ROYAL GLOBAL UNIVERSITY
GUWAHATI

ROYAL SCHOOL OF PHARMACY
(RSP)
(Diploma in Pharmacy)

SYLLABUS
&
COURSE STRUCTURE

D.PHARMACY

D.PHARMACY

Programme Structure

Part-I (1st year)							
Sl. No.	**Subject Code**	**Names of subjects**	**T**	**Hours/ Week**	**P**	**Hours/ Week**	**Total hours**
Core Subjects							
1	PHR231C101	Pharmaceutics	75	3	75	3	150
2	PHR231C102	Pharmaceutical Chemistry	75	3	75	3	150
3	PHR231C103	Pharmacognosy	75	3	75	3	150
4	PHR231C104	Human Anatomy & Physiology	75	3	75	3	150
5	PHR231C105	Social Pharmacy	75	3	75	3	150
Ability Enhancement Compulsory Courses (AECC)							
7	CEN981A101	Communicative English I	25	1	0	0	25
8	BHS981A104	Behavioural Science–I	25	1	0	0	25
		TOTAL	**425**	**17**	**375**	**15**	**800**

Part-II (2nd year)							
Sl. No.	**Subject Code**	**Names of subjects**	**T**	**Hours/ week**	**P**	**Hours/ week**	**Total hours**
Core Subjects							
1	PHR231C201	Pharmacology	75	3	50	2	125
2	PHR231C202	Community Pharmacy & Management	75	3	75	3	150
3	PHR231C203	Biochemistry & Clinical Pathology	75	3	50	2	125
4	PHR231C204	Pharmacotherapeutics	75	3	25	1	100
5	PHR231C205	Hospital & Clinical Pharmacy	75	3	25	1	100
6	PHR231C206	Pharmacy Law & Ethics	75	3	0	0	75
Ability Enhancement Compulsory Courses (AECC)							
7	CEN981A201	Communicative English II	25	1	0	0	25
8	BHS981A204	Behavioural Science–II	25	1	0	0	25
		TOTAL	**500**	**20**	**225**	**9**	**725**

*** 500 hours practical training spread over a period of not less than 3 months.**

COURSE STRUCTURE FOR D. PHARMACY

YEAR	CORE COURSE	Hour	Ability Enhancement Compulsory Course (AECC)	Hour	Ability Enhancement Elective Course (AEEC) (Skill Based)	Hour	Elective: Discipline Specific DSE	Hour	Elective: Generic (GE)	Hour	No of papers each semester	TOTAL HOUR
I	Pharmaceutics	150	Comm. English – I	25	Nil	Nil	Nil	Nil	Nil	Nil	7	950
	Pharmaceutical Chemistry	150	Behavioural Science-I *	25								
	Pharmacognosy	150										
	Human Anatomy & Physiology	150										
	Social Pharmacy	150										
II	Pharmacology	125	Comm. English – II	25	Nil	Nil	Nil	Nil	Nil		8	875
	Community Pharmacy & Management	150	Behavioural Science-II *	25								
	Biochemistry & Clinical Pathology	125										
	Pharmacotherape-utics	100										
	Hospital & Clinical Pharmacy	100										
	Pharmacy Law & Ethics	75										
Total		**1425**		**100**								**1825**

*** 500 hours practical training spread over a period of not less than 3 months**

Scheme of Evaluation

Theory Papers (T):	**Practical Papers (P):**
• **Internal assessment: 20%** • **End Term Examination: 80%**	• **Internal assessment: 20%** • **End Term Examination: 80%**

Period and other conditions of practical training:

After having appeared in Part-II examination of Diploma in Pharmacy conducted Board/University or other approved examination Body or any other course accepted as being equivalent by the Pharmacy Council of India, a candidate shall be eligible to undergo practical training in one or more of the following institutions namely:

Hospitals/Dispensaries run by Central/State Government/Municipal corporations/ central Government Health scheme and Employees state Insurance scheme. A pharmacy, chemist and Druggist licensed under the Drugs and cosmetics Rules, 1945 made under the Drugs and Cosmetics Act, 1940(23 of 1940). The institutions referred in sub-regulation (1) shall be eligible to impart training subject to the condition that the number of student pharmacists that may be taken in any Hospital, pharmacy, Chemist and Druggist licensed under the Drugs and cosmetics Rules,1945 made under the Drugs and cosmetics Act,1940 shall not exceed two where there is one registered pharmacist engaged in the work in which the student pharmacist is undergoing practical training, where there is more than one registered pharmacist similarly engaged, the number shall not exceed one for each additional such registered pharmacist. Hospital and Dispensary other than those specified in sub-regulation(1)for the purpose of giving practical training shall have to be recognized by pharmacy council of India on fulfilling the conditions specified in Appendix-D to these regulations.

In the course of practical training, the trainees shall have exposure to: Working knowledge of keeping of records required by various acts concerning the profession of pharmacy and Practical experience in the manipulation of pharmaceutical apparatus in common use, the reading, translation and copying of prescription including checking of dose, the dispensing of prescriptions illustrating the commoner methods of administering medicaments; the storage of drugs and medical preparations. The practical training shall be not less than five hundred hours spread over a period of not less than three months provided that not less than two hundred and fifty hours and devoted to actual dispensing of prescriptions.

SYLLABUS (Part I)

Paper I/Subject Name: PHARMACEUTICS - Theory

L-T-P-C – 3-0-3-150 **Total Hours: 75** **Scheme of Evaluation: (T/P/TP)**

Objective: This course will discuss the following aspects of pharmaceutical dosage forms

1. Basic concepts, types and need
2. Advantages and disadvantages, methods of preparation/formulation
3. Packaging and labelling requirements
4. Basic quality control tests, concepts of quality assurance and good manufacturing practices.

Course Outcome: Upon successful completion of this course, the students will be able to

1. Describe about the different dosage forms and their formulation aspects
2. Explain the advantages, disadvantages and quality control tests of different dosage forms
3. Discuss the importance quality assurance & good manufacturing practices

Detailed Syllabus

Modules	Topics (if applicable) & Course Contents	Periods
I.	History of the profession of Pharmacy in India in relation to Pharmacy education, industry, pharmacy practice, and various professional associations**.** **Pharmacy as a career** **Pharmacopoeia:** Introduction to IP, BP, USP, NF and Extra Pharmacopoeia. Salient features of Indian Pharmacopoeia. **Packaging materials:** Types, selection criteria, advantages and disadvantages of glass, plastic, metal, rubber as packaging materials. **Pharmaceutical aids:** Organoleptic (Colouring, flavouring, and sweetening) agents **Preservatives:** Definition, types with examples and uses	**15 hours**
II.	**Unit operations:** Definition, objectives/applications, principles, construction and workings of: **Size reduction:** hammer mill and ball mill **Size separation:** Classification powder according to IP, Cyclone separator, Sieves and standards of sieves **Mixing:** Double cone blender, Turbine mixer, Triple roller mill and Silverson mixer homogenizer **Filtration:** Theory of filtration, membrane filter and sintered glass filter **Drying:** working of fluidized bed dryer and process of freeze drying **Extraction:** Definition, Classification, method and applications **Tablets** - coated and uncoated, various modified tablets (sustained release, extended-release, fast dissolving, double layered) **Capsules** - hard and soft gelatine capsules	**21 hours**
III.	**Liquid oral preparations** - solution, syrup, elixir, emulsion, suspension, dry powder for reconstitution **Topical preparations** - ointments, creams, pastes, gels, liniments and lotions, suppositories and pessaries. Nasal preparations, Ear preparations **Powders and granules** - Insufflations, dusting powders, effervescent powders and effervescent granules	**19 hours**

IV	**Sterile formulations –** Injectables, eye drops and eye ointments **Immunological products:** Sera, vaccines, toxoids and their manufacturing methods. **Basic structure, layout, sections and activities of pharmaceutical manufacturing plants** **Quality control and quality assurance:** Definition and concepts of quality control & quality assurance, current good manufacturing practice (cGMP), Introduction to concept of calibration and validation **Novel drug delivery systems:** Introduction, Classification with examples, advantages and challenges	**20 hours**
TOTAL		**75 hours**

PHARMACEUTICS - Practical

Detailed Syllabus

Modules	Topics (if applicable) & Course Contents	Periods
I.	Handling and referring the official references: Pharmacopoeias, Formularies, etc. for retrieving formulas, procedures, etc.	**3 hours/week**
II.	Formulation of the following dosage forms as per monograph standards and dispensing with appropriate packaging & labelling **Liquid oral:** Simple syrup, Piperazine citrate elixir, Aqueous Iodine solution, Strong Iodine solution **Emulsion:** Castor oil emulsion, Cod liver oil emulsion, olive oil emulsion **Suspension:** Calamine lotion, Magnesium hydroxide mixture **Ointment:** Simple ointment base, Sulphur ointment **Cream:** Cetrimide cream **Gel:** Sodium alginate gel	**3 hours/week**
III.	Formulation of the following dosage forms as per monograph standards and dispensing with appropriate packaging & labelling **Liniment:** Turpentine liniment, White liniment BPC **Dry powder**: Effervescent powder granule, Dusting powder **Sterile Injection:** Normal Saline, Calcium gluconate Injection **Hard Gelatine Capsule:** Indomethacin capsules, Tetracycline capsules **Tablet:** Paracetamol tablet granules ready for compression	**3 hours/week**
IV	Demonstration on various stages of tablet manufacturing processes (including coating tablets, if possible) -Appropriate methods of usage, and storage of special dosage forms including different types of inhalers, spacers, insulin pens -Demonstration of quality control tests and evaluation of common dosage forms viz. tablets, capsules, emulsion, sterile injections as per the monographs	**3 hours/week**
TOTAL		**75 hours**

Text Book:

1. Singh, H. (1998). Pharmaceutical education (History of pharmacy in India and related aspects). Vallabh Prakashan.
2. Mittal, B. M. (1899). A Textbook of Pharmaceutical Formulation. Vallabh Prakashan.
3. Rawlins, E. A. (2010). Bentley's Textbook of Pharmaceuticals. Elsevier/bsp Books Pvt. Ltd.
4. Lachman, L., Lieberman, H., Kanig, J. (1986). The Theory and Practice of Industrial Pharmacy. Philadelphia: Verghese Publishing House.
5. Responsible Use of Medicines: A Layman's Handbook. Available at: www.ipapharma.org/publications.

Reference Books:

1. Indian Pharmacopoeia. (2018). 8th Edition.

Teaching Learning Process and Assessment Methods

Unit No.	Course Learning Outcomes	Teaching and Learning Activity	Assessment Tasks
I.	Students will learn about the history of profession of pharmacy, pharmacopeia, conventional dosage forms etc.	An appropriate blend of chalk board as well as Power point presentations will be adopted, practical demonstrations will also be given	Assignments will be Conducted along with regular tests.
II.	Understand the basics of different dosage forms and unit operations	Students will be taught by using of traditional chalk board and demonstrations by showing pictures of dosage form and unit operations.	Quiz will be organized. They will be shown various pictures to identify the liquid dosage forms and unit operations, along with assignment and tests.
III	Understand the basics of different dosage forms	Will be taught by chalk and board method. Students will be shown various power point presentations for concept building	They will be asked for examples from regularly used products. Assignment and tests will be conducted.
IV	Students will gain knowledge about other semi solid dosage form and various operations and plants and manufacturing companies.	Teaching will be imparted by chalk and board method laboratory preparation of the product will also be conducted	Students will be given assignments and tests.

Paper II/Subject Name: PHARMACEUTICAL CHEMISTRY - Theory

L-T-P-H – 3-0-3-150 **Total Hours: 75** **Scheme of Evaluation: (T/P/TP)**

Objectives: This course will discuss the following aspects of the chemical substances used as drugs and pharmaceuticals for various disease conditions

1. Chemical classification, chemical name, chemical structure
2. Pharmacological uses, doses, stability and storage conditions
3. Different types of formulations/dosage form available and their brand names
4. Impurity testing and basic quality control tests.

Course Outcome: Upon successful completion of this course, the students will be able to

1. Describe the chemical class, structure and chemical name of the commonly used drugs and pharmaceuticals of both organic and inorganic nature
2. Discuss the pharmacological uses, dosage regimen, stability issues and storage conditions of all such chemical substances commonly used as drugs

3. Describe the quantitative and qualitative analysis, impurity testing of the chemical substances given in the official monographs
4. Identify the dosage form & the brand names of the drugs and pharmaceuticals popular in the marketplace.

Detailed Syllabus

Modules	Topics (if applicable) & Course Contents	Periods
I.	**Introduction to Pharmaceutical chemistry:** Scope and objectives **Sources and types of errors:** Accuracy, precision, significant figures **Impurities in Pharmaceuticals:** Source and effect of impurities in Pharmacopoeial substances, importance of limit test, Principle and procedures of Limit tests for chlorides, sulphates, iron, heavy metals and arsenic. **Volumetric analysis:** Fundamentals of volumetric analysis, Acid-base titration, non-aqueous titration, precipitation titration, complexometric titration, redox titration **Gravimetric analysis:** Principle and method.	**16 hours**
II.	**Inorganic Pharmaceuticals:** Pharmaceutical formulations, market preparations, storage conditions and uses of **Haematinics:** Ferrous sulphate, Ferrous fumarate, Ferric ammonium citrate, Ferrous ascorbate, Carbonyl iron **Antacids:** Aluminium hydroxide gel, Magnesium hydroxide, Magaldrate, Sodium bicarbonate, Calcium Carbonate **Anti-microbial agents:** Silver Nitrate, Ionic Silver, Chlorhexidine Gluconate, Hydrogen peroxide, Boric acid, Bleaching powder, Potassium permanganate **Dental products:** Calcium carbonate, Sodium fluoride, Denture cleaners, Denture adhesives, Mouth washes **Medicinal gases:** Carbon dioxide, nitrous oxide, oxygen. -Introduction to nomenclature of organic chemical systems with particular reference to heterocyclic compounds containing up to three rings -Study of the following category of medicinal compounds with respect to classification, chemical name, chemical structure (compounds marked with*) uses, stability and storage conditions, different types of formulations and their popular brand names **Drugs Acting on Central Nervous System** **Anaesthetics:** Thiopental Sodium*, Ketamine Hydrochloride*, Propofol **Sedatives and Hypnotics:** Diazepam*, Alprazolam*, Nitrazepam, Phenobarbital* **Antipsychotics**: Chlorpromazine Hydrochloride*, Haloperidol*, Risperidone*, Sulpiride*, Olanzapine, Quetiapine, Lurasidone **Anticonvulsants:** Phenytoin*, Carbamazepine*, Clonazepam, Valproic Acid*, Gabapentin*, Topiramate, Vigabatrin, Lamotrigine **Anti-depressants:** Amitriptyline Hydrochloride*, Imipramine Hydrochloride*, Fluoxetine*, Venlafaxine, Duloxetine, Sertraline, Citalopram, Escitalopram, Fluvoxamine, Paroxetine	**18 hours**
III.	**Drugs Acting on Autonomic Nervous System** **Sympathomimetic Agents:** Direct Acting: Nor- Epinephrine*, Epinephrine, Phenylephrine, Dopamine*, Terbutaline, Salbutamol (Albuterol), Naphazoline*, Tetrahydrozoline. Indirect Acting Agents: Hydroxy Amphetamine, Pseudoephedrine. Agents With Mixed Mechanism: Ephedrine, Metaraminol **Adrenergic Antagonists:** Alpha Adrenergic Blockers: Tolazoline, Phentolamine Phenoxybenzamine, Prazosin. Beta Adrenergic Blockers: Propranolol*, Atenolol*, Carvedilol **Cholinergic Drugs and Related Agents:** Direct Acting Agents: Acetylcholine*, Carbachol, And Pilocarpine. Cholinesterase Inhibitors: Neostigmine*, Edrophonium Chloride, Tacrine Hydrochloride, Pralidoxime Chloride, Echothiopate Iodide	**22 hours**

	Cholinergic Blocking Agents: Atropine Sulphate*, Ipratropium Bromide. Synthetic Cholinergic Blocking Agents: Tropicamide, Cyclopentolate Hydrochloride, Clidinium Bromide, Dicyclomine Hydrochloride* **Drugs Acting on Cardiovascular System** **Anti-Arrhythmic Drugs:** Quinidine Sulphate, Procainamide Hydrochloride, Verapamil, Phenytoin Sodium*, Lidocaine Hydrochloride, Lorcainide Hydrochloride, Amiodarone and Sotalol **Anti-Hypertensive Agents:** Propranolol*, Captopril*, Ramipril, Methyldopate Hydrochloride, Clonidine Hydrochloride, Hydralazine Hydrochloride, Nifedipine, **Antianginal Agents:** Isosorbide Dinitrate **Diuretics:** Acetazolamide, Frusemide*, Bumetanide, Chlorthalidone, Benzthiazide, Metolazone, Xipamide, Spironolactone **Hypoglycemic Agents:** Insulin and Its Preparations, Metformin*, Glibenclamide*, Glimepiride, Pioglitazone, Repaglinide, Gliflozins, Gliptins **Analgesic And Anti-Inflammatory Agents:** Morphine Analogues, Narcotic Antagonists; Nonsteroidal Anti-Inflammatory Agents (NSAIDs) - Aspirin*, Diclofenac, Ibuprofen*, Piroxicam, Celecoxib, Mefenamic Acid, Paracetamol*, Aceclofenac	
IV	**Anti-Infective Agents** **Antifungal Agents:** Amphotericin-B, Griseofulvin, Miconazole, Ketoconazole*, Itraconazole, Fluconazole*, Naftifine Hydrochloride **Urinary Tract Anti-Infective Agents:** Norfloxacin, Ciprofloxacin, Ofloxacin*, Moxifloxacin **Anti-Tubercular Agents:** INH*, Ethambutol, Para Amino Salicylic Acid, Pyrazinamide, Rifampicin, Bedaquiline, Delamanid, Pretomanid* **Antiviral Agents:** Amantadine Hydrochloride, Idoxuridine, Acyclovir*, Foscarnet, Zidovudine, Ribavirin, Remdesivir, Favipiravir **Antimalarials:** Quinine Sulphate, Chloroquine Phosphate*, Primaquine Phosphate, Mefloquine*, Cycloguanil, Pyrimethamine, Artemisinin **Sulfonamides:** Sulfanilamide, Sulfadiazine, Sulfamethoxazole, Sulfacetamide*, Mafenide Acetate, Cotrimoxazole, Dapsone* **Antibiotics:** Penicillin G, Amoxicillin*, Cloxacillin, Streptomycin, Tetracyclines: Doxycycline, Minocycline, Macrolides: Erythromycin, Azithromycin, Miscellaneous: Chloramphenicol* Clindamycin **Anti-Neoplastic Agents:** Cyclophosphamide*, Busulfan, Mercaptopurine, Fluorouracil*, Methotrexate, Dactinomycin, Doxorubicin Hydrochloride, Vinblastine Sulphate, Cisplatin*, Dromostanolone Propionate	**19 hours**
TOTAL		**75 hours**

PHARMACEUTICAL CHEMISTRY - Practical

Detailed Syllabus

Modules	Topics (if applicable) & Course Contents	Periods
I.	**Limit test** for Chlorides; sulphate; Iron; heavy metals. **Identification tests** for Anions and Cations as per Indian Pharmacopoeia **Fundamentals of volumetric analysis:** Preparation of standard solution and standardization of Sodium Hydroxide, Ceric Ammonium Sulfate, Potassium Permanganate	**3 hours/ week**
II.	**Assay of the following compounds** Ferrous sulphate- by redox titration Calcium gluconate-by complexometric Sodium chloride-by Modified Volhard's method Ascorbic acid by cerimetry	**3 hours/ week**

	Metronidazole by Non-Aqueous Titration Ibuprofen by alkalimetry.	
III.	**Fundamentals of preparative organic chemistry:** Determination of Melting point and boiling point of organic compounds. **Preparation of organic compounds** Acetanilide from aniline Aspirin from salicylic acid	**3 hours/ week**
IV	**Identification and test for purity of pharmaceuticals:** Aspirin, Caffeine, Paracetamol, Sulfanilamide **Systematic qualitative analysis** experiments (4 substances).	**3 hours/ week**
TOTAL		**75 hours**

Text Books:

1. Singh, H., Kapoor, V. K. (2017). Medicinal and Pharmaceutical Chemistry. Vallabh Prakashan.
2. Beale, J. M., Block, J. (2010). Wilson and Gisvold's Textbook of Organic Medicinal and Pharmaceutical Chemistry. Lippincott Williams and Wilkins.
3. Mann, Saunders. (2009). Practical Organic Chemistry. 4th Edition. Pearson Education India.
4. Beckett, A. H., Stenlake, J. B. (2000). Practical Pharmaceutical Chemistry: Pt. 2: Part II. 4th Edition. Continuum International Publishing Group Ltd.

Reference Books:

1. Indian Pharmacopoeia. (2018). 8th Edition.
2. Furniss. (2003). Vogel's Textbook of Practical Organic Chemistry. 5th Edition. Pearson Education.

Teaching Learning Process and Assessment Methods

Unit No.	Course Learning Outcomes	Teaching and Learning Activity	Assessment Tasks
I	Understand the various impurities and errors made during formulation of drugs	Regular chalk and board teaching along with PPT presentations. Class discussions on syllabus topics will be performed.	MCQ based assignments will be given to students to check their understanding of the subject.
II	Students will learn about various chemical class, structure and chemical name of drugs .	Teaching will be conducted both through black board mode and power point presentation mode	Oral questions will be asked in the class. Students will be given to prepare power point presentation on the assigned topics.
III	Students will learn about various chemical class, chemical name, chemical structure, and pharmacological uses	Teaching will be conducted both through black board mode and power point presentation mode.	Problem solving assignments, regular question answer sessions, MCQs and unit-test for internal assessment
IV	Students will learn about various chemical class, chemical name, chemical structure, and pharmacological uses	Appropriate mix of chalk and board teaching as well as use of Power point presentations.	Internal assessment tests will be conducted, – presentations will be assessed along with practical assessment.

Paper III/Subject Name: PHARMACOGNOSY – Theory		
L-T-P-C – 3-0-3-150	**Total Hours: 75**	**Scheme of Evaluation: (T/P/TP)**

Objectives: This course will discuss the following aspects of drug substances derived from natural resources.

1. Occurrence, distribution, isolation, identification tests of common phytoconstituents
2. Therapeutic activity and pharmaceutical applications of various natural drug substances and phytoconstituents
3. Biological source, chemical constituents of selected crude drugs and their therapeutic efficacy in common diseases and ailments
4. Basic concepts in quality control of crude drugs and various system of medicines
5. Applications of herbs in health foods and cosmetics.

Course Outcome: Upon successful completion of this course, the students will be able to

1. Identify the important/common crude drugs of natural origin
2. Describe the uses of herbs in nutraceuticals and cosmeceuticals
3. Discuss the principles of alternative system of medicines
4. Describe the importance of quality control of drugs of natural origin

Detailed Syllabus

Modules	Topics (if applicable) & Course Contents	Periods
I.	**Definition, history, present status and scope of Pharmacognosy.** **Classification of drugs:** Alphabetical**,** Taxonomical**,** Morphological, Pharmacological, Chemical, Chemo-taxonomical **Quality control of crude drugs:** Different methods of adulteration of crude drugs**,** Evaluation of crude drugs **Brief outline of occurrence, distribution, isolation, identification tests, therapeutic activity and pharmaceutical applications** of alkaloids, terpenoids, glycosides, volatile oils, tannins and resins.	**18 hours**

II.	**Biological source, chemical constituents and therapeutic efficacy of the following categories of crude drugs:** **Laxatives:** Aloe, Castor oil, Ispaghula,Senna **Cardiotonic:** Digitalis, Arjuna **Carminatives and G.I. regulators:** Coriander, Fennel, Cardamom, Ginger, Clove, Black Pepper, Asafoetida, Nutmeg, Cinnamon **Astringents**: Myrobalan, Black Catechu **Drugs acting on nervous system:** Hyoscyamus, Belladonna, Ephedra, Opium, Tea leaves, Coffee seeds, Coca **Anti-hypertensive:** Rauwolfia **Anti-tussive:** Vasaka, Tolu Balsam **Anti-rheumatics:** Colchicum seed **Anti-tumour:** Vinca, Podophyllum **Antidiabetics:** Pterocarpus, Gymnema **Diuretics:** Gokhru, Punarnava **Anti-dysenteric:** Ipecacuanha **Antiseptics and disinfectants:** Benzoin, Myrrh, Neem, Turmeric **Antimalarials:** Cinchona, Artemisia **Oxytocic**: Ergot **Vitamins:** Cod liver oil, Shark liver oil **Enzymes:** Papaya, Diastase, Pancreatin,Yeast **Pharmaceutical Aids:** Kaolin, Lanolin, Beeswax, Acacia, Tragacanth, Sodium alginate, Agar, Guar gum, Gelatine **Miscellaneous:** Squill, Galls, Pale catechu, Ashwagandha, Vasaka, Tulsi, Guggul	**25 hours**
III.	**Plant fibres used as surgical dressings:** Cotton, silk, wool and regenerated fibres **Sutures:** Surgical Catgut and Ligatures **Basic principles involved in the traditional systems of medicine like:** Ayurveda, Siddha, Unani and Homeopathy **Method of preparation of Ayurvedic formulations like:** Arista, Asava, Gutika, Taila, Churna, Lehya and Bhasma **Role of medicinal and aromatic plants in national economy and their export potential**	**18 hours**
IV	**Herbs as health food:** **Brief introduction and therapeutic applications of:** Nutraceuticals, Antioxidants, Pro-biotics, Pre-biotics, Dietary fibres, Omega-3-fatty acids, Spirulina, Carotenoids, Soya and Garlic **Herbal cosmetics: Sources, chemical constituents, commercial preparations, therapeutic and cosmetic uses of:** Aloe vera gel, Almond oil, Lavender oil, Olive oil, Rosemary oil, Sandal Wood oil **Phytochemical investigation of drugs**	**14 hours**
TOTAL		**75 hours**

PHARMACOGNOSY – PRACTICAL

Detailed Syllabus

Modules	Topics (if applicable) & Course Contents	Periods
I.	**Morphological Identification of the following drugs:** Ispaghula, Senna, Coriander, Fennel, Cardamom, Ginger, Nutmeg, Black Pepper,	**3 hours/week**
II.	**Morphological Identification of the following drugs:** Cinnamon, Clove, Ephedra, Rauwolfia, Gokhru, Punarnava, Cinchona, Agar **Gross anatomical studies (Transverse Section) of:** Ajwain	**3 hours/week**
III.	**Gross anatomical studies (Transverse Section) of:** Datura, Cinnamon, Cinchona, Coriander, Ashwagandha, Liquorice, Clove, Curcuma, Nuxvomica, Vasaka.	**3 hours/week**
IV	**Physical and chemical tests for evaluation of any FIVE of the following drugs:** Asafoetida, Benzoin, Pale catechu, Black catechu, Castor oil, Acacia, Tragacanth,Agar, Guar gum, Gelatine	**3 hours/week**
TOTAL		**75 hours**

Text Books:

1. Kokate, C. K., Gokhale, S. B., Purohit, A. P. Text book of Pharmacognosy. 55th edition. Nirali Prakashan,
2. Shah, C. S., Qadry, J. S. Text book of Pharmacognosy. CBS Publishers & Distributors Pvt. Ltd.
3. Wallis, T. E. Text Book of Pharmacognosy. CBS Publishers & Distributors Pvt. Ltd.

References:

1. Iyengar, M. A. Study of crude drug. Manipal Press Ltd, Manipal.
2. Iyengar, M. A. Powder crude drugs by. Manipal Press Ltd, Manipal.
3. Iyengar, M. A. Anatomy of crude drugs. Manipal Press Ltd, Manipal.
4. Banerjee, D. D., Jain, B. Text Book of Homeopathic Pharmacy. Publishers (P) Ltd.

Teaching Learning Process and Assessment Methods

Unit No.	Course Learning Outcomes	Teaching and Learning Activity	Assessment Tasks
I.	The students will able to Identify the important/common crude drugs of natural origin	Regular chalk and board teaching along with PPT presentations. Class discussions on syllabus topics will be performed.	MCQ based assignments will be given to students to check their understanding of the subject.
II.	The students will able to describe the uses of herbs in nutraceuticals and cosmeceuticals	Teaching will be conducted both through black board mode and power point presentation mode	Oral questions will be asked in the class. Students will be given to prepare power point presentation on the assigned topics related to the class teachings.
III	The students will able to discuss the principles of alternative system of medicines.	Teaching will be conducted both through black board mode and power point presentation mode.	Problem solving assignments, regular question answer sessions,

		Software's/ Videos will be issued to demonstrate animal experiment.	MCQs and unit-test for internal assessment
IV	The students will able to Describe the importance of quality control of drugs of natural origin	Appropriate mix of chalk and board teaching as well as use of Power point presentations for clarity of concepts with reactions, Practical demonstration will be given.	Internal assessment tests will be conducted, – presentations will be assessed along with practical assessment.

Paper IV/Subject Name: HUMAN ANATOMY AND PHYSIOLOGY – Theory

L-T-P-H — 3-0-3-150 **Total Hours: 75** **Scheme of Evaluation: (T/P/TP)**

Objective: This course will discuss the following
1. Structure and functions of the various organ systems and organs of the human body
2. Homeostatic mechanisms and their imbalances in the human body
3. Various vital physiological parameters of the human body and their significances

Course Outcome: Upon successful completion of this course, the students will be able to
1. Describe the various organ systems of the human body
2. Discuss the anatomical features of the important human organs and tissues
3. Explain the homeostatic mechanisms regulating the normal physiology in the human system
4. Discuss the significance of various vital physiological parameters of the human body

Detailed Syllabus

Modules	Topics (if applicable) & Course Contents	Periods
I	**Scope of Anatomy and Physiology, Definition of various terminologies** **Structure of Cell:** Components and its functions **Tissues of the human body:** Epithelial, Connective, Muscular and Nervous tissues – their sub-types and characteristics. **Osseous system:** structure and functions of bones of axial and appendicular skeleton Classification, types and movements of joints, disorders of joints	**15 hours**
II	**Haemopoietic system:** Composition and functions of blood**,** Process of Hemopoiesis**,** Characteristics and functions of RBCs, WBCs and platelets, Mechanism of Blood Clotting, Importance of Blood groups **Lymphatic system:** Lymph and lymphatic system, composition, function and its formation, Structure and functions of spleen and lymph node **Cardiovascular system:** Anatomy and Physiology of heart**,** Blood vessels and circulation (Pulmonary, coronary and systemic circulation)**,** Cardiac cycle and Heart sounds, Basics of ECG**,** Blood pressure and its regulation **Respiratory system:** Anatomy of respiratory organs and their functions, Regulation Mechanism of respiration, Respiratory volumes and capacities – definitions	**20 hours**
III	**Digestive system:** Anatomy and Physiology of GIT, Anatomy and functions of accessory glands**,** Physiology of digestion and absorption **Skeletal muscles:** Histology**,** Physiology of muscle contraction, Disorder of skeletal muscles	**20 hours**

	Nervous system: Classification of nervous system, Anatomy and physiology of cerebrum, cerebellum, mid Brain, Function of hypothalamus, medulla oblongata and basal ganglia, Spinal cord-structure and reflexes **Names and functions of cranial nerves** **Anatomy and physiology of sympathetic and parasympathetic nervous system (ANS)**	
IV	**Sense organs -** Anatomy and physiology of Eye, Ear, Skin, Tongue, Nose **Urinary system:** Anatomy and physiology of urinary system, Physiology of urine formation, Renin - angiotensin system, Clearance tests and micturition **Endocrine system (Hormones and their functions):** Pituitary gland, Adrenal gland, Thyroid and parathyroid gland, Pancreas and gonads. **Reproductive system:** Anatomy of male and female reproductive system, Physiology of menstruation, Spermatogenesis and Oogenesis, Pregnancy and parturition	**20 hours**
TOTAL		**75 hours**

HUMAN ANATOMY AND PHYSIOLOGY – Practical

Detailed Syllabus

Modules	Topics (if applicable) & Course Contents	Periods
I.	**Study of compound microscope** **General techniques for the collection of blood** **Microscopic examination** of Epithelial tissue, Cardiac muscle, Smooth muscle, Skeletal muscle, Connective tissue and Nervous tissue of ready/pre-prepared slides.	**3 hours/ week**
II.	**Study of Human Skeleton-Axial skeleton and appendicular skeleton** **Study of appliances used in Haematological experiments** (only identification and listing the appliances) Determination of Blood group, ESR, Haemoglobin content of blood, Bleeding time and Clotting time	**3 hours/ week**
III.	Determination of WBC count of blood Determination of RBC count of blood Determination of Differential count of blood Recording of Blood Pressure in various postures, different arms, before and after exertion and interpreting the results Recording of Body temperature (using mercury, digital and IR thermometers at various locations), Pulse rate/Heart rate (at various locations in the body, before and after exertion), Respiratory Rate	**3 hours/ week**
IV	Recording Pulse Oxygen (before and after exertion) Recording force of air expelled using Peak Flow Meter Measurement of height, weight, and BMI Study of various systems and organs with the help of chart, models and specimens Cardiovascular system, Respiratory system, Digestive system, Urinary system, Endocrine system, Reproductive system, Nervous system, Eye, Ear, Skin	**3 hours/ week**
TOTAL		**75 hours**

Text Books:

1. Chatterjees, C. C. (2020). Human Physiology. 13th Edition. CBS Publishers.
2. Chaudhary, S., Chaudhary, A. (2016). Human Anatomy and Physiology. PV.
3. Ross & Wilson (2018). Anatomy and Physiology In Health And Illness 13th Edition. Elsevier.

Reference Books:

1. Goyal, Ramesh K. (2008). Derasari and Gandhi's Elements of Human Anatomy Physiology and Health Education. 17th Edition. B.S. Shah Prakashan.

2. Kale, S. R., Kale, R. R. (2017). Practical Human Anatomy and Physiology. Nirali Prakashan.
3. Tortora, Gerard, J., Derrickson, Bryan, H. (2017). Human Anatomy and Physiology. 15th Edition. Wiley.
4. Sembulingam, K., Sembulingam, P. (2016). Essentials of Medical Physiology. 7th Edition. Jaypee Brothers Medical Publishers.
5. Ranade, V. G., Joshi, P. N., Pradhan, S. (1981) Text Book of Practical Physiology. 3rd Edition. P.V.G. Prakashan.
6. Goyal, R. K., Natvar, M. P., Shah, S. A. Practical Anatomy, Physiology and Biochemistry, Experimental Physiology. B.S Shah Prakashan.

Teaching Learning Process and Assessment Methods

Unit No.	Course Learning Outcomes	Teaching and Learning Activity	Assessment Tasks
I	The students will learn about the various organ systems of the human body	An appropriate blend of chalk board as well as Power point presentations will be adopted, practical demonstrations will also be given	Assignments will be Conducted along with regular tests.
II	The students will learn about the various anatomical features of the important human organs and tissues	Students will be taught by using of traditional chalk board and demonstrations by showing pictures of dosage form.	Quiz will be organized. They will be shown various pictures to identify the liquid dosage forms. Assignment and tests.
III	The students will learn about the homeostatic mechanisms regulating the normal physiology in the human system	Will be taught by chalk and board method. Students will be shown various power point presentations for concept building	They will be asked for examples from regularly used products. Assignment and tests will be conducted.
IV	The students will learn about the significance of various vital physiological parameters of the human body	Teaching will be imparted by chalk and board method. laboratory Preparation of the product will also be conducted	Students will be given assignments and tests.

Paper V/Subject Name: SOCIAL PHARMACY – Theory

L-T-P-H – 3-0-3-150 **Total Hours: 75** **Scheme of Evaluation: (T/P/TP)**

Objective: This course will discuss about basic concepts of Public health and national health programs, Preventive healthcare, Food and nutrition related health issues, Health education & promotion, General roles and responsibilities of pharmacists in public health.

Course Outcome: Upon successful completion of this course, the students will be able to

1. Discuss about roles of pharmacists in the various national health programs
2. Describe various sources of health hazards and disease preventive measures
3. Discuss the healthcare issues associated with food and nutritional substances
4. Describe the general roles and responsibilities of pharmacists in public health

Detailed Syllabus

Modules	Topics (if applicable) & Course Contents	Periods
I.	**Introduction to Social Pharmacy:** Definition and Scope. Social Pharmacy as a discipline and its scope in improving the public health. Role of Pharmacists in Public Health. **Concept of Health** - WHO Definition, various dimensions, determinants, and health indicators. National Health Policy – Indian perspective Introduction to Millennium Development Goals, Sustainable Development Goals, FIP Development Goals.	**11 hours**
II.	**Preventive healthcare – Role of Pharmacists in the following:** Demography and Family Planning**,** Mother and child health, importance of breastfeeding, ill effects of infant, milk substitutes and bottle feeding,Overview of Vaccines, types of immunity and immunization. **Effect of Environment on Health** – Water pollution, importance of safe drinking water, waterborne diseases,air pollution, noise pollution, sewage and solid waste disposal, occupational illnesses, Environmental pollution due to pharmaceuticals. **Psychosocial Pharmacy**: Drugs of misuse and abuse –psychotropics, narcotics, alcohol, and tobacco products. Social Impact of these habits on social health and productivity and suicidal behaviours. **Nutrition and Health:** Basics of nutrition – Macronutrients and Micronutrients, Importance of water and fibres in diet, Balanced diet, nutrition deficiency diseases, ill effects of junk foods, calorific and nutritive values of various foods, fortification of food**,** Introduction to food safety, adulteration of foods, effects of artificial ripening, use of pesticides, genetically modified foods**,** Dietary supplements, nutraceuticals, food supplements – indications, benefits, Drug-Food Interactions.	**26 hours**
III.	**Introduction to Microbiology and common microorganisms** **Epidemiology**: Introduction to the terms Epidemiology, its applications, terms such as epidemic, pandemic, endemic, mode of transmission, quarantine, isolation, incubation period, Contact tracing. Causative agents, epidemiology and clinical presentations and Role of Pharmacists in educating the public in prevention of the following communicable diseases: **Respiratory infections** – chickenpox, measles, rubella, mumps, influenza (including Avian-Flu, H1N1, SARS, MERS, COVID-19), diphtheria, whooping cough, meningococcal meningitis, acute respiratory infections, tuberculosis, Ebola **Intestinal infections** – poliomyelitis, viral hepatitis, cholera, acute diarrheal diseases, typhoid, amebiasis, worm infestations, food poisoning.	**26 hours**

	Arthropod-borne infections - dengue, malaria, filariasis and, chikungunya. **Surface infections** − trachoma, tetanus, leprosy. **STDs, HIV/AIDS**	
IV	**Introduction to health systems** and all ongoing National health programs in India, their objectives, functioning, outcome and the role of pharmacists. Role of Pharmacists in disaster management. **Pharmacoeconomics** - basics, Health Insurance, Health, Maintenance Organizations (HMOs), Health spending, Out-of pocket, Expenses	**12 hours**
TOTAL		**75 hours**

SOCIAL PHARMACY – Practical

Detailed Syllabus

Modules	Topics (if applicable) & Course Contents	Periods
I.	National immunization schedule for children, adult vaccine schedule, Vaccines not included in the National Immunization Program. RCH - reproductive and child health - nutritional aspects Family planning devices Microscopical observation of different microbes (readymade slides)	**3 hours/ week**
II.	Oral Health and Hygiene Personal hygiene and etiquettes − hand washing techniques, Cough and sneeze etiquettes. Various types of masks, PPE gear, wearing/using them, and disposal. Menstrual hygiene, products used Marketed preparations of disinfectants, antiseptics, fumigating agents, antilarval agents, mosquito repellents, etc.	**3 hours/ week**
III.	Health Communication: Audio/Video podcasts, Images, Power Point Slides, Short Films, etc. in regional language(s) for mass communication/education/awareness on 5 different communicable diseases, their signs and symptoms, and prevention Water purification techniques, use of water testing kit, calculation of content/percentage of KMnO4, bleaching powder to be used for wells/tanks Counselling children on junk foods, balanced diets – using Information, Education and Communication (IEC), counselling, etc. (Simulation Experiments)	**3 hours/ week**
IV	Preparation of various charts on nutrition, sources of various nutrients from locally available foods, calculation of caloric needs of different groups (e.g., child, mother, sedentary lifestyle, etc.). Chart of glycemic index of foods Tobacco cessation, counselling, identifying various tobacco containing products through charts/pictures First Aid – Theory, basics, demonstration, hands on training, audio-visuals, and practices, BSL (Basic Life Support) Systems [SCA - Sudden Cardiac Arrest, FBAO- Foreign Body Airway Obstruction, CPR, Defibrillation (using AED) (include CPR techniques, First Responder)	**3 hours/ week**
TOTAL		**75 hours**

Text Books:

1. Geoff, H., Sarah, N., Kevin, T. Social Pharmacy − Innovation and development. The Pharmaceutical Press.
2. Text Book of Community Pharmacy Practice. RPSGB Publication.
3. Waterfield, J. Community Pharmacy Handbook.

Reference Books:

1. Khurana, S., Suresh P., Kalsi, R. Health Education & Community Pharmacy. S Vikas & Co
2. Tayler, Geoffrey. Social Pharmacy: Pharmaceutical Press. London.
3. Websites of Ministry of Health and Family Welfare, National Health Portal.
4. Pharmacists at the Frontlines: A Novel Approach at Combating TB (www.ipapharma.org) Visit Publications.
5. David, W. Where There Is No Doctor: A Village Health Care Handbook. 2015 updated version.

Teaching Learning Process and Assessment Methods

Unit No.	Course Learning Outcomes	Teaching and Learning Activity	Assessment Tasks
I	The students will learn about the roles of pharmacists in the various national health programs	Regular chalk and board teaching along with PPT presentations. Class discussions on syllabus topics will be performed.	MCQ based assignments will be given to students to check their understanding of the subject.
II	The students will learn to describe various sources of health hazards and disease preventive measures.	Teaching will be conducted both through black board mode and power point presentation mode	Oral questions will be asked in the class. Students will be given to prepare power point presentation on the assigned topics related to the class teachings.
III	The students will learn to discuss the healthcare issues associated with food and nutritional substances	Teaching will be conducted both through black board mode and power point presentation mode.	Problem solving assignments, regular question answer sessions, MCQs and unit-test for internal assessment
IV	The students will learn to describe the general roles and responsibilities of pharmacists in public health	Appropriate mix of chalk and board teaching as well as use of Power point presentations.	Internal assessment tests will be conducted, – presentations will be assessed along with practical assessment.

SYLLABUS (Part II)

Paper I/Subject Name: PHARMACOLOGY - Theory

L-T-P-C – 3-0-2-125 **Total Hours: 75** **Scheme of Evaluation: (T/P/TP)**

Objectives: This course will discuss the following:

1. General concepts of pharmacodynamics, pharmacokinetics, routes of administration etc.
2. Pharmacological classification and indications of drugs.
3. Dosage regimen, mechanisms of action, contraindications of drugs.
4. Common adverse effects of drugs.

Course Outcome: Upon successful completion of this course, the students will be able to

1. Describe the basic concepts of pharmacokinetics and pharmacodynamics.
2. Enlist the various classes and drugs of choices for any given disease condition.
3. Advice the dosage regimen, route of administration and contraindications for a given drug.
4. Describe the common adverse drug reactions.

Detailed Syllabus

Modules	Topics (if applicable) & Course Contents	Periods
I.	**General Pharmacology-**Introduction and scope of Pharmacology, Various routes of drug administration - advantages and disadvantages, Drug absorption -definition, types, factors affecting drug absorption, Bioavailability and the factors affecting bioavailability, Drug distribution -definition, factors affecting drug distribution, Biotransformation of drugs - Definition, types of biotransformation reactions, factors influencing drug metabolisms, Excretion of drugs - Definition, routes of drug excretion, General mechanisms of drug action and factors modifying drug action. **Drugs Acting on the Peripheral Nervous System-**Steps involved in neurohumoral transmission**,** Definition, classification, pharmacological actions, dose, indications, and contraindications of- Cholinergic drugs**,** Anti-Cholinergic drugs**,** Adrenergic drugs**,** Anti-adrenergic drugs**,** Neuromuscular blocking agents**,** Drugs used in Myasthenia gravis, Local anaesthetic agents, Non-Steroidal Anti-Inflammatory drugs (NSAIDs)	**21 hours**
II.	**Drugs Acting on the Eye-** Definition, classification, pharmacological actions, dose, indications and contraindications of –Miotics, Mydriatics, Drugs used in Glaucoma **Drugs Acting on the Central Nervous System-** Definition, classification, pharmacological actions, dose, indications and contraindications of-General anaesthetics, Hypnotics and sedatives, Anti-Convulsant drugs, Anti-anxiety drugs, Anti-depressant drugs, Anti-psychotics, Nootropic agents, Centrally acting muscle relaxants, Opioid analgesics **Drugs Acting on the Cardiovascular System-**Definition, classification, pharmacological actions, dose, indications and contraindications of-Anti-hypertensive drugs**,** Anti-anginal drugs**,** Anti-arrhythmic drugs**,** Drugs used in atherosclerosis and Congestive heart failure **Drugs Acting on Blood and Blood Forming Organs-**Definition, classification, pharmacological actions, dose,indications and contraindications of-Hematinic agents, Anti-coagulants, Anti-platelet agents, Thrombolytic drugs	**20 hours**

III.	**Definition, classification, pharmacological actions, dose, indications and contraindications of-** Bronchodilators**,** Expectorants**,** Anti-tussive agents**,** Mucolytic agents **Drugs Acting on the Gastro Intestinal Tract-**Definition, classification, pharmacological actions, dose, indications and contraindications of-Anti-ulcer drugs**,** Anti-emetics**,** Laxatives and purgatives**,** Anti-diarrheal drugs **Drugs Acting on the Kidney-**Definition, classification, pharmacological actions, dose, indications, and contraindications of-Diuretics**,** Anti-Diuretics **Hormones and Hormone Antagonists-**Physiological and pathological role and clinical uses of-Thyroid hormones, Anti-thyroid drugs, Parathormone, Calcitonin, Vitamin D, Insulin, Oral hypoglycemic agents, Estrogen, Progesterone, Oxytocin, Corticosteroids	**17 hours**
IV	**Autocoids-** Physiological role of Histamine, 5 HT and Prostaglandins**,** Classification, clinical uses and adverse effects of antihistamines and 5 HT antagonists **Chemotherapeutic Agents:** Introduction, basic principles of chemotherapy of infections, infestations and neoplastic diseases, Classification, dose, indication and contraindications of drugs belonging to-Penicillins, Cephalosporins, Aminoglycosides, Fluoroquinolones, Macrolides, Tetracyclines, Sulphonamides, Anti-tubercular drugs, Anti-fungal drugs, Anti-viral drugs, Anti-amoebic agents, Anthelmintics, Anti-malarial agents, Anti-neoplastic agent **Biologicals-**Definition, types and indications of biological agents with examples	**17 hours**
TOTAL		**75 hours**

PHARMACOLOGY – Practical

Detailed Syllabus

Modules	Topics (if applicable) & Course Contents	Periods
I	Introduction to experimental pharmacology Study of laboratory animals-(a) Mice; (b) Rats; (c) Guinea pigs; (d) Rabbits	**2 hours/ week**
II	Commonly used instruments in experimental pharmacology, Different routes of administration of drugs in animals	**2 hours/ week**
III	Types of pre-clinical experiments: In-Vivo, In-Vitro, Ex-Vivo, etc.	**2 hours/ week**
IV	Techniques of blood collection from animals	**2 hours/ week**
TOTAL		**50 hours**

Note: Animals shall not be used for doing/demonstrating any of the experiments given. The given experiments shall be carried-out /demonstrated as the case may be, ONLY with the use of software program(s).

Text Books:

1. Satoskar, R. S., Rege, N., Bhandarkar, S. D. (2015). Pharmacology and Pharmacotherapeutics. 24th Edition. Elsivier India.
2. Goyal, R. K. (2008). Derasari and Gandhi's elements of pharmacology.17th Edition. B.S. Shah Prakashan, Ahmedabad.
3. Suresh, B. (2019). Text book of Pharmacology. 16th Edition. Birla Publications (Regd) Pvt Ltd.
4. Kulkarni, S..K. (2014). Handbook of Experimental Pharmacology. Vallabh Prakashan.

Reference Books:

1. Sharma, H. K., Sharma, K. K. (2017). Principles of Pharmacology. 3rd Edition. Paras Medical Publisher, Hyderabad.
2. Howland, R. D., Mycek, M. J., Harvey, R. A., Champe, P. C. (2005). Lippincott's Illustrated Reviewa Pharmacology. 3rd Edition. Lippincott Williams & Wilkins.
3. Tripathi, K. D. (2019). Essentials of medical pharmacology. 8th Edition. Jaypee, New Delhi.

Teaching Learning Process and Assessment Methods

Unit No.	Course Learning Outcomes	Teaching and Learning Activity	Assessment Tasks
I.	The students will learn about the basic concepts of pharmacokinetics and pharmacodynamics.	An appropriate blend of chalk board as well as Power point presentations will be adopted, practical demonstrations will also be given	Assignments will be Conducted along with regular tests.
II.	The students will learn about the various classes and drugs of choices for any given disease condition.	Students will be taught by using of traditional chalk board and demonstrations by showing pictures of dosage form.	Quiz will be organized. They will asked MCQ about the drugs, diseases, symptoms and treatment. Assignment and tests.
III	The students will learn about the dosage regimen, route of administration and contraindications for a given drug.	Will be taught by chalk and board method. Students will be shown various power point presentations for concept building	They will be asked about the contradications for a given drugs. Assignment and tests will be conducted.
IV	The students will learn about the common adverse drug reactions.	Teaching will be imparted by chalk and board method. Students will be shown various power point presentations for concept building	Students will be given assignments and tests.

Paper II/Subject Name: COMMUNITY PHARMACY & MANAGEMENT –Theory

L-T-P-C – 3-0-3-150 **Total Hours: 75** **Scheme of Evaluation: (T/P/TP)**

Objective: This course will discuss about the following:

1. Establishing and running a community pharmacy and its legal requirements.
2. Professional aspects of handling and filling prescriptions.
3. Patient counselling on diseases, prescription and or non-prescription drugs.
4. Scope for performing basic health screening in community pharmacy settings

Course Outcome: Upon successful completion of this course, the students will be able to:

1. Describe the establishment, legal requirements and effective administration of a community pharmacy
2. Professionally handle prescriptions and dispense medications.
3. Counsel patients about the disease, prescription and or non- prescription drugs.
4. Perform basic health screening on patients and interpret the reports in the community pharmacy settings

Detailed Syllabus

Modules	Topics (if applicable) & Course Contents	Periods
I.	**Community Pharmacy Practice –** Definition, history and development of community pharmacy - International and Indian scenarios. Professional responsibilities of community pharmacists, Introduction to the concept of Good Pharmacy Practice and SOPs. **Prescription and prescription handling-**Definition, parts of prescriptions, legality of prescriptions, prescription handling, labelling of dispensed medications (Main label, ancillary label, pictograms), brief instructions on medication usage. Dispensing process, Good Dispensing Practices, dispensing errors and strategies to minimize them. **Communication skills-**Definition, types of communication skills**,** Interactions with professionals and patients**,** Verbal communication skills (one-to-one, over the telephone)**,**Written communication skills**,** Body language**,** Patient interview techniques	**18 hours**
II.	**Patient counseling**-Definition and benefits of patient counseling**,** Stages of patient counselling - Introduction, counseling content, counselling process and closing the counseling session**,** Barriers to effective counseling - Types and strategies to overcome the barriers**,** Patient counselling points for chronic diseases/disorders - Hypertension, Diabetes, Asthma, Tuberculosis, Chronic obstructive pulmonary disease and AIDS**,** Patient Package Inserts - Definition, importance and benefits, Scenarios of PPI use in India and other countries, Patient Information leaflets - Definition and uses **Medication Adherence-**Definition, factors influencing non adherence, strategies to overcome non-adherence **Health Screening Services in Community Pharmacy-**Introduction, scope and importance of various health screening services - for routine monitoring of patients, early detection and referral of undiagnosed cases	**17 hours**
III.	**Over The Counter (OTC) Medications-**Definition, need and role of Pharmacists in OTC medication dispensing**,** OTC medications in India, counseling for OTC products**,** Self-medication and role of pharmacists in promoting the safe practices during self-medication, Responding to symptoms, minor ailments and advice for selfcare in conditions such as - Pain management, Cough, Cold, Diarrhea, Constipation, Vomiting, Fever, Sore throat, Skin disorders, Oral health (mouth ulcers, dental pain, gum swelling)	**15 hours**

IV	**Community Pharmacy Management-**Legal requirements to set up a community pharmacy**,** Site selection requirements**,** Pharmacy designs and interiors**,** Vendor selection and ordering**,** Procurement, inventory control methods, and inventory management**,** Financial planning and management**,** Accountancy in community pharmacy – Day book, Cashbook**,** Introduction to pharmacy operation softwares – usefulness and availability**,** Customer Relation Management (CRM)**,** Audits in Pharmacies**,** SOP of Pharmacy Management**,** Introduction to Digital Health, Health and Online pharmacies	**25 hours**
TOTAL		**75 hours**

COMMUNITY PHARMACY & MANAGEMENT –Practical

Detailed Syllabus

Modules	Topics (if applicable) & Course Contents	Periods
I	Handling of prescriptions with professional standards, reviewing prescriptions, checking for legal compliance and completeness (minimum 5) Identification of drug-drug interactions in the prescription and follow-up actions (minimum 2)	**3 hours/ week**
II	Preparation of dispensing labels and auxiliary labels for the prescribed medications (minimum 5) Providing the following health screening services for monitoring patients / detecting new patients (one experiment for each activity) - Blood Pressure Recording, Capillary Blood Glucose Monitoring, Lung function assessment using Peak Flow Meter and incentive spirometer, recording capillary oxygen level using Pulse Oximeter, BMI measurement	**3 hours/ week**
III	Providing counselling to simulated patients for the following chronic diseases / disorders including education on the use of devices such as insulin pen, inhalers, spacers, nebulizers, etc. where appropriate (one experiment for each disease)- Type 2 Diabetes Mellitus, Primary Hypertension, Asthma, Hyperlipidaemia, Rheumatoid Arthritis Providing counselling to simulated patients for the following minor ailments (any three)- Headache, GI disturbances (Nausea, Vomiting, Dyspepsia, diarrhoea, constipation), Worm infestations, Pyrexia, Upper Respiratory Tract infections, Skin infections, Oral and dental disorder	**3 hours/ week**
IV	Appropriate handling of dummy dosage forms with correct administration techniques - oral liquids with measuring cup/cap/dropper, Eye Drops, Inhalers, Nasal drops, Insulin pen, nebulizers, different types of tablets, patches, enemas, suppositories	**3 hours/ week**
TOTAL		**75 hours**

Note: The following practicals shall be carried out in the model community pharmacy with appropriate simulated scenarios and materials. Students shall be trained through role plays wherever necessary. The activities of the students shall be assessed / evaluated using a structured objective assessment form.

Text Books:

1. Jain, N. K. (2014). Health Education & Community Pharmacy. 2nd Edition. CBS Publication.
2. Ali, M., Gupta, J. (2018). Drug Store and Business Management. 3rd Edition. CBS Publication.
3. Parmar, N. S. (2012). Health Education & Community Pharmacy. CBS Publication.
4. Shargel, L., Mutnick, A. H. (2012).Comprehensive Pharmacy Review for NAPLEX (Point (Lippincott Williams & Wilkins), 8th Edition. Lippincott Williams and Wilkins.

Reference Books:

1. Harman, R. J., Mason, P. (2002). Handbook of pharmacy – health care. 2nd Revised Edition. Pharmaceutical Press.
2. Pharmacists at the Frontline-A Novel Approach at Combating TB. Indian Pharmaceutical Association, Mumbai. Available at: https://www.google.com/url?sa=t&source=web&rct=j&url=https://ipapharma.org/wp-content/uploads/2019/02/pharmacists-at-the-frontlines-a-novel-approach-at-combating-tb-handbook-ipa.pdf&ved=2ahUKEwiKkYqq3brxAhXGfX0KHRn5A0MQFjACegQIDRAC&usg=AOvVaw2FOncIhr6IVrhKxspCJKW4
3. Responsible Use of Medicines: A Layman's Handbook. Indian Pharmaceutical Association, Pharmacy Council of India. Available at: https://www.google.com/url?sa=t&source=web&rct=j&url=https://ipapharma.org/wp-content/uploads/2019/04/Responsible-Use-of-Medicines-Handbook_IPA.pdf&ved=2ahUKE wirlcS437rxAhWwzDgGHYCpAIIQFjAAegQIBRAC&usg=AOvVaw1-Fa07ZpRpq42el6icP-vT&cshid=1624897657823
4. Community Pharmacy Practice around the Globe-Part One. Indian Pharmaceutical Association. Pharmacy Council of India. Available at: https://www.google.com/url?sa=t&source=web&rct=j&url=https://ipapharma.org/wp-content/uploads/2019/02/community-pharmacy-practice-around-the-globe-e28093-part-one-handbook-ipa.pdf&ved=2ahUKEwi8iaO84LrxAhVTfisKHYL6DLAQFjAAegQIAxAC&usg=AOvVaw1i_-v1dhQJYBRUYpizPjyi

Teaching Learning Process and Assessment Methods

Unit No.	Course Learning Outcomes	Teaching and Learning Activity	Assessment Tasks
I	The students will learn about the establishment, legal requirements and effective administration of a community pharmacy	Regular chalk and board teaching along with PPT presentations. Class discussions on syllabus topics will be performed.	MCQ based assignments will be given to students to check their understanding of the subject.
II	The students will learn to professionally handle prescriptions and dispense medications.	Teaching will be conducted both through black board mode and power point presentation mode	Oral questions will be asked in the class. Students will be given to prepare power point presentation on the assigned topics related to the class teachings.
III	The students will learn to counsel patients about the disease, prescription and or non- prescription drugs.	Teaching will be conducted both through black board mode and power point presentation mode.	Problem solving assignments, regular question answer sessions, MCQs and unit-test for internal assessment
IV	The students will learn to perform basic health screening on patients and interpret the reports in the community pharmacy settings	Appropriate mix of chalk and board teaching as well as use of Power point presentations.	Internal assessment tests will be conducted, – presentations will be assessed along with practical assessment.

Paper III/Subject Name: BIOCHEMISTRY & CLINICAL PATHOLOGY-Theory

L-T-P-C – 3-0-2-125 **Total Hours: 75** **Scheme of Evaluation: (T/P/TP)**

Objective: This course will discuss about the following:

1. Structure and Functions of biomolecules
2. Catalytic activity, diagnostic and therapeutic importance of enzymes
3. Metabolic pathways of biomolecules in health and illness (metabolic disorders)
4. Biochemical principles of organ function tests and their clinical significance
5. Qualitative and quantitative determination of biomolecules/metabolites in the biological sample
6. Clinical pathology of blood and urine.

Course Outcome: Upon successful completion of this course, the students will be able to

1. Describe the functions of biomolecules
2. Discuss the various functions of enzymes in the human system
3. Explain the metabolic pathways of biomolecules in both physiological and pathological conditions
4. Describe the principles of organ function tests and their clinical significances
5. Determine the biomolecules/metabolites in the given biological samples, both qualitatively and quantitatively
6. Describe the clinical pathology of blood and urine.

Detailed Syllabus

Modules	Topics (if applicable) & Course Contents	Periods
I.	**Introduction to biochemistry:** Scope of biochemistry in pharmacy; Cell and its biochemical organization**.** **Carbohydrates-**Definition, classification with examples, chemical properties**,** Monosaccharides - Structure of glucose, fructose and galactose**,** Disaccharides - structure of maltose, lactose and sucrose**,** Polysaccharides - chemical nature of starch and glycogen**,** Qualitative tests and biological role of carbohydrates **Proteins-** Definition, classification of proteins based on composition and solubility with examples**,** Definition, classification of amino acids based on chemical nature and nutritional requirements with examples- Structure of proteins (four levels of organization of protein structure)**,** Qualitative tests and biological role of proteins and amino acids**,** Diseases related to malnutrition of proteins.	**12 hours**
II.	**Lipids-**Definition, classification with examples**,** Structure and properties of triglycerides (oils and fats)**,** Fatty acid classification - Based on chemical and nutritional requirements with examples**,** Structure and functions of cholesterol in the body**,** Lipoproteins - types, composition and functions in the body**,** Qualitative tests and functions of lipids **Nucleic acids-** Definition, purine and pyrimidine bases**,** Components of nucleosides and nucleotides with examples**,** Structure of DNA (Watson and Crick model), RNA and their functions **Enzymes-**Definition, properties and IUB and MB classification**,** Factors affecting enzyme activity**,** Mechanism of action of enzymes, Enzyme inhibitors**,** Therapeutic and pharmaceutical importance of enzymes **Vitamins-**Definition and classification with examples**,** Sources, chemical nature, functions, coenzyme form, recommended dietary requirements, deficiency diseases of fat- and water-soluble vitamins.	**20 hours**

III.	**Metabolism (Study of cycle/pathways without chemical structures)-**Metabolism of Carbohydrates: Glycolysis, TCA cycle and glycogen metabolism, regulation of blood glucose level. Diseases related to abnormal metabolism of Carbohydrates**,** Metabolism of lipids: Lipolysis, β-oxidation of Fatty acid (Palmitic acid) ketogenesis and ketolysis, Diseases related to abnormal metabolism of lipids such as Ketoacidosis, Fatty liver, Hypercholesterolemia **Metabolism of Amino acids (Proteins):** General reactions of amino acids and its significance–Transamination, deamination, Urea cycle and decarboxylation. Diseases related to abnormal metabolism of amino acids, Disorders of ammonia metabolism, phenylketonuria, alkaptonuria and Jaundice. **Biological oxidation:** Electron transport chain and Oxidative phosphorylation **Minerals:** Functions, Deficiency diseases, recommended dietary requirements of calcium, phosphorus, iron, sodium and chloride	**25 hours**
IV	**Water and Electrolytes-**Distribution, functions of water in the body**,** Water turnover and balance**,** Electrolyte composition of the body fluids, Dietary intake of electrolyte and Electrolyte balance**,** Dehydration, causes of dehydration and oral rehydration therapy **Introduction to Biotechnology** **Organ function tests-**Functions of kidney and routinely performed tests to assess the functions of kidney and their clinical significances, Functions of liver and routinely performed tests to assess the functions of liver and their clinical significances**,** Lipid profile tests and its clinical significances **Introduction to Pathology of Blood and Urine-**Lymphocytes and Platelets, their role in health and disease**,** Erythrocytes - Abnormal cells and their significance**,** Normal and Abnormal constituents of Urine and their significance	**18 hours**
TOTAL		**75 hours**

BIOCHEMISTRY & CLINICAL PATHOLOGY - Practical

Detailed Syllabus

Modules	Topics (if applicable) & Course Contents	Periods
I.	Qualitative analysis of carbohydrates (4 experiments)	**2 hours/ week**
II.	Qualitative analysis of Proteins and amino acids (4 experiments) Qualitative analysis of lipids (2 experiments)	**2 hours/ week**
III.	Qualitative analysis of urine for normal and abnormal constituents(4 experiments) Determination of constituents of urine (glucose, creatinine, chlorides)(2 experiments)	**2 hours/ week**
IV	Determination of constituents of blood/serum (simulated) (Creatine, glucose, cholesterol, Calcium, Urea, SGOT/SGPT) (5 experiments) Study the hydrolysis of starch from acid and salivary amylase enzyme (1 experiment)	**2 hours/ week**
TOTAL		**50 hours**

Text Books:

1. Satyanarayana, U., Chakrapan, U. (2019). Essentials of Biochemistry. 4th Edition. Books and Allied Pvt. Ltd. Essentials of pharmaceutical biochemistry.
2. Rao, R. (2008): A Text Book of Biochemistry. UBS Publishers.

Reference Books:

1. Gupta, R. C. (2018). Practical Biochemistry. 5th Edition. CBS, New Delhi.
2. Pattabiraman, T. N. (2015). Laboratory Manual& Practical Biochemistry. 4th Edition. All India Publishers and Distributors.

Teaching Learning Process and Assessment Methods

Unit No.	Course Learning Outcomes	Teaching and Learning Activity	Assessment Tasks
I	The students will able to describe the functions of biomolecules	Regular chalk and board teaching along with PPT presentations. Class discussions on syllabus topics will be performed.	MCQ based assignments will be given to students to check their understanding of the subject.
II	The students will able to discuss the various functions of enzymes in the human system	Teaching will be conducted both through black board mode and power point presentation mode	Oral questions will be asked in the class. Students will be given to prepare power point presentation on the assigned topics related to the class teachings.
III	The students will able to describe the principles of organ function tests and their clinical significances	Teaching will be conducted both through black board mode and power point presentation mode. Software's/videos will be issued to demonstrate animal experiment.	Problem solving assignments, regular question answer sessions, MCQs and unit-test for internal assessment
IV	The students will able to determine the biomolecules/metabolites in the given biological samples, both qualitatively and quantitatively. The students will able to describe the clinical pathology of blood and urine	Appropriate mix of chalk and board teaching as well as use of Power point presentations for clarity of concepts with reactions, Practical demonstration will be given.	Internal assessment tests will be conducted, – presentations will be assessed along with practical assessment.

Paper IV/Subject Name: PHARMACOTHERAPEUTICS - Theory

L-T-P-C – 3-0-1-100 **Total Hours: 75** **Scheme of Evaluation: (T/P/TP)**

Objectives: This course is designed to impart fundamental knowledge on:
1. Etiopathogenesis of selected common diseases and evidence-based medicine therapy
2. Importance of individualized therapeutic plans based on diagnosis
3. Basic methods for assessing the clinical outcomes of drug therapy

Course Outcome: Upon completion of this course the student should be able to:
1. Help assessing the subjective and objective parameters of patients in common disease conditions
2. Assist other healthcare providers to analyse drug related problems and provide therapeutic interventions
3. Participate in planning the rational medicine therapy for common diseases
4. Design and deliver discharge counselling for patients.

Detailed Syllabus

Modules	Topics (if applicable) & Course Contents	Periods
I.	**Pharmacotherapeutics** – Introduction, scope and objectives. Rational use of Medicines, Evidence Based Medicine, Essential Medicines List, Standard Treatment Guidelines (STGs)	**10 hours**
II.	**Definition, etiopathogenesis, clinical manifestations, non-pharmacological and pharmacological management of the diseases associated with** **Cardiovascular System-**Hypertension**,** Angina and Myocardial infarction**,** Hyperlipidaemia, Congestive Heart Failure **Respiratory System-**Asthma, COPD **Endocrine System-** Diabetes, Thyroid disorders- Hypo and Hyperthyroidism	**20 hours**
III.	**Central Nervous System-** Epilepsy, Parkinson's disease, Alzheimer's disease, Stroke, Migraine **Gastro Intestinal Disorders-** Gastro oesophageal reflux disease, Peptic Ulcer Disease, Alcoholic liver disease, Inflammatory Bowel Diseases (Crohn's Disease and Ulcerative Colitis) **Haematological disorders-** Iron deficiency anaemia**,** Megaloblastic anaemia **Infectious diseases-**Tuberculosis- Pneumonia**,** Urinary tract infections**,** Hepatitis**,** Gonorrhoea and Syphilis**,** Malaria**,** HIV and Opportunistic infections**,** Viral Infections (SARS, CoV2)	**25 hours**
IV	**Musculoskeletal disorders-**Rheumatoid arthritis, Osteoarthritis **Dermatology-**Psoriasis, Scabies**,** Eczema **Psychiatric Disorders-**Depression, Anxiety, Psychosis **Ophthalmology-** Conjunctivitis (bacterial and viral), Glaucoma **Anti-microbial Resistance** **Women's Health-**Polycystic Ovary Syndrome, Dysmenorrhea, Premenstrual Syndrome	**20 hours**
TOTAL		**75 hours**

PHARMACOTHERAPEUTICS - Practical

Detailed Syllabus

Modules	Topics (if applicable) & Course Contents	Periods
I.	**Preparation and discussion of SOAP (Subjective, Objective, Assessment and Plan) notes for at least SIX clinical cases (real / hypothetical) of the following disease conditions-** Hypertension, Angina Pectoris, Myocardial Infarction, Hyperlipidaemia, Rheumatoid arthritis, Asthma	**1 hour/ week**
II.	**Preparation and discussion of SOAP (Subjective, Objective, Assessment and Plan) notes for at least SIX clinical cases (real / hypothetical) of the following disease conditions.** COPD, Diabetes, Epilepsy, Stroke, Depression, Tuberculosis, Anaemia (any one type as covered in theory), Viral infection (any one type as covered in theory), Dermatological conditions (any one condition as covered in theory)	**1 hour/ week**
III.	Patient counselling exercises using role plays based on the real/hypothetical clinical case scenarios (expected to provide counselling on disease condition, medications, life-style modifications, monitoring parameters, etc. and the same shall be documented) (Minimum 5 cases)	**1 hour/ week**
IV	Simulated cases to enable dose calculation of selected drugs in paediatrics, and geriatrics under various pathological conditions. (Minimum 4 cases)	**1 hour/ week**
TOTAL		**25 hours**

Text Book:

1. Roger, W. (2018). Clinical Pharmacy and Therapeutics, 6th Edition. Churchill Livingstone Publication.
2. Eric, T. H. (2018). Clinical Pharmacy and Therapeutics. 10th Edition. Wiley Publication.

Reference Books:

1. Lippincott, M. A. (2020). Applied Therapeutics: The clinical Use of Drugs. Williams and Wilkins Publication.
2. Joseph, T. D. (2020). Pharmacotherapy: A Pathophysiologic approach. Mac Graw Hills Publication. Appleton and Lange Publication.

Teaching Learning Process and Assessment Methods

Unit No.	Course Learning Outcomes	Teaching and Learning Activity	Assessment Tasks
I	Students will learn about the etiopathogenesis of selected common diseases and evidence-based medicine therapy, importance of individualized therapeutic plans based on diagnosis and basic methods for assessing the clinical outcomes of drug therapy	An appropriate blend of chalk board as well as Power point presentations will be adopted, practical demonstrations will also be given	Assignments will be Conducted along with regular tests.

II	Understand the basics of different assessment of the subjective and objective parameters of patients in commondisease conditions	Students will be taught by using of traditional chalk board and demonstrations by showing pictures of dosage form.	Quiz will be organized. They will be shown various pictures to identify the liquid dosage forms. Assignment and tests.
III	Understand and assist other healthcare providers to analyse drug related problems and providetherapeutic interventions	Will be taught by chalk and board method. Students will be shown various power point presentations for concept building	They will be asked for analysis of drug related problems. Assignment and tests will be conducted.
IV	Students will gain knowledge about planning the rational medicine therapy for common diseases.	Teaching will be imparted by chalk and board method. Students will be shown various power point presentations for concept building	Students will be given assignments and tests.

Paper V/Subject Name: HOSPITAL AND CLINICAL PHARMACY – Theory

L-T-P-H – 3-0-1-100 **Total Hours: 75** **Scheme of Evaluation: (T/P/TP)**

Objective: This course will discuss and train the students in the Hospital and Hospital Pharmacy organization and set-ups, Basics of hospital pharmacy services including the procurement, supply chain, storage of medicines and medical supplies, Basics of clinical pharmacy including introduction to comprehensive pharmaceutical care services, Basic interpretations of common laboratory results used in clinical diagnosis towards optimizing the drug therapy.

Course Outcome: Upon completion of the course student shall be able to

1. Explain about the basic concepts of hospital pharmacy administration
2. Manage the supply chain and distribution of medicines within the hospital settings
3. Assist the other healthcare providers in monitoring drug therapy and address drug related problems
4. Interpret common lab investigation reports for optimizing drug therapy

Detailed Syllabus

Modules	Topics (if applicable) & Course Contents	Periods
I	**Hospital Pharmacy-**Definition, scope, national and international scenario Organisational structure, Professional responsibilities, Qualification and experience requirements, job specifications, work load requirements and inter professional relationships, Good Pharmacy Practice (GPP) in hospital, Hospital Pharmacy Standards (FIP Basel Statements, AHSP), Introduction to NABH Accreditation and Role of Pharmacists **Different Committees in the Hospital-** Pharmacy and Therapeutics Committee - Objectives, Composition and functions**,** Hospital Formulary - Definition, procedure for development and use of hospital formulary, Infection Control Committee – Role of Pharmacist in preventing Antimicrobial Resistance **Supply Chain and Inventory Control-**Preparation of Drug lists - High Risk drugs, Emergency drugs, Schedule H1 drugs, NDPS drugs, reserved antibiotics**,** Procedures of Drug Purchases – Drug selection, short term, long term and tender/e-tender process, quotations, etc., Inventory control techniques: Economic Order Quantity, Reorder Quantity Level, Inventory Turnover etc., Inventory Management of Central Drug Store – Storage conditions, Methods of storage, Distribution, Maintaining Cold Chain, Devices used for cold storage (Refrigerator, ILR, Walk-in-Cold rooms),FEFO, FIFO methods**,** Expiry drug removal and their disposal methods e.g., Narcotics, Documentation - purchase and inventory	**25 hours**
II	**Drug distribution-**Drug distribution (in- patients and out - patients) – Definition, advantages and disadvantages of individual prescription order method, Floor Stock Method, Unit Dose, Drug Distribution Method, Drug Basket Method.**,** Distribution of drugs to ICCU/ICU/NICU/Emergency wards, Automated drug dispensing systems and devices**,** Distribution of Narcotic and Psychotropic substances and their storage **Compounding in Hospitals.** Bulk compounding, IV admixture services and incompatibilities, Total parenteral nutrition **Radio Pharmaceuticals** - Storage, dispensing and disposal of radiopharmaceuticals **Application of computers in Hospital Pharmacy Practice, Electronic health records, Softwares used in hospital pharmacy**	**15 hours**

III	**Clinical Pharmacy:** Definition, scope and development - in India and other countries Technical definitions, common terminologies used in clinical settings and their significance such as Paediatrics, Geriatric, Antinatal Care, Post-natal Care, etc. **Daily activities of clinical pharmacists:** Definition, goal and procedure of- Ward round participation, Treatment Chart Review, Adverse drug reaction monitoring, Drug information and poisons information, Medication history Patient counseling, Interprofessional collaboration **Pharmaceutical care:** Definition, classification of drug related problems. Principles and procedure to provide pharmaceutical care **Medication Therapy Management, Home Medication Review**	**15 hours**
IV	**Clinical laboratory tests used in the evaluation of disease states - significance and interpretation of test results-** Haematological, Liver function, Renal function, thyroid function tests, Tests associated with cardiac disorders, Fluid and electrolyte balance**,** Pulmonary Function Tests **Poisoning:** Types of poisoning: Clinical manifestations and Antidotes **Drugs and Poison Information Centre and their services** – Definition, Requirements, Information resources with examples, and their advantages and disadvantages. **Pharmacovgilance:** Definition, Aim, scope, Overview of Pharmacovigilance. **Medication errors:** Definition, types, consequences, and strategies to minimize medication errors, LASA drugs and Tallman lettering as per ISMP **Drug Interactions:** Definition, types, clinical significance of drug interactions	**20 hours**
TOTAL		**75 hours**

HOSPITAL AND CLINICAL PHARMACY - Practical

Note: Few of the experiments of Hospital and Clinical Pharmacy practical course listed here require adequate numbers of desktop computers with internet connectivity, adequate drug information resources including reference books, different types of surgical dressings and other medical devices and accessories. Various charts, models, exhibits pertaining to the experiments shall also be displayed in the laboratory.

Detailed Syllabus

Modules	Topics (if applicable) & Course Contents	Periods
I.	Systematic approach to drug information queries using primary / secondary / tertiary resources of information (2 cases) Interpretation of laboratory reports to optimize the drug therapy in a given clinical case (2 cases)	**1 hour/ week**
II.	Filling up IPC's ADR Reporting Form and perform causality assessments using various scales (2 cases) Demonstration/simulated/hands-on experience on the identification, types, use/ application/administration of- Orthopaedic and Surgical Aids such as knee cap, LS belts, abdominal belt, walker, walking sticks, etc. Different types of bandages such as sterile gauze, cotton, crepe bandages, etc. Needles, syringes, catheters, IV set, urine bag, RYLE's tube, urine pots, colostomy bags, oxygen masks, etc.	**1 hour/ week**
III.	Case studies on drug-drug interactions (any 2 cases) Wound dressing (simulated cases and role play – any 2 cases)	**1 hour/ week**
IV	Vaccination and injection techniques (IV, IM, SC) using mannequins (5 activities)	**1 hour/ week**
TOTAL		**25 hours**

Text Books:

1. Parthasarathi, G., Karin, N., Milap, N. (2017). A Textbook of Clinical Pharmacy Practice - Essential concepts and skills. Orient Longman Pvt. Ltd. Hyderabad.
2. Pratibha, N., Roop, K. K. (2020). Text Book of Hospital and Clinical Pharmacy. Birla publications, New Delhi.

Reference Books:

1. Scott, L.T. (2019). Basic skills in interpreting laboratory data. American Society of Health System Pharmacists Inc. Available at: https://www.shpa.org.au/sites/default/files/uploaded-content/website-content/mi_procedure_manualvfinal.pdf.
2. Gupta, B. K., Gupta, R. N. (2019). GPP in Hospital Pharmacy, Vallabh Prakashan.

Teaching Learning Process and Assessment Methods

Unit No.	Course Learning Outcomes	Teaching and Learning Activity	Assessment Tasks
I	Understand the Hospital and Hospital Pharmacy organization and set-ups	Regular chalk and board teaching along with PPT presentations. Class discussions on syllabus topics will be performed.	MCQ based assignments will be given to students to check their understanding of the subject.
II	Students will learn about Basics of hospital pharmacy services including the procurement, supply chain, storage of medicines and medical supplies	Teaching will be conducted both through black board mode and power point presentation mode	Oral questions will be asked in the class. Students will be given to prepare power point presentation on the assigned topics related to the class teachings.
III	Students can understand basics of clinical pharmacy including introduction to comprehensive pharmaceutical care services	Teaching will be conducted both through black board mode and power point presentation mode.	Problem solving assignments, regular question answer sessions, MCQs and unit-test for internal assessment
IV	Students able to interpret common lab investigation reports for optimizing drug therapy	Appropriate mix of chalk and board teaching as well as use of Power point presentations.	Internal assessment tests will be conducted, – presentations will be assessed along with practical assessment.

Paper VI/Subject Name: PHARMACY LAW AND ETHICS – Theory

L-T-P-H – 3-0-0-75 **Total Hours: 75** **Scheme of Evaluation: (T)**

Objective: This course will discuss about the:
1. General perspectives, history, evolution of pharmacy law in India
2. Act and Rules regulating the profession and practice of pharmacy in India
3. Important code of ethical guidelines pertaining to various practice standards
4. Brief introduction to the patent laws and their applications in pharmacy

Course Outcome: Upon completion of this course the student should be able to
1. Describe the history and evolution of pharmacy law in India
2. Interpret the act and rules regulating the profession and practice of pharmacy in India
3. Discuss the various codes of ethics related to practice standards in pharmacy
4. Interpret the fundamentals of patent laws from the perspectives of pharmacy

Detailed Syllabus

Modules	Topics (if applicable) & Course Contents	Periods
I	**General Principals of Law, History and various Acts related to Drugs and Pharmacy profession** **Pharmacy Act-1948 and Rules:** Objectives, Definitions, Pharmacy Council of India; its constitution and functions, Education Regulations, State and Joint state pharmacy councils, Registration of Pharmacists, Offences and Penalties. **Pharmacy Practice Regulations 2015** **Drugs and Cosmetics Act 1940 and Rules 1945 and New Amendments** 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. **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. Study of schedule C and C1, G, H, H1, K, P, M, N, X and Y. **Sale of Drugs** – Wholesale, Retail sale and Restricted license, Records to be kept in a pharmacy, Drugs Prohibited for manufacture and sale in India **Administration of the Act and Rules** – Drugs Technical Advisory Board, Central Drugs Laboratory, Drugs Consultative Committee, Government analysts, licensing authorities, controlling authorities, Drug Inspectors.	**25 hours**
II	**Medicinal and Toilet Preparations Act 1955:** Objectives, Definitions, Licensing, Offences and Penalties, Narcotic Drugs and psychotropic substances Act 1985 and Rules Objectives, Definitions, Authorities and Officers, Prohibition, Control and Regulation, Offences and Penalties. **Drugs and Magic Remedies (Objectionable Advertisements) Act 1954** Objectives, Definitions, Prohibition of certain advertisements, Classes of Exempted advertisements, Offences and Penalties. **Prevention of cruelty to Animals Act-1960:** Objectives, Definitions, CPCSEA - brief overview, 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. **Poisons Act-1919:**	**20 hours**

	Introduction, objective, definition, possession, possession for sales and sale of any poison, import of poisons	
III	**FSSAI (Food Safety and Standards Authority of India) Act and Rules:** Brief overview and aspects related to manufacture, storage, sale and labelling of Food Supplements. **National Pharmaceutical Pricing Authority:** Drugs Price Control Order (DPCO) - 2013. Objectives, Definitions, Sale prices of bulk drugs, Retail price of formulations, Retail price and ceiling price of scheduled formulations, pharmaceutical policy 2002, National List of Essential Medicines (NLEM) **Code of Pharmaceutical Ethics:** Definition, ethical principles, ethical problem solving, registration, code of ethics for Pharmacist in relation to his job, trade, medical profession and his profession, Pharmacist's oath. **Medical Termination of Pregnancy Act and Rules** – basic understanding/salient features	**15 hours**
IV	**Role of all the government pharma regulator bodies –** Central Drugs Standards Control Organization (CDSCO), Indian Pharmacopoeia Commission (IPC). **Good Regulatory practices** (documentation, licenses, renewals, e-governance) in Community Pharmacy, Hospital pharmacy, Pharma Manufacturing, Wholesale business, inspections, import, export of drugs and medical devices. Introduction to BCS system of classification, Basic concepts of Clinical Trials, ANDA, NDA, New Drug development, Schedule Y. Brand v/s Generic, Trade name concept, Introduction to Patent Law and Intellectual Property Rights, Emergency Use Authorization **Blood bank –** basic requirements and functions **Clinical Establishment Act and Rules –** Aspects related to Pharmacy **Biomedical Waste Management Rules 2016 –** Basic aspects, and aspects related to pharma manufacture to disposal of pharma / medical waste at homes, pharmacies, and hospitals. **Bioethics -** Basic concepts, history and principles. Brief overview of ICMR's National Ethical Guidelines for Biomedical and Health Research involving human participants. **Introduction to the Consumer Protection Act.** **Medical Devices –** Categorization, basic aspects related to manufacture and sale	**15 hours**
TOTAL		**75 hours**

Text Books:

1. Suresh, B. (2020). Forensic Pharmacy. 5th Ed. Birla Publication.
2. Mithal, B. M. (2020). Text book of Forensic Pharmacy. Ed. 10th Ed. Vallabh Prakashan.

Reference Book:

1. Mehra, M. L. (2020). Hand book of drug law. 8th Ed. Jain Book Depot.
2. Jain, N.K. (2019). A text book of Forensic Pharmacy. 5th Ed. Vallabh Prakash Publication.
3. The Drugs and Cosmetics Act and Rules. Ministry of Health and Family Welfare (Dept of Health). https://cdsco.gov.in/opencms/export/sites/CDSCO_WEB/Pdfdocuments/acts_rules/2016DrugsandCosmeticsAct1940Rules1945.pdf.

Teaching Learning Process and Assessment Methods

Unit No.	Course Learning Outcomes	Teaching and Learning Activity	Assessment Tasks
I	Understand the General perspectives, history, evolution of pharmacy law in India	Regular chalk and board teaching along with PPT presentations. Class discussions on syllabus topics will be performed.	MCQ based assignments will be given to students to check their understanding of the subject.
II	Students will be able to explainAct and Rules regulating the profession and practice of pharmacy in India.	Teaching will be conducted both through black board mode and power point presentation mode	Oral questions will be asked in the class. Students will be given to prepare power point presentation on the assigned topics related to the class teachings.
III	Students can able to understand Important code of ethical guidelines pertaining to various practice standards	Teaching will be conducted both through black board mode and power point presentation mode. Software's/ Videos will be issued to demonstrate animal experiment.	Problem solving assignments, regular question answer sessions, MCQs and unit-test for internal assessment
IV	Students can able to interpret the fundamentals of patent laws from the perspectives of pharmacy	Appropriate mix of chalk and board teaching as well as use of Power point presentations for clarity of concepts with reactions, Practical demonstration will be given.	Internal assessment tests will be conducted, – presentations will be assessed along with practical assessment.