R21 Curriculum and Syllabus
Diploma in Pharmacy; D. Pharm
(based on Education Regulations 2020)

JIS University
Agarpara, Kolkata

PART - I							
Sl. No.	**Type**	**Course No.**	**Course Name**	**L**	**T**	**P**	**Total H**
THEORY							
1		ER20-11T	Pharmaceutics - Theory	3	0	0	75
2		ER20-12T	Pharmaceutical Chemistry - Theory	3	0	0	75
3		ER20-13T	Pharmacognosy - Theory	3	0	0	75
4		ER20-14T	Human Anatomy & Physiology - Theory	3	0	0	75
5		ER20-15T	Social Pharmacy - Theory	3	0	0	75
PRACTICAL							
6		ER20-11P	Pharmaceutics - Practical	0	0	3	75
7		ER20-12P	Pharmaceutical Chemistry - Practical	0	0	3	75
8		ER20-13P	Pharmacognosy - Practical	0	0	3	75
9		ER20-14P	Human Anatomy & Physiology - Practical	0	0	3	75
10		ER20-15P	Social Pharmacy - Practical	0	0	3	75
MANDATORY NON CREDIT COURSE							
11		DSD181	Seminar and Group Discussion	0	0	0	25
12		MSD182	Skill X and Other Activities (MOOCs Courses)	0	0	0	25
TOTAL				**15**	**0**	**15**	**750**

PART - II							
Sl. No.	**Type**	**Course No.**	**Course Name**	**L**	**T**	**P**	**Total H**
THEORY							
1		ER20-21T	Pharmacology - Theory	3	0	0	75
2		ER20-22T	Community Pharmacy & Management - Theory	3	0	0	75
3		ER20-23T	Biochemistry & Clinical Pathology - Theory	3	0	0	75
4		ER20-24T	Pharmacotherapeutics - Theory	3	0	0	75
5		ER20-25T	Hospital & Clinical Pharmacy - Theory	3	0	0	75
6		ER20-26T	Pharmacy Law & Ethics - Theory	3	0	0	75
PRACTICAL							
7		ER20-21P	Pharmacology - Practical	0	0	2	50
8		ER20-22P	Community Pharmacy & Management - Practical	0	0	3	75
9		ER20-23P	Biochemistry & Clinical Pathology - Practical	0	0	2	50
10		ER20-24P	Pharmacotherapeutics - Practical	0	0	1	25
11		ER20-25P	Hospital & Clinical Pharmacy - Practical	0	0	1	25
MANDATORY NON CREDIT COURSE							
12		DSD281	Seminar and Group Discussion	0	0	0	25
13		MSD282	Skill X and Other Activities (MOOCs Courses)	0	0	0	25
TOTAL				**18**	**0**	**9**	**675**

Hour Distribution: Summary of Curriculum

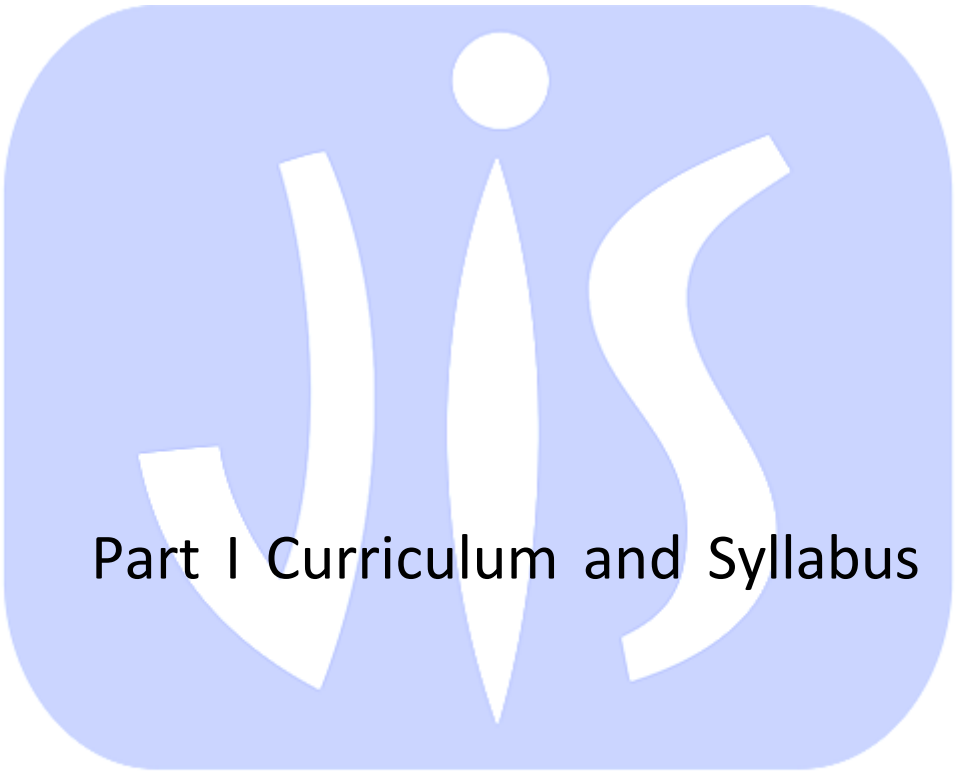
Category	Hour Allocation As Per PCI	Hour Allocation As per University
Part I	750	750
Part II	675	675
Part III	500	500
Total	1925	12025
Distribution Details		
Number of subjects (considering both theory & practical together)	11	15
Number of Theory Hours	825	825
Number of Practical Hours	600	600
Number of Tutorial Hours	275	275
Number of practical training hours	500	500
Mandatory Courses [Seminar and Skill X- Non CGPA]	0	50
Number of Course Outcomes for Theory courses	45	45
Number of Course Outcomes for Practical courses	40	40
Number of courses which have given assignments	9	9
Number of assignment topics given	75	75
Number of assignments reports each student shall submit	27	27
Number of courses which have given field visit	5	5
Number of field visit reports each student shall submit	9	9
Number of professional competencies	10	10

Credit Distribution in details:

A. Pharmacy Core Courses (PC)							
Sl. No.	Paper Code	Theory	Contact Hours/Week				Credit Points
			L	T	P	Total	
		Total Credit:					

B. Internship in Hospitals							
Sl. No.	Paper Code	Theory	Contact Hours/Week				Credit Points
			L	T	P	Total	
		Total Credit:					

C. Mandatory Courses [Seminar and SkillX](MC)							
Sl. No.	Paper Code	Theory	Contact Hours/Week				Credit Points
			L	T	P	Total	
		Total Credit:					



Part I Curriculum and Syllabus

PART - I							
Sl. No.	**Type**	**Course No.**	**Course Name**	**L**	**T**	**P**	**Total H**
THEORY							
1		ER20-11T	Pharmaceutics - Theory	3	0	0	75
2		ER20-12T	Pharmaceutical Chemistry - Theory	3	0	0	75
3		ER20-13T	Pharmacognosy - Theory	3	0	0	75
4		ER20-14T	Human Anatomy & Physiology - Theory	3	0	0	75
5		ER20-15T	Social Pharmacy - Theory	3	0	0	75
PRACTICAL							
6		ER20-11P	Pharmaceutics - Practical	0	0	3	75
7		ER20-12P	Pharmaceutical Chemistry - Theory	0	0	3	75
8		ER20-13P	Pharmacognosy - Theory	0	0	3	75
9		ER20-14P	Human Anatomy & Physiology - Theory	0	0	3	75
10		ER20-15P	Social Pharmacy - Theory	0	0	3	75
MANDATORY NON CREDIT COURSE							
11		DSD181	Seminar and Group Discussion	0	0	0	25
12		MSD182	Skill X and Other Activities (MOOCs Courses)	0	0	0	25
TOTAL				**15**	**0**	**15**	**750**

Course Code	ER20-11T			
Course Title	PHARMACEUTICS – THEORY			
Category				
LTP & Credits	L	T	P	Total H
	3	0	0	75
Total Contact Hours	75			
Pre-requisites	None			

Scope:

This course is designed to impart basic knowledge and skills on the art and science of formulating and dispensing different pharmaceutical dosage forms.

Course 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 completion of the course the students shall 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

Course Content:

CHAPTER 1: **[7L]**

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

CHAPTER 2: **[5L]**

Packaging Materials: Types, selection criteria, advantages and disadvantages of glass, plastic, metal, rubber as packaging materials

CHAPTER 3: **[7L]**

Pharmaceutical aids: Organoleptic (Colouring, flavouring, and sweetening) agents

Preservatives: Definition, types with examples and uses

CHAPTER 4: **[9L]**

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

CHAPTER 5: **[41L]**

Tablets **[8L]**

coated and uncoated, various modified tablets (sustained release, extended-release, fast dissolving, double layered)

Capsules - hard and soft gelatine capsules **[4L]**

Liquid oral preparations **[6L]**

solution, syrup, elixir, emulsion, suspension, dry powder for reconstitution

Topical preparations **[8L]**

ointments, creams, pastes, gels, liniments and lotions, suppositories and pessaries

Nasal preparations, Ear preparations **[2L]**

Powders and granules **[3L]**

Insufflations, dusting powders, effervescent powders and effervescent granules

Sterile formulations – Injectables, eye drops and eye ointments **[6L]**

Immunological products: **[4L]**

Sera, vaccines, toxoids and their manufacturing methods.

CHAPTER 6: **[5L]**

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

CHAPTER 7: **[5L]**

Novel drug delivery systems:

Introduction, Classification with examples, advantages and challenges

Recommended Books (Latest Editions):

1. Dr. Harikishan Singh, ”History of Pharmacy in India”
2. ”Indian Pharmacopoeia”, Govt. of India Publication
3. B.M. Mithal, ”A Text book of Pharmaceuticals Formulation”, Vallabh Prakashan
4. editor E.A. Rawlins, ”Bentleys’ Text book of Pharmaceutics”, Elsevier Int.
5. Leon Lachman, Herbert Lieberman and Joseph Kanig, Editors, Lea and Febiger, ”The Theory and Practice of Industrial Pharmacy”. Philadelphia. Verghese Publishing House
6. ”Responsible Use of Medicines: A Layman’s Handbook”, www.ipapharma.org /publications

CO-PO Mapping:

CO	Program Outcome										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
ER20-11T.1	3	-	-	-	-	-	-	-	-	-	3
ER20-11T.2	2	1	-	-	-	-	-	-	-	-	2
ER20-11T.3	-	2	1	-	-	-	-	-	-	-	-
ER20-11T.4	-	-	1	-	-	2	-	-	-	-	1
ER20-11T.5	-	3	2	-	-	-	-	-	-	-	1
ER20-11T.6	-	1	1	-	-	-	-	-	-	-	1

Course Code	ER20-12T			
Course Title	PHARMACEUTICAL CHEMISTRY – THEORY			
Category				
LTP & Credits	L	T	P	Total H
	3	0	0	75
Total Contact Hours	75			
Pre-requisites	None			

Scope:

This course is designed to impart basic knowledge on the chemical structure, storage conditions and medicinal uses of organic and inorganic chemical substances used as drugs and pharmaceuticals. Also, this course discusses the impurities, quality control aspects of chemical substances used in pharmaceuticals

Course Objective:

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 completion of the course the students shall 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

Course Content:

CHAPTER 1: **[8L]**

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

CHAPTER 2: **[8L]**

Volumetric analysis: Fundamentals of volumetric analysis, Acid-base titration, non-aqueous titration, precipitation titration, complexometric titration, redox titration

Gravimetric analysis: Principle and method.

CHAPTER 3: **[3L]**

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

CHAPTER 4: **[2L]**

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

---

CHAPTER 5: **[9L]**

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

CHAPTER 6: **[9L]**

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

Cholinergic Blocking Agents: Atropine Sulphate*, Ipratropium Bromide

Synthetic Cholinergic Blocking Agents: Tropicamide, Cyclopentolate Hydrochloride, Clidinium Bromide, Dicyclomine Hydrochloride*

CHAPTER 7 : **[5L]**

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

CHAPTER 8: **[2L]**

Diuretics: Acetazolamide, Frusemide*, Bumetanide, Chlorthalidone, Benzthiazide, Metolazone, Xipamide, Spironolactone

CHAPTER 9 : **[3L]**

Hypoglycemic Agents: Insulin and Its Preparations, Metformin*, Glibenclamide*, Glimepiride, Pioglitazone, Repaglinide, Gliflozins, Gliptins

CHAPTER 10 : **[3L]**

Analgesic And Anti-Inflammatory Agents: Morphine Analogues, Narcotic Antagonists;

Nonsteroidal Anti- Inflammatory Agents (NSAIDs) - Aspirin*, Diclofenac, Ibuprofen*, Piroxicam, Celecoxib, Mefenamic Acid, Paracetamol*, Aceclofenac

CHAPTER 11 : **[8L]**

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, Sulfameth oxazole, Sulfacetamide*, Mafenide Acetate, Cotrimoxazole, Dapsone*

CHAPTER 12 : [8L]

Antibiotics: Penicillin G, Amoxicillin*, Cloxacillin, Streptomycin, **Tetracyclines:** Doxycycline, Minocycline, **Macrolides:** Erythromycin, Azithromycin, Miscellaneous: Chloramphenicol* Clindamycin

CHAPTER 13 : [3L]

Anti-Neoplastic Agents: Cyclophosphamide*, Busulfan, Mercaptopurine, Fluorouracil*, Methotrexate, Dactinomycin, Doxorubicin Hydrochloride, Vinblastine Sulphate, Cisplatin*, Dromostanolone Propionate

Recommended Books (Latest Editions):

1. Medicinal & Pharmaceutical chemistry by Harikishan Singh and VK Kapoor
2. Wilson and Griswold's Text book of Organic Medicinal and pharmaceutical Chemistry
3. Practical Organic Chemistry by Mann and Saunders.
4. Practical Pharmaceutical Chemistry, Volume- I & II by Beckett and J. B. Stenlake
5. Indian Pharmacopoeia
6. Vogel's text book of Practical Organic Chemistry

CO-PO Mapping:

CO	Program Outcome										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
ER20-12T.1	3	-	-	-	-	-	-	-	-	-	3
ER20-12T.2	2	1	-	-	-	-	-	-	-	-	2
ER20-12T.3	-	2	1	-	-	-	-	-	-	-	-
ER20-12T.4	-	-	1	-	-	2	-	-	-	-	1
ER20-12T.5	-	3	2	-	-	-	-	-	-	-	1
ER20-12T.6	-	1	1	-	-	-	-	-	-	-	1

Course Code	ER20-13T			
Course Title	PHARMACOGNOSY – THEORY			
Category				
LTP & Credits	L	T	P	Total H
	3	0	0	75
Total Contact Hours	75			
Pre-requisites	None			

Scope:

This course is designed to impart knowledge on the medicinal uses of various drugs of natural origin. Also, the course emphasizes the fundamental concepts in the evaluation of crude drugs, alternative systems of medicine, nutraceuticals and herbal cosmetics.

Course Objective:

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 the course the students shall 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

Course Content:

CHAPTER 1: **[2L]**

Definition, history, present status and scope of Pharmacognosy

CHAPTER 2: **[4L]**

Classification of drugs:

Alphabetical

Taxonomical

Morphological

Pharmacological

Chemical

Chemo-taxonomical

CHAPTER 3: **[6L]**

Quality control of crude drugs:

Different methods of adulteration of crude drugs

Evaluation of crude drugs

CHAPTER 4: **[6L]**

Brief outline of occurrence, distribution, isolation, identification tests, therapeutic activity and pharmaceutical applications of alkaloids, terpenoids, glycosides, volatile oils, tannins and resins.

CHAPTER 5: **[34L]**

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

CHAPTER 6: **[3L]**

Plant fibres used as surgical dressings: Cotton, silk,wool and regenerated fibres

Sutures – Surgical Catgut and Ligatures

CHAPTER 7 : **[8L]**

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

CHAPTER 8: **[2L]**

Role of medicinal and aromatic plants in national economy and their export potential

CHAPTER 9 : **[4L]**

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

CHAPTER 10 : **[4L]**

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

CHAPTER 11 : **[2L]**

Phytochemical investigation of drugs

Recommended Books (Latest Editions):

1. Text book of Pharmacognosy by C. K. Kokate, S. B. Gokhale, A.P. Purohit, Nirali Prakashan
2. Text book of Pharmacognosy by C.S. Shah and J. S. Qadry, CBS Publishers & Distributors Pvt. Ltd.
3. Text Book of Pharmacognosy by T. E. Wallis. CBS Publishers & Distributors Pvt. Ltd.
4. Study of crude drugs by M. A. Iyengar, Manipal Press Ltd, Manipal
5. Powder crude drugs by M. A. Iyengar, Manipal Press Ltd, Manipal
6. Anatomy of crude drugs by M. A. Iyengar, Manipal Press Ltd, Manipal
7. Augmented Text Book of Homeopathic Pharmacy by Dr. D D Banerjee, B Jain Publishers (P) Ltd

CO-PO Mapping:

CO	Program Outcome										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
ER20-13T.1	3	-	-	-	-	-	-	-	-	-	3
ER20-13T.2	2	1	-	-	-	-	-	-	-	-	2
ER20-13T.3	-	2	1	-	-	-	-	-	-	-	-
ER20-13T.4	-	-	1	-	-	2	-	-	-	-	1
ER20-13T.5	-	3	2	-	-	-	-	-	-	-	1
ER20-13T.6	-	1	1	-	-	-	-	-	-	-	1

Course Code	ER20-14T			
Course Title	HUMAN ANATOMY AND PHYSIOLOGY – THEORY			
Category				
LTP & Credits	L	T	P	Total H
	3	0	0	75
Total Contact Hours	75			
Pre-requisites	None			

Scope:

This course is designed to impart basic knowledge on the structure and functions of the human body. It helps in understanding both homeostasis mechanisms and homeostatic imbalances of various systems of the human body.

Course 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 the course the students shall 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

Course Content:

CHAPTER 1: **[2L]**

Scope of Anatomy and Physiology

Definition of various terminologies

CHAPTER 2: **[2L]**

Structure of Cell: Components and its functions

CHAPTER 3: **[4L]**

Tissues of the human body: Epithelial, Connective, Muscular and Nervous tissues – their sub-types and characteristics.

CHAPTER 4: **[6L]**

Osseous system: structure and functions of bones of axial and appendicular skeleton

Classification, types and movements of joints, disorders of joints.

CHAPTER 5: **[8L]**

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

CHAPTER 6: **[3L]**

Lymphatic system

Lymph and lymphatic system, composition, function and its formation.

Structure and functions of spleen and lymph node.

CHAPTER 7 : **[8L]**

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

CHAPTER 8: **[4L]**

Respiratory system

Anatomy of respiratory organs and their functions.

Regulation Mechanism of respiration.

Respiratory volumes and capacities – definitions

CHAPTER 9 : **[8L]**

Digestive system

Anatomy and Physiology of GIT

Anatomy and functions of accessory glands

Physiology of digestion and absorption

CHAPTER 10 : **[2L]**

Skeletal muscles

Histology

Physiology of muscle contraction

Disorder of skeletal muscles

CHAPTER 11 : [8L]

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)

CHAPTER 12 : [6L]

Sense organs - Anatomy and physiology of

Eye

Ear

Skin

Tongue

Nose

CHAPTER 13 : [4L]

Urinary system

Anatomy and physiology of urinary system

Physiology of urine formation

Renin - angiotensin system

Clearance tests and micturition

CHAPTER 14: [6L]

Endocrine system (Hormones and their functions)

Pituitary gland

Adrenal gland

Thyroid and parathyroid gland

Pancreas and gonads

CHAPTER 15 : [4L]

Reproductive system

Anatomy of male and female reproductive system

Physiology of menstruation

Spermatogenesis and Oogenesis

Pregnancy and parturition

Recommended Books (Latest Editions):

1. Human Physiology by C. C. Chatterjee
2. Human Anatomy and Physiology by S. Chaudhary and A. Chaudhary
3. Derasari and Gandhi's elements of Human Anatomy, Physiology and Health Education
4. S.R. Kale and R.R. Kale, Textbook of Practical Anatomy and Physiology
5. Ross and Wilson Anatomy and Physiology in Health and illness
6. Human Anatomy and Physiology by Tortora Gerard J
7. Fundamentals of Medical Physiology by K. Sambulingam and Prana Sambulingam

CO-PO Mapping:

CO	Program Outcome										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
ER20-14T.1	3	-	-	-	-	-	-	-	-	-	3
ER20-14T.2	2	1	-	-	-	-	-	-	-	-	2
ER20-14T.3	-	2	1	-	-	-	-	-	-	-	-
ER20-14T.4	-	-	1	-	-	2	-	-	-	-	1
ER20-14T.5	-	3	2	-	-	-	-	-	-	-	1
ER20-14T.6	-	1	1	-	-	-	-	-	-	-	1

Course Code	ER20-15T			
Course Title	SOCIAL PHARMACY – THEORY			
Category				
LTP & Credits	L	T	P	Total H
	3	0	0	75
Total Contact Hours	75			
Pre-requisites	None			

Scope:

This course is designed to impart basic knowledge on public health, epidemiology, preventive care and other social health related concepts. Also, to emphasize the roles of pharmacists in the public health programs

Course Objective:

This course will discuss about basic concepts of

1. Public health and national health programs
2. Preventive healthcare
3. Food and nutrition related health issues
4. Health education & promotion
5. General roles and responsibilities of pharmacists in public health significance

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

Course Content:

CHAPTER 1: [7L]

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. (2)

• Concept of Health - WHO Definition, various dimensions, determinants, and health indicators. (3)

• National Health Policy – Indian perspective (1)

• Introduction to Millennium Development Goals, Sustainable Development Goals, FIP Development Goals (1)

CHAPTER 2: **[18L]**

Preventive healthcare – Role of Pharmacists in the following

- Demography and Family Planning (3)
- Mother and child health, importance of breastfeeding, ill effects of infant milk substitutes and bottle feeding (2)
- Overview of Vaccines, types of immunity and immunization (5)
- 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 (6)
- Psychosocial Pharmacy: Drugs of misuse and abuse – psychotropics, narcotics, alcohol, tobacco products. Social Impact of these habits on social health and productivity and suicidal behaviours (2)

CHAPTER 3: **[7L]**

Nutrition and Health

- Basics of nutrition – Macronutrients and Micronutrients (2)
- Importance of water and fibres in diet (1)
- Balanced diet, nutrition deficiency diseases, ill effects of junk foods, calorific and nutritive values of various foods, fortification of food (3)
- Introduction to food safety, adulteration of foods, effects of artificial ripening, use of pesticides, genetically modified foods (1)
- Dietary supplements, nutraceuticals, food supplements – indications, benefits, Drug-Food Interactions (2)

CHAPTER 4: **[33L]**

Introduction to Microbiology and common microorganisms (3)

Epidemiology: Introduction to the terms Epidemiology, its applications, terms such as epidemic, pandemic, endemic, mode of transmission, quarantine, isolation, incubation period, contact tracing. (2)

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 (10)
- Intestinal infections – poliomyelitis, viral hepatitis, cholera, acute diarrheal diseases, typhoid, amebiasis, worm infestations, food poisoning (8)
- Arthropod-borne infections - dengue, malaria, filariasis and, chikungunya (4)
- Surface infections – trachoma, tetanus, leprosy (3)
- STDs, HIV/AIDS (3)

CHAPTER 5: **[5L]**

Introduction to health systems and all ongoing National health programs in India, their objectives, functioning, outcome and the role of pharmacists.

CHAPTER 6: **[2L]**

Role of Pharmacists in disaster management.

CHAPTER 7: **[3L]**

Pharmacoeconomics - basics, Health Insurance, Health Maintenance Organizations (HMOs), Health spending, Out-ofpocket expenses

Recommended Books (Latest Editions):

1. Social Pharmacy – Innovation and development. Geoff Harding, Sarah Nettleton and Kevin Taylor. The Pharmaceutical Press.
2. Text Book of Community Pharmacy Practice. RPSGB Publication
3. Community Pharmacy Handbook- Jonathan Waterfield
4. S Khurana, P Suresh and R Kalsi. Health Education & Community Pharmacy. S Vikas & Co
5. Social Pharmacy: Tayler, Geoffrey. Pharmaceutical Press. London.
6. Websites of Ministry of Health and Family Welfare, National Health Portal
7. Pharmacists at the Frontlines: A Novel Approach at Combating TB www.ipapharma.org Visit Publications
8. Where There Is No Doctor: A Village Health Care Handbook by David Werner, 2015 updated version
9. Various WHO publications www.who.int

CO-PO Mapping:

CO	Program Outcome										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
ER20-15T.1	3	-	-	-	-	-	-	-	-	-	3
ER20-15T.2	2	1	-	-	-	-	-	-	-	-	2
ER20-15T.3	-	2	1	-	-	-	-	-	-	-	-
ER20-15T.4	-	-	1	-	-	2	-	-	-	-	1
ER20-15T.5	-	3	2	-	-	-	-	-	-	-	1
ER20-15T.6	-	1	1	-	-	-	-	-	-	-	1

Course Code	ER20-11P			
Course Title	PHARMACEUTICS – PRACTICAL			
Category				
LTP & Credits	L	T	P	Total H
	0	0	3	75
Total Contact Hours	75			
Pre-requisites	None			

Scope:

This course is designed to train the students in formulating and dispensing common pharmaceutical dosage forms

Course Objective:

This course will discuss and train the following aspects of preparing and dispensing various pharmaceutical dosage forms:

1. Calculation of working formula from the official master formula
2. Formulation of dosage forms based on working formula
3. Appropriate Packaging and labelling requirements
4. Methods of basic quality control tests

Course Outcome:

Upon completion of the course the students shall be able to:

1. Calculate the working formula from the given master formula
2. Formulate the dosage form and dispense in appropriate container
3. Design the label with necessary product and patient information
4. Perform the basic quality control tests for the common dosage forms

Practicals:

1. Handling and referring the official references: Pharmacopoeias, Formularies, etc. for retrieving formulas, procedures, etc.

2. 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
- 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. Demonstration on various stages of tablet manufacturing processes (including coating tablets, if possible)
4. Appropriate methods of usage, and storage of special dosage forms including different types of inhalers, spacers, insulin pens
5. Demonstration of quality control tests and evaluation of common dosage forms viz. tablets, capsules, emulsion, sterile injections as per the monographs

Assignments:

The students shall be asked to submit written assignments on the following topics (One assignment per student per sessional period. i.e., a minimum of THREE assignments per student)

1. Various systems of measures commonly used in prescribing, compounding and dispensing practices
2. Market preparations (including Fixed Dose Combinations) of each type of dosage forms, generic name, minimum three brand names and label contents of the dosage forms mentioned in theory/practical
3. Overview of various machines / equipment / instruments involved in the formulation and quality control of various dosage forms / pharmaceutical formulations.
4. Overview of extemporaneous preparations at community / hospital pharmacy vs. manufacturing of dosage forms at industrial level
5. Basic pharmaceutical calculations: ratios; conversion to percentage fraction, allegation, proof spirit, isotonicity

Field Visits:

The students shall be taken for an industrial visit to pharmaceutical industries to witness and understand the various processes of manufacturing of any of the common dosage forms viz. tablets, capsules, liquid orals, injectables, etc. Individual reports from each student on their learning experience from the filed visit shall be submitted.

CO-PO Mapping:

CO	Program Outcome										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
ER20-11P.1	3	-	-	-	-	-	-	-	-	-	3
ER20-11P.2	2	1	-	-	-	-	-	-	-	-	2
ER20-11P.3	-	2	1	-	-	-	-	-	-	-	-
ER20-11P.4	-	-	1	-	-	2	-	-	-	-	1
ER20-11P.5	-	3	2	-	-	-	-	-	-	-	1
ER20-11P.6	-	1	1	-	-	-	-	-	-	-	1

Course Code	ER20-12P			
Course Title	PHARMACEUTICAL CHEMISTRY – PRACTICAL			
Category				
LTP & Credits	L	T	P	Total H
	0	0	3	75
Total Contact Hours	75			
Pre-requisites	None			

Scope:

This course is designed to impart basic training and hands-on experiences to synthesis chemical substances used as drugs and pharmaceuticals. Also, to perform the quality control tests, impurity testing, test for purity and systematic qualitative analysis of chemical substances used as drugs and pharmaceuticals.

Course Objective:

This course will provide the hands-on experience on the following aspects of chemical substances used as drugs and pharmaceuticals

1. Limit tests and assays of selected chemical substances as per the monograph
2. Volumetric analysis of the chemical substances
3. Basics of preparatory chemistry and their analysis
4. Systematic qualitative analysis for the identification of the chemical drugs

Course Outcome:

Upon completion of the course the students shall be able to:

1. Perform the limit tests for various inorganic elements and report
2. Prepare standard solutions using the principles of volumetric analysis
3. Test the purity of the selected inorganic and organic compounds against the monograph standards
4. Synthesize the selected chemical substances as per the standard synthetic scheme
5. Perform qualitative tests to systematically identify the unknown chemical substances

Practicals:

1. **Limit test for** Chlorides; sulphate; Iron; heavy metals
2. Identification tests for Anions and Cations as per Indian Pharmacopoeia
3. **Fundamentals of volumetric analysis**

   Preparation of standard solution and standardization of Sodium Hydroxide, Ceric Ammonium Sulfate, Potassium Permanganate

4. **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

   Metronidazole by Non-Aqueous Titration

   Ibuprofen by alkalimetry

5. **Fundamentals of preparative organic chemistry**

   Determination of Melting point and boiling point of organic compounds

6. **Preparation of organic compounds**

   Acetanilide from aniline

   Aspirin from salicylic acid

7. **Identification and test for purity of pharmaceuticals**

   Aspirin, Caffeine, Paracetamol, Sulfanilamide

8. Systematic Qualitative analysis experiments (4 substances)

Assignments:

The students shall be asked to submit the written assignments on the following topics (One assignment per student per sessional period. i.e., a minimum of THREE assignments per student)

1. Different monographs and formularies available and their major contents
2. Significance of quality control and quality assurance in pharmaceutical industries
3. Overview on Green Chemistry
4. Various software programs available for computer aided drug discovery
5. Various instrumentation used for characterization & quantification of drug

CO-PO Mapping:

CO	Program Outcome										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
ER20-12P.1	3	-	-	-	-	-	-	-	-	-	3
ER20-12P.2	2	1	-	-	-	-	-	-	-	-	2
ER20-12P.3	-	2	1	-	-	-	-	-	-	-	-
ER20-12P.4	-	-	1	-	-	2	-	-	-	-	1
ER20-12P.5	-	3	2	-	-	-	-	-	-	-	1
ER20-12P.6	-	1	1	-	-	-	-	-	-	-	1

Course Code	ER20-13P			
Course Title	PHARMACOGNOSY – PRACTICAL			
Category				
LTP & Credits	L	T	P	Total H
	0	0	3	75
Total Contact Hours	75			
Pre-requisites	None			

Scope:

This course is designed to train the students in physical identification, morphological characterization, physical and chemical characterization and evaluation of commonly used herbal drugs.

Course Objective:

This course will provide hands-on experiences to the students in

1. Identification of the crude drugs based on their morphological characteristics
2. Various characteristic anatomical characteristics of the herbal drugs studied through transverse section
3. Physical and chemical tests to evaluate the crude drugs

Course Outcome:

Upon completion of the course the students shall be able to:

1. Identify the given crude drugs based on the morphological characteristics
2. Take a transverse section of the given crude drugs
3. Describe the anatomical characteristics of the given crude drug under microscopical conditions
4. Carry out the physical and chemical tests to evaluate the given crude drugs

Practicals:

1. **Morphological Identification of the following drugs:**

   Ispaghula, Senna, Coriander, Fennel, Cardamom, Ginger, Nutmeg, Black Pepper, Cinnamon, Clove, Ephedra, Rauwolfia, Gokhru, Punarnava, Cinchona, Agar.

2. **Gross anatomical studies (Transverse Section) of the following drugs:**

   Ajwain, Datura, Cinnamon, Cinchona, Coriander, Ashwagandha, Liquorice, Clove, Curcuma, Nuxvomica, Vasaka

3. **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

Assignments:

The students shall be asked to submit the written assignments on the following topics (One assignment per student per sessional period. i.e., a minimum of THREE assignments per student)

1. Market preparations of various dosage forms of Ayurvedic, Unani, Siddha, Homeopathic (Classical and Proprietary), indications, and their labelling requirements
2. Market preparations of various herbal cosmetics, indications, and their labelling requirements

Field Visits:

The students shall be taken in groups to a medicinal garden to witness and understand the nature of various medicinal plants discussed in theory and practical courses. Additionally, they shall be taken in groups to the pharmacies of traditional systems of medicines to understand the availability of various dosage forms and their labelling requirements. Individual reports from each student on their learning experience from the filed visit shall be submitted.

CO-PO Mapping:

CO	Program Outcome										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
ER20-13P.1	3	-	-	-	-	-	-	-	-	-	3
ER20-13P.2	2	1	-	-	-	-	-	-	-	-	2
ER20-13P.3	-	2	1	-	-	-	-	-	-	-	-
ER20-13P.4	-	-	1	-	-	2	-	-	-	-	1
ER20-13P.5	-	3	2	-	-	-	-	-	-	-	1
ER20-13P.6	-	1	1	-	-	-	-	-	-	-	1

Course Code	ER20-14P			
Course Title	HUMAN ANATOMY AND PHYSIOLOGY – PRACTICAL			
Category				
LTP & Credits	L	T	P	Total H
	0	0	3	75
Total Contact Hours	75			
Pre-requisites	None			

Scope:

This course is designed to train the students and instil the skills for carrying out basic physiological monitoring of various systems and functions

Course Objective:

This course will provide hands-on experience in the following

1. General blood collection techniques and carrying out various haematological assessments and interpreting the results
2. Recording and monitoring the vital physiological parameters in human subjects and the basic interpretations of the results
3. Microscopic examinations of the various tissues permanently mounted in glass slides
4. Discuss the anatomical and physiological characteristics of various organ systems of the body using models, charts and other teaching aids

Course Outcome:

Upon successful completion of the course the students shall be able to:

1. Perform the haematological tests in human subjects and interpret the results
2. Record, monitor and document the vital physiological parameters of human subjects and interpret the results
3. Describe the anatomical features of the important human tissues under the microscopical conditions
4. Discuss the significance of various anatomical and physiological characteristics of the human body

Practicals:

1. Study of compound microscope

2. General techniques for the collection of blood

3. Microscopic examination of Epithelial tissue, Cardiac muscle, Smooth muscle, Skeletal muscle, Connective tissue and Nervous tissue of ready / pre-prepared slides.

4. Study of Human Skeleton-Axial skeleton and appendicular skeleton

5. Study of appliances used in Haematological experiments (only identification and listing the appliances)

6. **Determination of**

   a. Blood group

   b. ESR

   c. Haemoglobin content of blood

   d. Bleeding time and Clotting time

7. Determination of WBC count of blood

8. Determination of RBC count of blood

9. Determination of Differential count of blood

10. Recording of Blood Pressure in various postures, different arms, before and after exertion and interpreting the results

11. 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

12. Recording Pulse Oxygen (before and after exertion)

13. Recording force of air expelled using Peak Flow Meter

14. Measurement of height, weight, and BMI

15. **Study of various systems and organs with the help of chart, models and specimens**

    a) Cardiovascular system

    b) Respiratory system

    c) Digestive system

    d) Urinary system

    e) Endocrine system

    f) Reproductive system

    g) Nervous system

    h) Eye

    i) Ear

    j) Skin

CO-PO Mapping:

CO	Program Outcome										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
ER20-14P.1	3	-	-	-	-	-	-	-	-	-	3
ER20-14P.2	2	1	-	-	-	-	-	-	-	-	2
ER20-14P.3	-	2	1	-	-	-	-	-	-	-	-
ER20-14P.4	-	-	1	-	-	2	-	-	-	-	1
ER20-14P.5	-	3	2	-	-	-	-	-	-	-	1
ER20-14P.6	-	1	1	-	-	-	-	-	-	-	1

Course Code	ER20-15P			
Course Title	SOCIAL PHARMACY – PRACTICAL			
Category				
LTP & Credits	L	T	P	Total H
	0	0	3	75
Total Contact Hours	75			
Pre-requisites	None			

Scope:

This course is designed to provide simulated experience in various public health and social pharmacy activities.

Course Objective:

This course will train the students on various roles of pharmacists in public health and social pharmacy activities in the following areas

1. National immunization programs
2. Reproductive and child health programs
3. Food and nutrition related health programs
4. Health education and promotion
5. General roles and responsibilities of the pharmacists in public health
6. First Aid for various emergency conditions including basic life support and cardiopulmonary resuscitation

Course Outcome:

Upon completion of the course the students shall be able to:

1. Describe the roles and responsibilities of pharmacists in various National health programs
2. Design promotional materials for public health awareness
3. Describe various health hazards including microbial sources
4. Advice on preventive measures for various diseases
5. Provide first aid for various emergency conditions including basic life support and cardiopulmonary resuscitation

Note: Demonstration / Hands-on experience / preparation of charts / models / promotional materials / role plays / enacting / e-brochures / e-flyers / podcasts / video podcasts / any other innovative activities to understand the concept of various elements of social pharmacy listed here. (At least one activity to be carried out for each one of the following):

Practicals:

1. National immunization schedule for children, adult vaccine schedule, Vaccines not included in the National Immunization Program
2. RCH – reproductive and child health – nutritional aspects
3. Family planning devices
4. Microscopical observation of different microbes (readymade slides)
5. Personal hygiene and etiquettes – hand washing techniques, Cough and sneeze etiquettes. Various types of masks, PPE gear, wearing/using them, and disposal
6. Personal hygiene and etiquettes – hand washing techniques, Cough and sneeze etiquettes. Various types of masks, PPE gear, wearing/using them, and disposal
7. Menstrual hygiene, products used
8. Marketed preparations of disinfectants, antiseptics, fumigating agents, antilarval agents, mosquito repellents, etc.
9. 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
10. Water purification techniques, use of water testing kit, calculation of content/percentage of KMnO4, bleaching powder to be used for wells/tanks
11. Counselling children on junk foods, balanced diets – using Information, Education and Communication (IEC), counselling, etc. (Simulation Experiments)
12. 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
13. Tobacco cessation, counselling, identifying various tobacco containing products through charts/pictures
14. 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)

Assignments:

The students shall be asked to submit the written assignments on the following topics (One assignment per student per sessional period. i.e., a minimum of THREE assignments per student)

1. An overview on Antibiograms
2. Study the labels of various packed foods to understand their nutritional contents

3. Calorie free sweeteners - market examples, and their contents
4. Breastfeeding counselling, guidance – using Information, Education and Communication (IEC)
5. Information about the organizations working on deaddiction services in the region (city / district, etc.)
6. Role of a pharmacist in disaster management – A case study
7. Overview on the National Tuberculosis Elimination Programme (NTEP)
8. Drug disposal systems in the country, at industry level and citizen level
9. Various Prebiotics or Probiotics (dietary and market products)
10. Emergency preparedness: Study local Government structure with respect to Fire, Police departments, health department
11. Prepare poster/presentation for general public on any one of the World Health Days. e.g., TB Day, AIDS Day, Handwashing Day, World Diabetes Day, World Heart Day, etc.
12. List of home medicines, their storage, safe handling and disposal of unused medicines
13. Responsible Use of Medicines: From Purchase to Disposal
14. Collection of newspaper clips (minimum 5) relevant to any one topic and its submission in an organized form with collective summary based on the news items
15. Read a minimum one article relevant to any theory topic, from Pharma /Science/ or other Periodicals and prepare summary of it for submission
16. Mental health and its significance among the various segments of the society
17. Potential roles of pharmacists in rural India

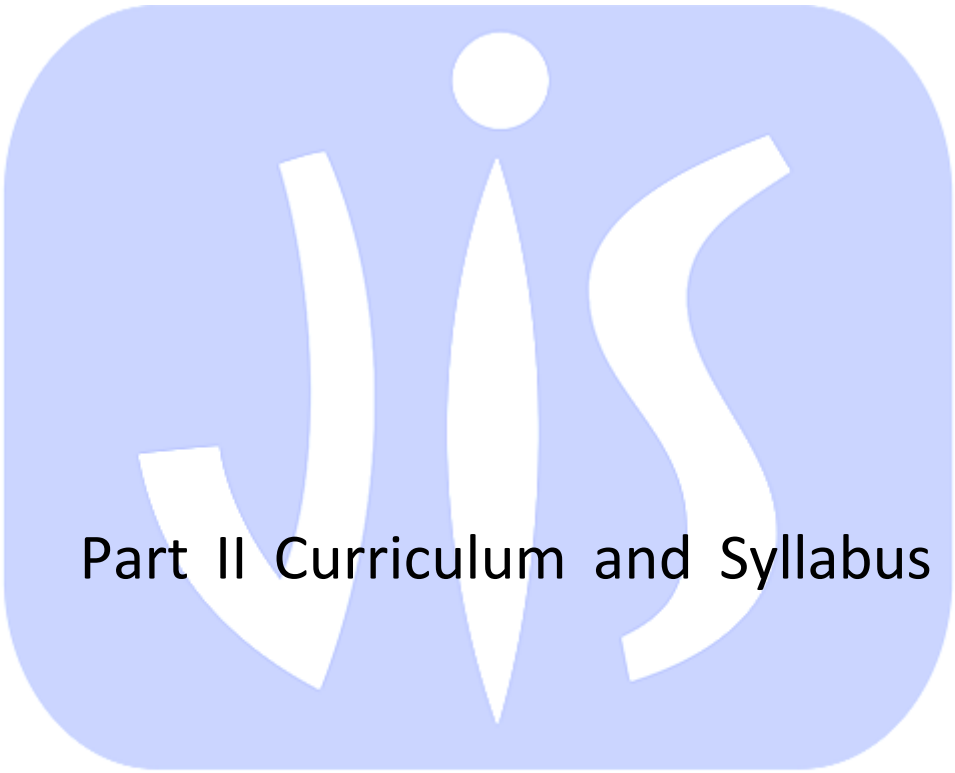
Field Visits:

The students shall be taken in groups to visit any THREE of the following facilities to witness and understand the activities of such centres/facilities from the perspectives of the topics discussed in theory and/or practical courses. Individual reports from each student on their learning experience from the field visits shall be submitted

1. Garbage Treatment Plant
2. Sewage Treatment Plant
3. Bio-medical Waste Treatment Plant
4. Effluent Treatment Plant
5. Water purification plant
6. Orphanage / Elderly-Care-Home / School and or Hostel/Home for persons with disabilities
7. Primary health care centre

CO-PO Mapping:

CO	Program Outcome										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
ER20-15P.1	3	-	-	-	-	-	-	-	-	-	3
ER20-15P.2	2	1	-	-	-	-	-	-	-	-	2
ER20-15P.3	-	2	1	-	-	-	-	-	-	-	-
ER20-15P.4	-	-	1	-	-	2	-	-	-	-	1
ER20-15P.5	-	3	2	-	-	-	-	-	-	-	1
ER20-15P.6	-	1	1	-	-	-	-	-	-	-	1



Part II Curriculum and Syllabus

PART - II							
Sl. No.	**Type**	**Course No.**	**Course Name**	**L**	**T**	**P**	**Total H**
THEORY							
1		ER20-21T	Pharmacology - Theory	3	0	0	75
2		ER20-22T	Community Pharmacy & Management - Theory	3	0	0	75
3		ER20-23T	Biochemistry & Clinical Pathology - Theory	3	0	0	75
4		ER20-24T	Pharmacotherapeutics - Theory	3	0	0	75
5		ER20-25T	Hospital & Clinical Pharmacy - Theory	3	0	0	75
6		ER20-26T	Pharmacy Law & Ethics - Theory	3	0	0	75
PRACTICAL							
7		ER20-21P	Pharmacology - Practical	0	0	2	50
8		ER20-22P	Community Pharmacy & Management - Practical	0	0	3	75
9		ER20-23P	Biochemistry & Clinical Pathology - Practical	0	0	2	50
10		ER20-24P	Pharmacotherapeutics - Practical	0	0	1	25
11		ER20-25P	Hospital & Clinical Pharmacy - Practical	0	0	1	25
MANDATORY NON CREDIT COURSE							
12		DSD281	Seminar and Group Discussion	0	0	0	25
13		MSD282	Skill X and Other Activities (MOOCs Courses)	0	0	0	25
TOTAL				**18**	**0**	**9**	**675**

Course Code	ER20-21T			
Course Title	PHARMACOLOGY – THEORY			
Category				
LTP & Credits	L	T	P	Total H
	3	0	0	75
Total Contact Hours	75			
Pre-requisites	None			

Scope:

This course provides basic knowledge about different classes of drugs available for the pharmacotherapy of common diseases. The indications for use, dosage regimen, routes of administration, pharmacokinetics, pharmacodynamics, and contraindications of the drugs discussed in this course are vital for successful professional practice.

Course Objective:

This course will discuss the following

1. General concepts of pharmacology including pharmacokinetics, pharmacodynamics, 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 the course the students shall 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

Course Content:

CHAPTER 1: **[10L]**

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

CHAPTER 2: **[11L]**

Drugs Acting on the Peripheral Nervous System

- Steps involved in neurohumoral transmission
- Definition, classification, pharmacological actions, dose, indications, and contraindications of

a) Cholinergic drugs

b) Anti-Cholinergic drugs

c) Adrenergic drugs

d) Anti-adrenergic drugs

e) Neuromuscular blocking agents

f) Drugs used in Myasthenia gravis

g) Local anaesthetic agents

h) Non-Steroidal Anti-Inflammatory drugs (NSAIDs)

CHAPTER 3: **[2L]**

Drugs Acting on the Eye

Definition, classification, pharmacological actions, dose, indications and contraindications of

- Miotics
- Mydriatics
- Drugs used in Glaucoma

CHAPTER 4: **[8L]**

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.

CHAPTER 5: **[6L]**

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

CHAPTER 6: **[4L]**

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

CHAPTER 7 : **[2L]**

Definition, classification, pharmacological actions, dose, indications and contraindications of

- Bronchodilators
- Expectorants
- Anti-tussive agents
- Mucolytic agents

CHAPTER 8: **[5L]**

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

CHAPTER 9 : [2L]

Drugs Acting on the Kidney

Definition, classification, pharmacological actions, dose, indications, and contraindications of

- Diuretics
- Anti-Diuretics

CHAPTER 10 : [8L]

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

CHAPTER 11 : [3L]

Autocoids

- Physiological role of Histamine, 5 HT and Prostaglandins
- Classification, clinical uses and adverse effects of antihistamines and 5 HT antagonists

CHAPTER 12 : [12L]

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 agents

CHAPTER 13 : **[2L]**

Biologicals

Definition, types and indications of biological agents with examples

Recommended Books (Latest Editions):

1. Satoskar, R.S. and Bhandarkar, S.D. Pharmacology and Pharmacotherapeutics
2. B. Suresh, A Text Book of Pharmacology
3. Derasari and Gandhi's Elements of Pharmacology
4. S.K. Kulkarni, Practical Pharmacology and Clinical Pharmacy
5. H.K. Sharma. Principles of Pharmacology
6. Mary J. Mycek, Lippincott Williams and Wilkins. Lippincott's illustrated Reviews: Pharmacology
7. Tripathi, K.D. Essentials of Medical Pharmacology.
8. Various Drug Information Books like British National Formulary, MIMS, CIMS, Drug Today etc., WHO, NIH Websites

CO-PO Mapping:

CO	Program Outcome										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
ER20-21T.1	3	-	-	-	-	-	-	-	-	-	3
ER20-21T.2	2	1	-	-	-	-	-	-	-	-	2
ER20-21T.3	-	2	1	-	-	-	-	-	-	-	-
ER20-21T.4	-	-	1	-	-	2	-	-	-	-	1
ER20-21T.5	-	3	2	-	-	-	-	-	-	-	1
ER20-21T.6	-	1	1	-	-	-	-	-	-	-	1

Course Code	ER20-22T			
Course Title	COMMUNITY PHARMACY AND MANAGEMENT – THEORY			
Category				
LTP & Credits	L	T	P	Total H
	3	0	0	75
Total Contact Hours	75			
Pre-requisites	None			

Scope:

The course is designed to impart basic knowledge and skills to provide various pharmaceutical care services to patients and general practitioners in the community setup.

Course Objective:

This course will discuss 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 the course the students shall 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

Course Content:

CHAPTER 1: **[2L]**

Community Pharmacy Practice – Definition, history and development of community pharmacy - International and Indian scenarios

CHAPTER 2: **[3L]**

Professional responsibilities of community pharmacists

Introduction to the concept of Good Pharmacy Practice and SOPs.

CHAPTER 3: **[7L]**

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

CHAPTER 4: **[6L]**

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

CHAPTER 5: **[10L]**

Patient counselling

• Definition and benefits of patient counselling

• Stages of patient counselling - Introduction, counselling content, counselling process and closing the counselling 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

CHAPTER 6: **[2L]**

Medication Adherence

Definition, factors influencing non adherence, strategies to overcome non-adherence

CHAPTER 7 : **[5L]**

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

CHAPTER 8: **[15L]**

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)

CHAPTER 9 : [25L]

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, Cash book
- Introduction to pharmacy operation softwares – usefulness and availability
- Customer Relation Management (CRM)
- Audits in Pharmacies
- SOP of Pharmacy Management
- Introduction to Digital Health, mHealth and Online pharmacies

Recommended Books (Latest Editions):

1. Health Education and Community Pharmacy by N.S. Parmar.
2. WHO consultative group report.
3. Drug store and Business management by Mohammed Ali and Jyoti.
4. Handbook of pharmacy – health care. Edt. Robin J Harman. The Pharmaceutical Press
5. Comprehensive Pharmacy Review – Edt. Leon Shargel. Lippincott Williams and Wilkins.
6. Good Pharmacy Practices Training Manual by IPA/CDSCO/WHO India
7. Training Module for Community Pharmacists in TB Care and Control/ by MoH/IPA
8. Hand Book of PharmaSoS, Drugs in Special population- Pregnancy and Lactation, Tobacco free future- Choice is yours: KSPC Publications.
9. Responsible Use of Medicines: A Layman's Handbook, www.ipapharma.org/publications
10. Community Pharmacy Practice around the Globe: Part One: www.ipapharma.org /publications

CO-PO Mapping:

CO	Program Outcome										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
ER20-22T.1	3	-	-	-	-	-	-	-	-	-	3
ER20-22T.2	2	1	-	-	-	-	-	-	-	-	2
ER20-22T.3	-	2	1	-	-	-	-	-	-	-	-
ER20-22T.4	-	-	1	-	-	2	-	-	-	-	1
ER20-22T.5	-	3	2	-	-	-	-	-	-	-	1
ER20-22T.6	-	1	1	-	-	-	-	-	-	-	1

Course Code	ER20-23T			
Course Title	BIOCHEMISTRY & CLINICAL PATHOLOGY – THEORY			
Category				
LTP & Credits	L	T	P	Total H
	3	0	0	75
Total Contact Hours	75			
Pre-requisites	None			

Scope:

This course is designed to impart basic knowledge on the study of structure and functions of biomolecules and the chemical processes associated with living cells in normal and abnormal states. The course also emphasizes on the clinical pathology of blood and urine.

Course Objective:

This course will discuss the following at the fundamental level

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 the course the students shall 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

Course Content:

CHAPTER 1: **[2L]**

Introduction to biochemistry: Scope of biochemistry in pharmacy; Cell and its biochemical organization.

CHAPTER 2: **[5L]**

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

CHAPTER 3: **[5L]**

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.

CHAPTER 4: **[5L]**

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

CHAPTER 5: **[4L]**

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

CHAPTER 6: **[5L]**

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

CHAPTER 7: **[6L]**

Vitamins

- Definition and classification with examples
- Sources, chemical nature, functions, coenzyme form, recommended dietary requirements, deficiency diseases of fat-and water-soluble vitamins

CHAPTER 8: **[20L]**

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, -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

CHAPTER 9: **[5L]**

Minerals:

Functions, Deficiency diseases, recommended dietary requirements of calcium, phosphorus, iron, sodium and chloride

CHAPTER 10 : **[5L]**

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

CHAPTER 11 : **[1L]**

Introduction to Biotechnology

CHAPTER 12 : [6L]

Organ function tests

- Functions of kidney and routinely performed tests to assess the functions of kidney and their clinical significance
- Functions of liver and routinely performed tests to assess the functions of liver and their clinical significance
- Lipid profile tests and its clinical significance

CHAPTER 13 : [6L]

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

Recommended Books (Latest Editions):

1. Essentials of Biochemistry by U. Satyanarayana, Books and Allied (P) Ltd.
2. A Textbook of Biochemistry by A.V.S.S. Rama Rao, UBS Publishers' Distributors Pvt. Ltd.
3. Practical Biochemistry by R.C. Gupta and S. Bhargava.
4. Laboratory manual of Biochemistry by Pattabiraman and Sitaram Acharya

CO-PO Mapping:

CO	Program Outcome										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
ER20-23T.1	3	-	-	-	-	-	-	-	-	-	3
ER20-23T.2	2	1	-	-	-	-	-	-	-	-	2
ER20-23T.3	-	2	1	-	-	-	-	-	-	-	-
ER20-23T.4	-	-	1	-	-	2	-	-	-	-	1
ER20-23T.5	-	3	2	-	-	-	-	-	-	-	1
ER20-23T.6	-	1	1	-	-	-	-	-	-	-	1

Course Code	ER20-24T			
Course Title	PHARMACOTHERAPEUTICS - THEORY			
Category				
LTP & Credits	L	T	P	Total H
	3	0	0	75
Total Contact Hours	75			
Pre-requisites	None			

Scope:

This course is designed to impart basic knowledge on etiopathogenesis of common diseases and their management along with quality use of medicines.

Course Objective:

This course will discuss about

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 successful completion of the course the students shall 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

Course Content:

CHAPTER 1: **[6L]**

Pharmacotherapeutics – Introduction, scope and objectives.

Rational use of Medicines, Evidence Based Medicine, Essential Medicines List, Standard Treatment Guidelines (STGs)

CHAPTER 2: **[69L]**

Definition, etiopathogenesis, clinical manifestations, nonpharmacological and pharmacological management of the diseases associated with

(a) Cardiovascular System **[8L]**

- Hypertension
- Angina and Myocardial infarction
- Hyperlipidaemia
- Congestive Heart Failure

(b) Respiratory System **[4L]**

- Asthma
- COPD

(c) Endocrine System **[5L]**

- Diabetes
- Thyroid disorders- Hypo and Hyperthyroidism

(d) Central Nervous System **[8L]**

- Epilepsy
- Parkinson's disease
- Alzheimer's disease
- Stroke
- Migraine

(e) Gastro Intestinal Disorders **[8L]**

- Gastro oesophageal reflux disease
- Peptic Ulcer Disease
- Alcoholic liver disease
- Inflammatory Bowel Diseases (Crohn's Disease and Ulcerative Colitis)

(f) Haematological disorders **[4L]**

- Iron deficiency anaemia
- Megaloblastic anaemia

(g) Infectious diseases **[12L]**

- Tuberculosis
- Pneumonia
- Urinary tract infections
- Hepatitis
- Gonorrhoea and Syphilis
- Malaria
- HIV and Opportunistic infections
- Viral Infections (SARS, CoV2)

(h) Musculoskeletal disorders **[3L]**

- Rheumatoid arthritis
- Osteoarthritis

(i) Dermatology **[3L]**

- Psoriasis
- Scabies
- Eczema

(j) Psychiatric Disorders **[4L]**

- Depression
- Anxiety
- Psychosis

(k) Ophthalmology **[2L]**

- Conjunctivitis (bacterial and viral)
- Glaucoma

(l) Anti-microbial Resistance **[2L]**

(m) Women's Health **[4L]**

- Polycystic Ovary Syndrome
- Dysmenorrhea
- Premenstrual Syndrome

Recommended Books (Latest Editions):

1. Clinical Pharmacy and Therapeutics - Roger and Walker, Churchill Livingstone Publication
2. Clinical Pharmacy and Therapeutics - Eric T. Herfindal, Williams and Wilkins Publication
3. Applied Therapeutics: The clinical Use of Drugs. Lloyd Young and Koda-Kimble MA Lippincott, Williams and Wilkins Publication.
4. Pharmacotherapy: A Pathophysiologic approach - Joseph T. Dipiro et al. Appleton and Lange Publication.

CO-PO Mapping:

CO	Program Outcome										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
ER20-24T.1	3	-	-	-	-	-	-	-	-	-	3
ER20-4T.2	2	1	-	-	-	-	-	-	-	-	2
ER20-24T.3	-	2	1	-	-	-	-	-	-	-	-
ER20-24T.4	-	-	1	-	-	2	-	-	-	-	1
ER20-24T.5	-	3	2	-	-	-	-	-	-	-	1
ER20-24T.6	-	1	1	-	-	-	-	-	-	-	1

Course Code	ER20-25T			
Course Title	HOSPITAL AND CLINICAL PHARMACY – THEORY			
Category				
LTP & Credits	L	T	P	Total H
	3	0	0	75
Total Contact Hours	75			
Pre-requisites	None			

Scope:

This course is designed to impart fundamental knowledge and professional skills required for facilitating various hospital and clinical pharmacy services.

Course Objective:

This course will discuss and train the students in the following

1. Hospital and Hospital Pharmacy organization and set-ups
2. Basics of hospital pharmacy services including the procurement, supply chain, storage of medicines and medical supplies
3. Basics of clinical pharmacy including introduction to comprehensive pharmaceutical care services
4. Basic interpretations of common laboratory results used in clinical diagnosis towards optimizing the drug therapy

Course Outcome:

Upon successful completion of the course the students 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

Course Content:

CHAPTER 1: **[6L]**

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

CHAPTER 2: **[4L]**

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

CHAPTER 3: **[14L]**

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

CHAPTER 4: **[7L]**

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

CHAPTER 5: **[4L]**

Compounding in Hospitals. Bulk compounding, IV admixture services and incompatibilities, Total parenteral nutrition

CHAPTER 6: **[2L]**

Radio Pharmaceuticals - Storage, dispensing and disposal of radiopharmaceuticals

CHAPTER 7: **[6L]**

Application of computers in Hospital Pharmacy Practice, Electronic health records, Softwares used in hospital pharmacy

CHAPTER 8: **[12L]**

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 counselling
- Interprofessional collaboration

Pharmaceutical care: Definition, classification of drug related problems. Principles and procedure to provide pharmaceutical care

Medication Therapy Management, Home Medication Review

CHAPTER 9: **[10L]**

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

CHAPTER 10 : **[6L]**

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

CHAPTER 11 : **[2L]**

Pharmacovigilance

- Definition, aim and scope
- Overview of Pharmacovigilance

CHAPTER 12 : [6L]

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

Recommended Books (Latest Editions):

1. A Textbook of Clinical Pharmacy Practice - Essential concepts and skills - Parthasarathi G, Karin Nyfort-Hansen and Milap Nahata. Orient Longman Pvt. Ltd. Hyderabad.
2. Text Book of Hospital and Clinical Pharmacy by Dr. Pratibha Nand and Dr. Roop K Khar, Birla publications, New Delhi.
3. Gupta B.K and Gupta R.N., GPP in Hospital Pharmacy, Vallabh Prakashan.
4. Basic skills in interpreting laboratory data - Scott LT, American Society of Health System Pharmacists Inc.
5. Australian drug information - Procedure manual. The Society of Hospital Pharmacists of Australia.

CO-PO Mapping:

CO	Program Outcome										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
ER20-25T.1	3	-	-	-	-	-	-	-	-	-	3
ER20-25T.2	2	1	-	-	-	-	-	-	-	-	2
ER20-25T.3	-	2	1	-	-	-	-	-	-	-	-
ER20-25T.4	-	-	1	-	-	2	-	-	-	-	1
ER20-25T.5	-	3	2	-	-	-	-	-	-	-	1
ER20-25T.6	-	1	1	-	-	-	-	-	-	-	1

Course Code	ER20-26T			
Course Title	PHARMACY LAW AND ETHICS – THEORY			
Category				
LTP & Credits	L	T	P	Total H
	3	0	0	75
Total Contact Hours	75			
Pre-requisites	None			

Scope:

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

Course Objective:

This course will discuss the following

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 successful completion of the course the students shall 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

Course Content:

CHAPTER 1: **[2L]**

Principals of Law, History and various Acts related to Drugs and Pharmacy profession

CHAPTER 2: **[5L]**

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

CHAPTER 3: **[23L]**

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.

CHAPTER 4: **[2L]**

Medicinal and Toilet Preparations Act 1955:

Objectives, Definitions, Licensing, Offences and Penalties

CHAPTER 5: **[4L]**

Narcotic Drugs and psychotropic substances Act 1985and Rules

Objectives, Definitions, Authorities and Officers, Prohibition, Control and Regulation, Offences and Penalties.

CHAPTER 6: **[2L]**

Drugs and Magic Remedies (Objectionable Advertisements) Act 1954

Objectives, Definitions, Prohibition of certain advertisements, Classes of Exempted advertisements, Offences and Penalties.

CHAPTER 7: **[2L]**

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.

CHAPTER 8: **[2L]**

Poisons Act-1919:

Introduction, objective, definition, possession, possession for sales and sale of any poison, import of poisons

CHAPTER 9: **[2L]**

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

CHAPTER 10: **[5L]**

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)

CHAPTER 11: **[5L]**

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.

CHAPTER 12: **[2L]**

Medical Termination of Pregnancy Act and Rules

– basic understanding/salient features

CHAPTER 13: **[1L]**

Role of all the government pharma regulator bodies

– Central Drugs Standards Control Organization (CDSCO), Indian Pharmacopoeia Commission (IPC)

CHAPTER 14: **[3L]**

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

CHAPTER 15: **[5L]**

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

CHAPTER 16: **[2L]**

Blood bank – basic requirements and functions

CHAPTER 17: **[2L]**

Clinical Establishment Act and Rules – Aspects related to Pharmacy

CHAPTER 18: **[6L]**

Biomedical Waste Management Rules 2016

– Basic aspects, and aspects related to pharma manufacture to disposal of pharma / medical waste at homes, pharmacies, and hospitals

CHAPTER 19: **[2L]**

Bioethics - Basic concepts, history and principles. Brief overview of ICMR's National Ethical Guidelines for Biomedical and Health Research involving human participants

CHAPTER 20: **[2L]**

Introduction to the Consumer Protection Act

CHAPTER 21: **[2L]**

Medical Devices

– Categorization, basic aspects related to manufacture and sale

Recommended Books (Latest Editions):

1. A Textbook of Clinical Pharmacy Practice - Essential concepts and skills - Parthasarathi G, Karin Nyfort-Hansen and Milap Nahata. Orient Longman Pvt. Ltd.Hyderabad.
2. Text Book of Hospital and Clinical Pharmacy by Dr. Pratibha Nand and Dr. Roop K Khar, Birla publications, New Delhi.
3. Gupta B.K and Gupta R.N., GPP in Hospital Pharmacy, Vallabh Prakashan.
4. Basic skills in interpreting laboratory data - Scott LT, American Society of Health System Pharmacists Inc.
5. Australian drug information - Procedure manual. The Society of Hospital Pharmacists of Australia.

CO-PO Mapping:

CO	Program Outcome										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
ER20-26T.1	3	-	-	-	-	-	-	-	-	-	3
ER20-26T.2	2	1	-	-	-	-	-	-	-	-	2
ER20-26T.3	-	2	1	-	-	-	-	-	-	-	-
ER20-26T.4	-	-	1	-	-	2	-	-	-	-	1
ER20-26T.5	-	3	2	-	-	-	-	-	-	-	1
ER20-26T.6	-	1	1	-	-	-	-	-	-	-	1

Course Code	ER20-21P			
Course Title	PHARMACOLOGY – PRACTICAL			
Category				
LTP & Credits	L	T	P	Total H
	0	0	3	75
Total Contact Hours	75			
Pre-requisites	None			

Scope:

This course provides the basic understanding about the uses, mechanisms of actions, dose dependent responses of drugs in simulated virtual animal models and experimental conditions

Course Objective:

This course will demonstrate / provide hands-on experience in the virtual platform using appropriate software on the following

1. Study of pharmacological effects of drugs like local anaesthetics, mydriatic and mitotic on rabbit eye
2. Screening the effects of various drugs acting in the central nervous system
3. Study of drug effects on isolated organs / tissues
4. Study of pyrogen testing on rabbit

Course Outcome:

Upon completion of the course the students shall be able to:

1. Study and report the local anaesthetic, mydriatic and mitotic effects of the given drug on the rabbit eye
2. Choose appropriate animal experiment model to study the effects of the given drugs acting on the central nervous system and submit the report
3. Perform the effects of given tissues (simulated) on isolated organs / tissues and interpret the results
4. Interpret the dose dependent responses of drugs in various animal experiment models

Practicals:

Introduction to the following topics pertaining to the experimental pharmacology have to be discussed and documented in the practical manuals.

1. Introduction to experimental pharmacology

2. Study of laboratory animals (a) Mice; (b) Rats; (c) Guinea pigs; (d) Rabbits

3. Commonly used instruments in experimental pharmacology

4. Different routes of administration of drugs in animals
5. Types of pre-clinical experiments: In-Vivo, In-Vitro, Ex-Vivo, etc.
6. Techniques of blood collection from animals

Experiments:

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).

1. Study of local anaesthetics on rabbit eye
2. Study of Mydriatic effect on rabbit eye
3. Study of Miotic effect on rabbit eye
4. Effect of analgesics using Analgesiometer
5. Study of analgesic activity by writhing test
6. Screening of anti-convulsant using Electro Convulsiometer
7. Screening of Muscle relaxants using Rota-Rod apparatus
8. Screening of CNS stimulants and depressants using Actophotometer
9. Study of anxiolytic activity using elevated plus maze method
10. Study of effect of drugs (any 2) on isolated heart
11. Effect of drugs on ciliary motility on frog's buccal cavity
12. Pyrogen testing by rabbit method

Assignments:

The students shall be asked to submit written assignments on the following topics (One assignment per student per sessional period. i.e., a minimum of THREE assignments per student)

1. Newer techniques in experimental pharmacology
2. Introduction to High Throughput screening
3. Introduction to ELISA test
4. Intro to Allergy Testing
5. Intro to Toxicity Studies
6. Drugs available as paediatric formulations
7. Drug Facts Labels of USFDA

8. Antimicrobial Resistance

9. Introduction to Bioassays

9. Pre-clinical studies in new drug development

CO-PO Mapping:

CO	Program Outcome										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
ER20-21P.1	3	-	-	-	-	-	-	-	-	-	3
ER20-21P.2	2	1	-	-	-	-	-	-	-	-	2
ER20-21P.3	-	2	1	-	-	-	-	-	-	-	-
ER20-21P.4	-	-	1	-	-	2	-	-	-	-	1
ER20-21P.5	-	3	2	-	-	-	-	-	-	-	1
ER20-21P.6	-	1	1	-	-	-	-	-	-	-	1

Course Code	ER20-22P			
Course Title	COMMUNITY PHARMACY AND MANAGEMENT – PRACTICAL			
Category				
LTP & Credits	L	T	P	Total H
	0	0	3	75
Total Contact Hours	75			
Pre-requisites	None			

Scope:

The course is designed to train the students and improve professional skills to provide various pharmaceutical care services in the simulated community pharmacy

Course Objective:

This course will train the students in the following

1. Professional handling and filling prescriptions
2. Patient counselling on diseases and minor ailments
3. Patient counselling on prescription and / or non-prescription drugs
4. Preparation of counselling materials such as patient information leaflets
5. Performing basic health screening tests

Course Outcome:

Upon completion of the course the students shall be able to:

1. Handle and fill prescriptions in a professional manner
2. Counsel patients on various diseases and minor ailments
3. Counsel patients on prescription and or non-prescription drugs
4. Design and prepare patient information leaflets
5. Perform basic health screening tests

Practicals:

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

1. Handling of prescriptions with professional standards, reviewing prescriptions, checking for legal compliance and completeness (minimum 5)

2. Identification of drug-drug interactions in the prescription and follow-up actions (minimum 2)

3. Preparation of dispensing labels and auxiliary labels for the prescribed medications (minimum 5)

4. 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

5. 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

6. 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 disorders.

7. 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

Assignments:

The students shall be asked to submit written assignments on the following topics (One assignment per student per sessional period. i.e., a minimum of THREE assignments per student)

1. SOPs for various activities in Community Pharmacy (as discussed in Theory and Practical)

2. List out the various abbreviations, short forms used in prescriptions and their interpretation

3. Patient Information Leaflet for a given chronic disease / disorder

4. Patient Information Leaflet for prescription / non-prescription drugs

5. Preparation of window / shelf display materials for the model community pharmacy

6. Software available for retail pharmacy management including billing, inventory, etc.

7. Dosage / Medication Reminder Aids

8. Overview on the operations and marketing strategies of various online pharmacies

9. Overview on the common fixed dose combinations
10. Overview on the medications require special storage conditions
11. Roles of Community Pharmacists in preventing Antimicrobial Resistance
12. Jan Aushadhi and other Generic Medicine initiatives in India
13. Overview of various professional associations of Pharmacy / Pharmacists in India
14. Community Pharmacy Practice Standards: Global Vs. Indian Scenario
15. Overview on Pharma Marketing

Field Visit:

The students shall be taken in groups to visit community pharmacies (both retail and whole-sale) to understand and witness the professional activities of the community pharmacists. Individual reports from each student on their learning experience from

CO-PO Mapping:

CO	Program Outcome										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
ER20-22P.1	3	-	-	-	-	-	-	-	-	-	3
ER20-22P.2	2	1	-	-	-	-	-	-	-	-	2
ER20-22P.3	-	2	1	-	-	-	-	-	-	-	-
ER20-22P.4	-	-	1	-	-	2	-	-	-	-	1
ER20-22P.5	-	3	2	-	-	-	-	-	-	-	1
ER20-22P.6	-	1	1	-	-	-	-	-	-	-	1

Course Code	ER20-23P			
Course Title	BIOCHEMISTRY & CLINICAL PATHOLOGY – PRACTICAL			
Category				
LTP & Credits	L	T	P	Total H
	0	0	3	75
Total Contact Hours	75			
Pre-requisites	None			

Scope:

This course is designed to train the students in the qualitative testing of various biomolecules and testing of biological samples for determination of normal and abnormal constituents

Course Objective:

This course will train and provide hands-on experiences on the following

1. Qualitative determination of biomolecules / metabolites in simulated biological samples
2. Determination of normal and abnormal constituents of simulated blood and urine samples

Course Outcome:

Upon completion of the course the students shall be able to:

1. Qualitatively determine the biomolecules / metabolites in the given biological samples
2. Determine the normal and abnormal constituents in blood and urine samples and interpret the results of such testing

Practicals:

1. Qualitative analysis of carbohydrates (4 experiments)

2. Qualitative analysis of Proteins and amino acids (4 experiments)

3. Qualitative analysis of lipids (2 experiments)

4. Qualitative analysis of urine for normal and abnormal constituents (4 experiments)

5. Determination of constituents of urine (glucose, creatinine, chlorides) (2 experiments)

6. Determination of constituents of blood/serum (simulated) (Creatine, glucose, cholesterol, Calcium, Urea, SGOT/SGPT) (5 experiments)

7. Study the hydrolysis of starch from acid and salivary amylase enzyme (1 experiment)

Assignments:

The students shall be asked to submit written assignments on Various Pathology Lab Reports (One assignment per student per sessional period. that is, a minimum of THREE assignments per student)

CO-PO Mapping:

CO	Program Outcome										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
ER20-23P.1	3	-	-	-	-	-	-	-	-	-	3
ER20-23P.2	2	1	-	-	-	-	-	-	-	-	2
ER20-23P.3	-	2	1	-	-	-	-	-	-	-	-
ER20-23P.4	-	-	1	-	-	2	-	-	-	-	1
ER20-23P.5	-	3	2	-	-	-	-	-	-	-	1
ER20-23P.6	-	1	1	-	-	-	-	-	-	-	1

Course Code	ER20-24P			
Course Title	PHARMACOTHERAPEUTICS – PRACTICAL			
Category				
LTP & Credits	L	T	P	Total H
	0	0	1	25
Total Contact Hours	25			
Pre-requisites	None			

Scope:

This course is designed to train the students in the basic skills required to support the pharmaceutical care services for selected common disease conditions

Course Objective:

This course will train the students on

1. How to prepare a SOAP (Subjective, Objective, Assessment and Plan) note for clinical cases of selected common diseases
2. Patient counselling techniques/methods for common disease conditions

Course Outcome:

Upon completion of the course the students shall be able to:

1. Write the SOAP (Subjective, Objective, Assessment and Plan) notes for the given clinical cases of selected common diseases
2. Counsel the patients about the disease conditions, uses of drugs, methods of handling and administration of drugs, life-style modifications and monitoring parameters.

Practicals:

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.

1. Hypertension
2. Angina Pectoris
3. Myocardial Infarction
4. Hyperlipidaemia
5. Rheumatoid arthritis
6. Asthma
7. COPD
8. Diabetes
9. Epilepsy

10. Stroke
11. Depression
12. Tuberculosis
13. Anaemia (any one type as covered in theory)
14. Viral infection (any one type as covered in theory)
15. Dermatological conditions (any one condition as covered in theory)

II. Patient counselling exercises using role plays based on the real / hypothetical clinical case scenarios. The students are expected to provide counselling on disease condition, medications, life-style modifications, monitoring parameters, etc. and the same shall be documented. (Minimum 5 cases)

III. Simulated cases to enable dose calculation of selected drugs in paediatrics, and geriatrics under various pathological conditions. (Minimum 4 cases)

CO-PO Mapping:

CO	Program Outcome										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
ER20-24P.1	3	-	-	-	-	-	-	-	-	-	3
ER20-24P.2	2	1	-	-	-	-	-	-	-	-	2
ER20-24P.3	-	2	1	-	-	-	-	-	-	-	-
ER20-24P.4	-	-	1	-	-	2	-	-	-	-	1
ER20-24P.5	-	3	2	-	-	-	-	-	-	-	1
ER20-24P.6	-	1	1	-	-	-	-	-	-	-	1

Course Code	ER20-25P			
Course Title	HOSPITAL AND CLINICAL PHARMACY – PRACTICAL			
Category				
LTP & Credits	L	T	P	Total H
	0	0	1	25
Total Contact Hours	25			
Pre-requisites	None			

Scope:

This course is designed to train the students to assist other healthcare providers in the basic services of hospital and clinical pharmacy

Course Objective:

This course will train the students with hands-on experiences, simulated clinical case studies in the following

1. Methods to systematically approach and respond to drug information queries
2. How to interpret the common laboratory reports to understand the need for optimizing the dosage regimen
3. How to report the suspected adverse drug reactions to the concerned authorities
4. Uses and methods of handling various medical/surgical aids and devices
5. How to interpret the drug-drug interactions in the treatment of common diseases.

Course Outcome:

Upon completion of the course, the students will be able to

1. Professionally handle and answer the drug information queries
2. Interpret the common laboratory reports
3. Report suspected adverse drug reactions using standard procedures
4. Understand the uses and methods of handling various medical/surgical aids and devices
5. Interpret and report the drug-drug interactions in common diseases for optimizing the drug therapy

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.

Practicals:

1. Systematic approach to drug information queries using primary / secondary / tertiary resources of information (2 cases)
2. Interpretation of laboratory reports to optimize the drug therapy in a given clinical case (2 cases)
3. Filling up IPC's ADR Reporting Form and perform causality assessments using various scales (2 cases)
4. 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.
5. Case studies on drug-drug interactions (any 2 cases)
6. Wound dressing (simulated cases and role play – any 2 cases)
7. Vaccination and injection techniques (IV, IM, SC) using mannequins (5 activities)

Assignments:

The students shall be asked to submit written assignments on the following topics (One assignment per student per sessional period. i.e., a minimum of THREE assignments per student)

1. Typical profile of a drug to be included in the hospital formulary
2. Brief layout and various services of the Central Sterile Supplies Department (CSSD)
3. Various types of sterilizers and sterilization techniques used in hospitals
4. Fumigation and pesticide control in hospitals
5. Genesis and development of Drug / Poison Information centres in India
6. Role of Pharmacists in Transition of Care: Discharge cards, post hospitalization care, medicine reconciliation activities in developed countries
7. Total parenteral nutrition and IV admixtures and their compatibility issues
8. Concept of electronic health records
9. Invasive and Non-invasive diagnostic tests - HRCT, MRI, Sonography, 2DECHO, X-rays, Mammography, ECG, EMG
10. Diagnostic Kits - Pregnancy Test
11. Measures to be taken in hospitals, ICUs to minimize the Antimicrobial Resistance
12. Antimicrobial Stewardship Program

Field Visits:

The students shall be taken in groups to visit a Govt / private healthcare facility to understand and witness the various hospital and clinical pharmacy services provided. Individual reports from each student on their learning experience from the filed visit shall be submitted.

CO-PO Mapping:

CO	Program Outcome										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
ER20-25P.1	3	-	-	-	-	-	-	-	-	-	3
ER20-25P.2	2	1	-	-	-	-	-	-	-	-	2
ER20-25P.3	-	2	1	-	-	-	-	-	-	-	-
ER20-25P.4	-	-	1	-	-	2	-	-	-	-	1
ER20-25P.5	-	3	2	-	-	-	-	-	-	-	1
ER20-25P.6	-	1	1	-	-	-	-	-	-	-	1