual**
Synopsis	04	10
Assay/Estimation	06	30
Preparation	06	20
Viva	04	10
Max Marks	**20**	**70**
Duration	**03 hrs**	**04 hrs**

4.2 PHARMACOLOGY-II (THEORY)

Teacher/s: Dr. S.N. Manjula (SNM) **75 Hours (3 Hrs/ Week)**

Scope: This subject is intended to impart the fundamental knowledge on various aspects (classification, mechanism of action, therapeutic effects, clinical uses, side effects and contraindications) of drugs used in systemic diseases as well as infectious diseases. In addition, emphasizes on the basic concepts of bioassays and principles of toxicology

Objectives:

Upon completion of the subject, the student shall be able to:

Theory:

1. Classify the drugs used for systemic and infectious diseases
2. Explain the physiological and pathological role of hormones
3. Explain the mechanism of drug action and its relevance in the treatment of different diseases
4. Describe the principles of toxicology and treatment of various poisonings.
5. Explain the principles and methods of bioassay and significance of chronopharmacology

Practical:

1. Record DRC of agonists using simulated software and explain the effect of drugs on the CRC of agonist
2. Determine the concentration of unknown sample of agonist by different bioassay methods employing simulated software.
3. Describe the principle and method involved in determination pharmacokinetic parameters
4. Estimate the serum biochemical parameters and interpret the results

Lecture wise programme:

	Topic	Hrs
1.	**Pharmacology of Endocrine System** a. Basic concepts in endocrine pharmacology. b. Hypothalamic and pituitary hormones. c. Thyroid hormones and anti thyroid drugs, Parathormone, Calcitonin and Vitamin-D. d. Insulin, Oral Hypoglycemic agents and glucagon. e. ACTH and corticosteroids. f. Androgens and Anabolic steroids. g. Estrogens, progesterone and oral contraceptives. h. Drugs acting on the uterus.	**19**

2. **Pharmacology of Drugs acting on the Gastrointestinal Tract** **8**
   a. Antacids, anti-secretary and anti ulcer drugs.
   b. Laxatives and anti-diarrheal drugs.
   c. Appetite stimulants and suppressants.
   d. Digestants and carminatives.
   e. Emetics and anti-emetics.

3. **Chemotherapy** **24**
   a. General Principles of Chemotherapy.
   b. Sulfonamides and co-trimoxazole.
   c. Antibiotics- Penicillins, Cephalosporins, Chloramphenicol, Erythromycin, Quinolones and Fluoroquinolins, tetracycline and aminoglycosides
   d. Chemotherapy of tuberculosis, leprosy, fungal diseases, viral diseases, antiprotozoal drugs, anthelminitics, urinary tract infections and sexually transmitted diseases.
   e. Chemotherapy of malignancy

4. **Autacoids** **9**
   a. Histamine, 5-HT and their antagonists.
   b. Prostaglandins, Thromboxanes and Leukotrienes.
   c. Pentagastrin, Cholecystokinin, Angiotensin, Bradykinin and Substance P.
   d. Analgesic, anti-pyretic, anti-inflammatory and anti-gout drugs.

5. **Principles of Toxicology** **6**
   a. Definition of poison, general principles of treatment of poisoning.
   b. Heavy metals and heavy metal antagonists.
   c. Definition for acute, sub acute and chronic toxicity, genotoxicity,
   a. Carcinogenicity, teratogenicity and mutagenicity studies.

6. **Chronopharmacology:** Definition of rhythm and cycles. Biological clock and their significance leading to chronotherapy. **2**

7. **Bioassay:** Principles and methods of bioassay. Bioassay of insulin, oxytocin, vasopressin, ACTH, histamine and 5-HT **4**

8. **Immunopharmacology:** Immunostimulants and immunosuppresants **3**

Theory Sessional examination syllabus

Sessional No.	Syllabus Chapters no.
I	1 to 2c
II	2d, 2e and 3
III	4-8

4.2 PHARMACOLOGY-II (PRACTICALS)

Teacher/s: Dr. S. N. Manjula (SNM) & Ms. Nagashree 75 Hours (3 Hrs/wk)

***General Requirements*:** Napkin, Apron, Record, Observation book (100pages), Assignment book and Stationary items.

Course materials:

Text books

1. Kulkarni, S. K. and Dandia, P. C. Hand Book of Experimental Pharmacology. Latest edition, Publisher: Vallabha Prakashan, New Delhi.

Reference books

1. Macleod, L.J. Pharmacological experiments on intact preparations. Latest edition, Publisher: Churchill livingstone.
2. Macleod, L.J. Pharmacological experiments on isolated preparations. Latest edition, Publisher: Churchill livingstone.
3. Ghosh, M.N. Fundamentals of experimental pharmacology. Latest edition, Publisher: Scientific book agency, Kolkata.

	Title of the experiment	Expts
1.	Introduction to *in-vitro* pharmacology and physiological salt solutions.	**3**
2.	Experiments on isolated preparations using simulated software: a. To record CRC of acetylcholine by using suitable muscle preparations. b. To record the CRC of 5HT on rat fundus preparation. c. To record CRC of Nor adrenaline on rat anococcygeus muscle preparation. d. To record the agonistic and antagonistic response by using suitable muscle preparations. e. To estimate the strength of the test sample of agonist/ drug (e.g. Acetylcholine, Histamine, 5HT, Oxytocin) using a suitable isolated muscle preparation employing matching bioassay, interpolation bioassay, three point bioassay and four point bioassay.	**12**
3.	Estimation of bioavailability parameters viz AUC, Tmax, Kel from blood and urine samples in human volunteers or in laboratory animals.	**2**
4.	Alternate methods for animal experimentation for both efficacy and toxicity studies.	**3**
5.	Estimation of serum biochemical parameters by using semi- autoanalyzer.	**2**

Scheme of Practical Examination

	Sessionals	Annual
Synopsis	04	10
Major Experiment	08	40
Minor Experiment	04	10
Viva	04	10
Max Marks	**20**	**70**
Duration	**3 hrs**	**4 hrs**

Recommended books

1. Craig C.R. and Stitzel R.R, Modern Pharmacology.
2. Ghosh M. N, Fundamentals of experimental Pharmacology.
3. Katzung B.G, Basic and Clinical Pharmacology, Prentice Hall International.
4. Laurence D.R and Bennet P.N. Clinical Pharmacology Churchill Livingstone.
5. Mycek M.J, Gelnet S.B and Perper M.M, Pharmacology, Lippincott's illustrated Reviews.
6. Rang M.P, Dale M.M, Reter J.M, Pharmacology.
7. Goodman and Gilman's, The Pharmacological basis of Therapeutics.
8. S.K. Kulakarni. Hand book of Experimental Pharmacology.
9. N.Udupa and P.D. Gupta, Concepts in Chronopharmacology.

4.3 FORMULATIVE AND INDUSTRIAL PHARMACY (THEORY)

Teacher/s: Dr. M.P. Venkatesh (MPV) **75 Hours (3 Hrs/Week)**

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:

Theory:

1. Explain the various pharmaceutical dosage forms and their manufacturing techniques.
2. Describe formulation considerations in development of pharmaceutical dosage forms
3. Appraise the formulation techniques of solid, liquid and semisolid dosage forms and their evaluation parameters
4. Explain the principle and formulation strategies of Novel drug delivery systems

Practical:

1. Perform Preformulation studies for the prepared granules
2. Formulate and evaluate solid dosage forms (tablets and capsules) using different methods and relevant test procedures
3. Manufacture parenterals and perform quality control tests using pharmacopoeial methods
4. Formulate and evaluate microcapsules
5. Formulate cosmetic preparations

Lecture wise programme

	Topic	Hrs
1.	**Preformulation Studies:** Study of physical/physicochemical properties of drugs like physical form, particle size, shape, density, wetting, dielectric constant, solubility, dissolution, organoleptic properties and their effect on formulation, stability & bioavailabilty. Study of chemical properties of drugs like hydrolysis, oxidation, reduction, racemisation, polymerization etc. and their influence on formulation.	**5**
2.	**Tablets:** Classification of different types of tablets, tablets equipments, granulation technology on large scale by various techniques. Tablets tooling, different types of tablets compression machinery, processing problem of tablets and evaluation of tablets. Coating of tablets: Types of coating, Sugar coating, film forming materials, formulation of coating solution, equipment for coating, film defects and evaluation of coated tablets.	**8**

3.	**Capsules:** Advantages & disadvantages of capsule dosage form, extraction of gelatin, production of hard gelatin capsules, size of capsules and method of capsule filling. Soft gelatin capsule, Nature of capsule shell & capsule content, importance of base adsorption, minim/ gm factors in soft capsules, production, quality control, stability testing and storage of capsule dosage forms.	**6**
4.	**Parenteral Products:** Preformulation factors, routes of administration, water for injection, pyrogenicity, non-aqueous vehicles, isotonicity & methods of its adjustment. Formulation details, containers and closures and their selection. Prefilling treatment, washing the container and closers, preparation of solution and suspension, filling, closing of ampoules, vials infusion fluids, lyophilization, preparation of sterile powders, equipment for large scale manufacture and evaluation of parenteral products. Aseptic techniques: Source of contamination, methods of prevention, design of aseptic area, laminar flow bench, air handling units, services and maintenance.	**8**
5.	**Microencapsulation:** Types of microcapsules and their importance, microencapsulation by co-acervation phase separation, multi orifice centrifugation, spray drying, spray congealing, polymerization, air suspension, pan coating & other techniques, evaluation of microcapsules.	**8**
6.	**Packaging of Pharmaceuticals** Desirable features and a detailed study of different types of Pharmaceutical Containers and closures (Glass, Plastics and Rubber), including their merits and demerits Selection and evaluation of Pharmaceutical packaging materials.	**4**
7.	**Ophthalmic Formulations:** Requirements, formulation of eye drops, eye ointments and introduction to occuserts, containers and evaluation.	**4**
8.	**Pharmaceutical Aerosols:** Definition, propellants, containers, valves, types of aerosol systems, manufacture of aerosol, quality control and stability studies.	**7**
9.	**Controlled Delivery Systems:** Principle, Advantages & disadvantages, selection of drug candidates, various approaches to design controlled release formulations, graphical presentation of sustained release, prolonged action, repeated release, controlled release, pulsatile release pharmaceuticals.	**4**
10.	**Novel Drug Delivery Systems:** Transdermal delivery systems, osmotic drug delivery systems, buccal drug delivery systems.	**4**
11.	**Cosmetics: Formulation and preparation of the following cosmetic preparations:** Lipsticks, shampoos, face and talcum powders, nail lacquers, tooth pastes and hair dyes.	**7**
12.	**Pilot plant scale up techniques:** Significance of pilot plant scale up study, Large scale manufacturing techniques formula, equipment, process, stability and quality control) of solids, liquids and semisolid dosage forms.	**6**
13.	**Stability Studies:** Basic concept and objectives of stability study. Importance of accelerated stability study. Effect of various environments/processing on stability of the formulation and techniques for stabilization of products against the same. Regulatory requirements related to stability testing with emphasis on ICH Guidelines, matrixing / bracketing techniques, climatic zone, impurities in stability study, photo stability testing etc.	**6**

Theory Sessional examination syllabus

Sessional No.	Syllabus Chapters no.
I	1, 2, 3, 4
II	5, 6, 7, 8
III	9, 10, 11, 12, 13

4.3 FORMULATIVE AND INDUSTRIAL PHARMACY (PRACTICALS)

Teacher/s: Mr. Tanmoy Das & Ms. Deeksha R. Pai **75 Hours (3 Hrs/Week)**

	Title of the experiment	Expts
1.	Preformulation studies on prepared granules	**1**
2.	**Manufacture of tablets and their evaluation** a. Uncoated tablets by Wet granulation method b. Uncoated tablets by Dry granulation method c. Uncoated tablets by Direct compression method	**4**
3.	Formulation and filling of hard gelatin capsules	**1**
4.	**Manufacture of parenterals** a. Preparation and evaluation of Ascorbic acid injection b. Preparation and evaluation of Calcium gluconate injection c. Preparation and evaluation of Sodium chloride injection d. Preparation and evaluation of Dextrose and sodium chloride injection/infusion	**4**
5.	**Microcapsules** a. Preparation and evaluation of microcapsules by Non-solvent method b. Preparation and evaluation of microcapsules by Salt-addition method	**2**
6.	**Cosmetic preparations** a. Preparation of Lipsticks b. Preparation of Cold cream and vanishing cream c. Preparation of Clear liquid shampoo d. Preparation of Tooth paste and tooth powder	**4**
7.	Tablet coating (demo)	**1**

Recommended Books

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. Novel Drug Delivery System by Y.W.Chein

8. Pharmaceutics-the science of dosage form design by M.E.Aulton, Churchill livingstone, Latest edition

9. Introduction to Pharmaceutical Dosage Forms by H. C.Ansel, Lea & febiger, Philadelphia, 5th edition, 2005

10. Drug stability - Principles and practice by Cartensen & C.J. Rhodes, 3rd Edition, Marcel Dekker Series, Vol 107.

Scheme of Practical Examination

	Sessionals	**Annual**
Synopsis	04	10
Major Experiment	08	30
Minor Experiment	04	20
Viva-voce	04	10
Max. Marks	**20**	**70**
Duration	**03 Hrs**	**04 Hrs**

4.4 INSTRUMENTAL METHODS OF ANALYSIS (THEORY)

Teacher/s: **Dr. R. S .Chandan (RSC)** **75 Hours (3 Hrs/Wk)**

Scope: This subject is designed to impart a fundamental knowledge on the testing of 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 knowledge about modern instruments that are used for drug testing like NMR, IR, Mass, HPLC, HPTLC etc,

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

Theory:

1. explain the principle involved in various analytical techniques
2. describe the construction and working of various analytical instruments
3. summarize the applications of analytical instruments in quantitative analysis of drugs
4. account the calibration and validation of various instruments and their importance
5. describe principles of chromatographic methods and its applications
6. account the steps involved in analytical method development and validation

Practical:

1. prepare various standard and sample solutions using appropriate procedure
2. perform the quantitative analysis of the drug using appropriate instrumental techniques
3. carryout qualitative analysis of drugs by chromatographic methods

Lecture wise Programme

TOPICS

	Topics	Hrs
1.	**UV/Visible spectroscopy**	
1.1	Theory of atomic and molecular spectra, Electronic transitions, Beer and Lambert's law, Derivation and deviations, Applications of Beer law to single and multi component systems, Chromophores, Auxochromes, Spectral shifts, Solvent effect on absorption spectra. Instrumentation - Sources of radiation, wavelength selectors, sample cells, Detectors- Barrier layer cell, Photo tube, Photomultiplier tube, Silicon Photodiode. Applications - Spectrophotometric titrations, Measurement of equilibrium constant and rate constant.	**10**
1.2	**IR spectroscopy –** Introduction, Fundamental modes of vibrations in poly atomic molecules. Sample handling, Instrumentation - Sources of radiation, wavelength selectors, sample cells, Detectors – Golay cell, Bolometer, Thermocouple, Thermister, Pyrroelectric detector. Structure - frequency correlation with examples.	**4**
1.3	**Atomic absorption spectroscopy -** Introduction, Theory, instrumentation, and	**2**

	applications.	
2.	**Fluorimetry –** Theory, Concepts of singlet, doublet and triplet electronic states, internal and external conversions, factors affecting fluorescence, quenching. Instrumentation and applications	**3**
2.1	**Flame emission spectroscopy –** Introduction, Theory, Instrumentation, Interferences and applications	**3**
2.2	**Flame emission spectroscopy –** Introduction, Theory, Instrumentation, Interferences and applications	**3**
3	**Nephelometry and Turbidimetry** – Theory, Instrumentation and applications	**2**
4	**NMR Spectroscopy** - Principles, Instrumentation and applications	**3**
5	**Mass Spectroscopy** - Principles, Fragmentation, Instrumentation, applications. Introduction to MALDI and ICPMS	**3**
6	**X- Ray diffraction studies** – Introduction, diffraction methods and applications	**2**
7	**Thermal Methods of Analysis:** Theory, Instrumentation and applications of Differential Scanning Calorimetry (DSC)	**2**
8	**Chromatography**	
8.1	**Adsorption and partition column chromatography** – Methodology, advantages, disadvantages and applications	**2**
8.2	**Thin layer chromatography –** Introduction, Principle, Methodology, Stahl's triangle, Rf values, advantages, disadvantages and applications.	**2**
8.3	**High Performance Thin Layer Chromatography (HPTLC) –** Introduction, instrumentation, advantages, application.	**2**
8.4	**Paper chromatography** – Introduction, Principle, Methodology, developmental techniques, advantages, disadvantages, applications.	**2**
8.5	**Ion exchange chromatography** – Introduction, Definition, classification, ion exchange resins, properties, mechanism of ion exchange process, Factors affecting ion exchange, methodology, applications.	**3**
8.6	**High Performance Liquid Chromatography (HPLC)** – Introduction, theory, instrumentation, advantages and applications. Introduction to UPLC and super critical fluid chromatography	**4**
8.7	**Gas Chromatography -** Introduction, theory, instrumentation, derivatization, temperature programming, advantages, disadvantages and applications.	**4**
8.8	**Electrophoresis -** Principle of separation, classification, equipment for moving boundary electrophoresis, gel, paper electrophoresis and applications.	**3**
8.9	**Gel Filtration Chromatography** – Introduction, technique, factors affecting, Applications.	**2**
9.	**Electro chemical methods of analysis**	
9.1	**Conductometry** - Introduction, Conductivity cell, Conductometric titrations, applications.	**3**

9.2 **Potentiometry** – Electrochemical cell, construction and working of reference and indicator electrodes, methods to determine end point of titration. **4**

10. **Quality assurance** **6**

A. Calibration and validation of following Instruments

UV-Visible spectrophotometer, pH meter, HPLC, Electronic balance, Conductivity meter, IR spectrophotometer, Fluorimeter, Flame Photometer

B. Introduction to analytical method development **4**

Theory Sessional examination syllabus

Sessional No.	Syllabus Chapters no.
I	1 – 3
II	4 – 8.6
III	8.7 - 10

4.4 INSTRUMENTAL METHODS OF ANALYSIS (PRACTICALS)

Teacher/s: **Dr. B. Vishwanathan (BV), Dr. R.S. Chandan (RSC) & Mr. Maruthi**

75 Hours (3 Hrs/Week)

	Title of the experiment	Expts
1.	Separation & identification of amino acids by paper chromatography	**1**
2.	Separation & identification of alkaloids by TLC	**1**
3.	Conductometric titration of Benzoic acid with NaOH	**1**
4.	Potentiometric titration of HCl with NaOH	**1**
5.	Estimation of Quinine sulphate by fluorimetry	**1**
6.	Estimation of riboflavin by fluorimetry	**1**
7.	Study of quenching effects in fluorimetry by iodide ions	**1**
8.	Determination of absorption maxima of a compound	**1**
9.	Determination of primary amines by PDAB or NQS reagents method	**1**
10.	Colorimetric estimation of Sulphanilamide using BM reagent	**1**
11.	Determination of pKa of weak acid by colorimetry	**1**
12.	Determination of Ibuprofen and Paracetamol by simultaneous equation method	**1**
13.	Determination of Chloride and Sulphate by Nepheloturbidometry	**1**
14.	Kinetics of Aspirin hydrolysis	**1**
15.	Determination of Sodium/Potassium by flame photometry	**1**
16.	Determination of water content by Karl Fischer electrometric titration method	**1**
17.	IR interpretation of drug samples with different functional groups	**1**
18.	IR, NMR, Mass spectral interpretation of some organic compounds	**1**
19.	Impurity profiling (Determination of related substance) by HPLC	**1**
20.	Estimation of organic compound by GC method	**1**
21.	DSC Demonstration	**1**

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)

Recommended Books

1. Instrumental methods of analysis by Hobarth Willard, Lynne L Merritt and John A Dean, 7th edition, CBC publishers, New Delhi.

2. Kennith A Connors, A Text Book of Pharmaceutical Analysis, 3rd edition, John Wiley and sons, New york (1982)

3. William Kemp, Spectroscopical methods, ELBS.

4. Indian Pharmacopoeia.

5. United States Pharmacopoeia.

6. British Pharmacopoeia.

7. Higuchi T and Hanssen E.B., Text Book of Pharmaceutical Analysis, A Wiley Interscience Publications.

8. Instrumental methods of chemical analysis by Gurudeep Chatwal and Sham Anand, Himalaya publishing house, 2002.

9. Instrumental methods of chemical analysis by B. K. Sharma, 10th edition, GOEL publishing house, 2002.

10. Principles of instrumental analysis by Doglas A Skoog, F. James Holler, 5th edition, Eastern press, Bangalore, 1998

11. Practical pharmaceutical chemistry by Beckett A. H. and Stenlake J. B., 4th edition, CBS publishers, New Delhi, 1997

12. Spectrometric identification of organic compounds by Robert M Silverstein, G. Clayton and Terence C. Morill, 6th edition, John Wiley and Sons, 2004

13. Quantitative analysis of drugs in Pharmaceutical formulation – P. D. Sethi, 3rd edition, CBS Publishers, New Delhi, 1997.

4.5 PHARMACY PRACTICE (THEORY)

Teacher/s: Dr. Umesh M (UM) **75 Hours (3 Hrs/Week)**

1. **Scope:** This course is designed to impart basic knowledge and skills that are required for the practice of pharmacy in both hospital and community settings.
2. **Objectives:** Upon completion of this course it is expected that students shall be able to
    1. explain the organization, structure, functions and management of hospital and hospital pharmacy.
    2. apply various inventory control methods in drug store management and describe the drug distribution systems in hospital
    3. explain the organization, structure and management of community pharmacy
    4. describe the principles and procedures of various clinical pharmacy services in hospital
    5. summarize basic pathophysiology and pharmacotherapy of select diseases.

3. Lecture wise Programme

Topic	Hrs
A) Hospital & Community Pharmacy	**25**
Hospital and its organization: Definition and classification of hospital - Primary, Secondary and Tertiary hospitals; organizational structure and functions of a hospital.	**2**
Hospital pharmacy and its organization: Definition, organizational structure and functions of hospital pharmacy.	**2**
Pharmacy and therapeutic committee (PTC): Composition and functions of pharmacy and therapeutics committee	**1**
Budget preparation and implementation	**1**
Hospital formulary (HF): Definition, content, preparation and revision of hospital formulary	**2**
Drug store management and inventory control • Organization of drug store, types of materials, stocked and storage conditions • Purchase and inventory control, purchase order, procurement and stocking • Methods in inventory control	**5**
Drug distribution system in a hospital • Types of drug distribution systems, charging policy and labeling. • Dispensing of controlled drugs.	**3**
Community Pharmacy: Organization and structure of retail and wholesale drug store, types and design of drug store, legal requirements for establishment and maintenance of a drug store, dispensing of proprietary products, maintenance of records of retail and wholesale, finance, staff and infrastructure requirements.	**7**

Prescribed medication order: Interpretation and legal requirements	**1**
Over the counter (OTC) sales: Rational use of common OTC medications (vitamins, tonics, iron preparations, analgesics, NSAIDS, cough mixtures, anti-diarrheal preparations)	**1**
B) Clinical Pharmacy	**25**
Introduction to Clinical Pharmacy: Definition, concept, scenario of clinical pharmacy and pharmaceutical care.	**3**
Daily activities of a clinical pharmacist: Ward round participation, drug therapy monitoring (medicines review), treatment chart review, clinical review, pharmacist intervention, adverse drug reaction management, drug and poison information service, patient medication history and patient medication counseling.	**8**
Drug information services: Drug information centre, drug information resources, answering drug information query.	**3**
Adverse drug reaction (ADR): Definition, types, predisposing factors, detection, reporting, management and prevention of ADR, role of pharmacist in the management of ADR.	**3**
Medication adherence: Causes of medication non- adherence; pharmacist role in the medication adherence; monitoring of patient medication adherence.	**1**
Medication errors: Definition, types, categories, sources and management of medication errors.	**2**
Therapeutic drug monitoring (TDM): Definition, need for TDM and factors influencing TDM	**1**
Clinical Trials: Definition, various phases, designs and conduct of clinical trials	**4**
C) Therapeutics	**25**
Basic pathophysiology and pharmacotherapy of the following disorders	
Cardiovascular system: Hypertension and myocardial infarction	**4**
Respiratory System: Asthma	**2**
Renal System: Acute Renal Failure	**2**
Endocrine System: Diabetes	**2**
Nervous System: Epilepsy and stroke	**4**
Gastrointestinal System: Peptic ulcer disease	**2**
Disease of bones and joints: Rheumatoid arthritis	**2**
Infectious Diseases: Guideline for rational use of antibiotics, Tuberculosis, Malaria, Pneumonia, Urinary tract infection	**7**

Recommended Books

1. Hospital Pharmacy by William E. Hassan.

2. A textbook of Hospital Pharmacy by S.H. Merchant and J.S. Quadry.

3. Clinical Pharmacy and Hospital Drug Management by David H Lawson and R Michael E. Richards.

4. Clinical Pharmacy by Tipnis Bajaj.

5. A textbook of Clinical Pharmacy Practice- essential concepts and skills by Dr. G. Parthasarathi, Nyfort-Hansen Karin, Milap Nahata.

6. Basic skills in interpreting laboratory data - Scott LT, American Society of Health System Pharmacists Inc (latest edition)

7. Health Education and Community Pharmacy by Parmar N.S., CBS publishers.

8. Pathologic basis of disease : Robbins SL, W.B. Saunders publication

9. Pathology and therapeutics for Pharmacists: A Basis for Clinical Pharmacy Practice - Green and Harris, Chapman and Hall publication

10. Clinical Pharmacy and Therapeutics - Eric T. Herfindal, Williams and Wilkins Publication

11. Applied Therapeutics: The clinical Use of Drugs. Lloyd Young and Koda-Kimble MA, Williams and Wilkins Publication

12. Avery's Drug Treatment, 4th Edn, 1997, Adis International Limited.

Sessional Syllabus

Sessional Number	Chapters
I	Section A) Hospital and Community Pharmacy
II	Section B) Clinical Pharmacy
III	Section C) Therapeutics

4.6 PHARMACEUTICAL MARKETING AND MANAGEMENT (THEORY)

Teacher/s: Dr. Amit B. Patil (ABP) **75 Hours (3 Hrs/ week)**

Scope: This course gives the general management principles and pharmaceutical marketing systems, different types of market & marketing authorization and competitive practices in pharmaceutical industries. Marketing aspect covers types of market, principles of marketing and pharmaceutical product.

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

1. explain Pharmaceutical marketing and consumer profile.
2. demonstrate the process of PLC and new product development.
3. appraise the competitive practices in pharmaceutical industry.
4. discuss the process of distribution and promotion.
5. describe the structure and management of organization.

Lecture wise programme:

	Topic	Hrs
1	**Marketing:** a. The meaning and scope of marketing b. The pharmaceutical market: Quantitative and qualitative aspects, size and composition of the market, demographic descriptions and socio-psychological characteristics of the consumer, market segmentation. c. Analyzing the market - Role of market research d. Consumer profile – Motivation and prescribing habits of the physician, patients choice of physician and retail pharmacist	**11**
2	**The pharmaceutical product** a. Market consideration in product development, marketing mix, product life cycle (PLC), effects of different elements of marketing mix at different stages of PLC, product classification, product planning, product differentiation, me-too products, modification of existing product. b. New product development-All stages from the new product idea to the stage of marketing the developed product (bulk drug and formulations). c. Branding-concept of brand, different types of brand, importance and reasons for branding, packaging.	**6**
3	**Competitive practice in the pharmaceutical industry** a. Patent laws, Trademark laws b. Price competition-pricing, rate contracts. c. Non-price competition-All types of non-price competition with special emphasis on competition through research and development, competition through quality	**4**

4 **Distribution** **4**

a. The wholesaler-His role in distribution of pharmaceutical services offered to the manufacturer and the retailer, advantages and disadvantages of distribution through wholesaler.

b. The retailer-Classification of retail institutions, advantages and disadvantages of retail institutions, the hospital as retail outlet.

5 **Promotions** **5**

a. Communication and its importance

b. Different types of promotion-Advertising, Direct mail, Professionals, Journals, Sampling, Retailing, Medical exhibition, Public relations

c. Professional sales representatives (PSR)-Duties of PSR, Purpose of detailing, selection and training, compensation and future prospects of PSR

6 **Management:** **10**

a. Concepts of management, principles of management, objectives of management, manager-role and types, ,

b. Primary functions of management – planning, organizing, staffing, directing, controlling, motivation, entrepreneurship development

c. Secondary functions of management – decision-making, leadership, innovation, delegation of authority/responsibility

7 **The organization:** **4**

Organisational structure, function, departmentialisation, basic principles of organization. Manufacturer objectives, influence of internal controls such as company policy on the company's operation, effects of government regulations and controls of marketing practices

8. Six sigma-introduction, methods(DMAIC), role, levels, software used and applications **6**

Sessional Syllabus

Sessional Number	Chapters
I	1, 2
II	3, 4, 5, 7
III	6, 8

Recommended Books

1. Heinz Weihrich, Harold Koontz: Management: A global Perspective, McGraw Hill International Edition, Tenth edition.
2. S.V.R. Subba Rao, Pharmaceutical Marketing in India, Asian Institute of Pharmaceutical Marketing, Hyderabad, 1998 edition.
3. Mickey C. Smith, Principles of Pharmaceutical Marketing, CBS publishers and distributors, New Delhi, 3rd edition.
4. C.V.S. Subrahmanyam. Pharmaceutical production and management, Vallabh Prakashan publisher, New Delhi, 2005.
5. Peter F. Drucker, Management-tasks, responsibilities, practices. Allied Publishers Pvt Ltd., Mumbai, 2003.
6. Mickey C. Smith, Pharmaceutical Marketing in the 21st Century, pharmaceutical product press, New York, USA, 1996
7. Sachin Itkar, Pharmaceutical Management, Nirali Prakashan Publishers, Pune, 2007.

JSS University

JSS College of Pharmacy

Sri ShivarathreeshwaraNagara, Mysore-570015

CLASS TIME TABLE – 2017-18*

Class: IV B. PHARM

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		11.10-12.05PM	12.05–1.00PM		2.00-2.55PM	2.55-3.50PM		4.05-5.00PM
Monday	Medicinal Chemistry- II AKT	←--Batch – I----- ←--Batch – II---- ←--Batch – III--- ←--Batch – IV--	TEA BREAK	--- Medicinal Chemistry- II-----RJ---------→ ---- Pharmacology II----------SNM -------→ --- Instrumental Methods of Analysis----M--→ -Formulative&Industrial Pharmacy------T------→		LUNCH BREAK	Instrumental Methods of Analysis RSC	Pharmacology II SNM	TEA BREAK	Formulative&Industrial Pharmacy MPV
Tuesday	Medicinal Chemistry- II AKT	←--Batch – II---- ←--Batch – III--- ←--Batch – IV-- ←--Batch – I---		--- Medicinal Chemistry- II--- AKT ---------→ ---- Pharmacology II--------KSN----------→ --- Instrumental Methods of Analysis---BV---→ -Formulative&Industrial Pharmacy -----T---→			Formulative&Industrial Pharmacy MPV	Instrumental Methods of Analysis RSC		Pharm. Marketing & Management ABP
Wednesday	Medicinal Chemistry- II AKT	←--Batch – II---- ←--Batch – III--- ←--Batch – IV-- ←--Batch – I---		-Formulative&Industrial Pharmacy----D--→ --- Medicinal Chemistry- II--- AKT --------→ ---- Pharmacology II---------KSN ----------→ --- Instrumental Methods of Analysis---BV-----→			Pharmacy Practice UM	Pharmacology II SNM		Pharmacy Practice UM
Thursday	----------	←--Batch – II---- ←--Batch – III---		--- Instrumental Methods of Analysis---M ---→ ----Formulative&Industrial Pharmacy---D--- →			Instrumental Methods of Analysis RSC	Formulative& Industrial Pharmacy MPV		Pharmacy Practice UM
Friday	----------	←--Batch – IV--		--- Medicinal Chemistry- II------ AKT -------→			Pharm. Marketing & Management ABP	Pharmacology II SNM		Pharm. Marketing & Management ABP
Saturday	----------	←--Batch – I---		---- Pharmacology II-------KSN----------→			----------			

***Effective from: 21th June 2017**

Note: 1. No tea break for practicals
2. Forenoon practical starts from 10.00AM

Time table Coordinator

Principal

Copy: SNB/LNB/SCF/SCC-Teachers/OC/TTF-MSV/PP Dept./Extra-MSV.