

DIPLOMA IN PHARMACY (D.PHARM.) - SECOND YEAR

S. No.	Name of Subject	Credits	Total Marks
1	Pharmacology (T)	5	100
2	Community Pharmacy & Management (T)	5	100
3	Biochemistry & Clinical Pathology (T)	5	100
4	Pharmacotherapeutics (T)	5	100
5	Hospital & Clinical Pharmacy (T)	5	100
6	Pharmacy Law & Ethics (T)	5	100
7	Pharmacology (P+Tu)	5	100
8	Community Pharmacy & Management (P+Tu)	5	100
9	Biochemistry & Clinical Pathology (P+Tu)	5	100
10	Pharmacotherapeutics (Tu)	2	100
11	Hospital & Clinical Pharmacy (Tu)	2	100
12	Pharmacy Law & Ethics (Tu)	2	100
Total		51	

Subject Name: PHARMACOLOGY

Scope: The subject provides basic knowledge of drugs with regard to definition, classification, pharmacokinetics and pharmacodynamics, uses, dose, route of administration, contraindications.

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

- Pharmacokinetics and pharmacodynamics of various drugs
- The clinical uses, dose, adverse effects indications and contraindications of various drugs

1. General Pharmacology

- Introduction and scope of Pharmacology
- Various routes of drug administration- advantages and disadvantages
- Drug absorption- definition, types, factors affecting drug absorption
- Bio availability and the factors affecting the bioavailability
- Drug distribution- definition, factors affecting drug distribution
- Biotransformation of drugs- Definition, types of biotransformation reactions
- Excretion of drugs- Definition, routes of drug elimination

- General mechanisms of drug action and factors modifying drug action

2. **Drugs Acting on 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) Adrenergic receptor blockers
 - e) Neuromuscular blocking agents
 - f) Drugs used in Myasthenia gravis
 - g) Local anaesthetic agents
 - h) Non Steroidal Anti-Inflammatory drugs (NSAIDs)

3. **Drugs Acting on Eye**

Definition, classification, pharmacological actions, dose, indications and contraindications of Miotics, Mydriatics and Cycloplegics.

4. **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
- Centrally acting muscle relaxants
- Narcotic analgesics

5. **Drugs Acting on 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.

1. **Drugs Acting on Blood and Blood Forming Organs**

Definition, classification, pharmacological dose, indications and actions, contraindications of Haematinics, Anti-coagulants and Anti platelet drugs.

2. Definition, classification, pharmacological actions, dose, indications and contraindications of
 - Bronchodilators
 - Expectorants

- Anti-tussives

8. **Drugs Acting on Gastro Intestinal Tract**

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

- Anti-ulcer drugs
- Anti-emetics
- Laxatives and purgatives
- Anti-diarrheal drugs

9. **Drugs Acting on Kidney**

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

- Diuretics
- Anti-Diuretics

10. **Hormones and Hormone Antagonists**

- Physiological and pathological role and clinical uses of thyroid hormones and anti-thyroid drugs, Parathormone, calcitonin and vitamin D
- Insulin, Oral hypoglycemic agents
- Estrogen and Progesterone
- Oxytocin

11. **Autocoids**

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

12. **Chemotherapy**

Classification, dose, indication and contraindications of drugs belonging to

- Penicillins
- Cephalosporins
- Aminoglycosides
- Fluoroquinolones
- Anti-tubercular drugs
- Anti-fungal drugs
- Anti-viral drugs
- Anti-cancer

Practical

- Demonstration with recommended software and explanations only
 - No use of animals for doing the Experiments
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. Study of different routes of administration of drugs
5. Study of Local anaesthetics on rabbit eye and study of Mydriatic and Mitotic effect on rabbit eye
6. Demonstration of effect of analgesics using Analgesiometer
7. Principles involved in screening of anti-convulsant in mice or rats
8. Principles involved in screening of Muscle relaxants using Rota Rod apparatus
9. Principles involved in screening of CNS stimulants and depressants using actophotometer
10. Pyrogen testing by rabbit method
11. Study of effect of drugs on isolated heart
12. Effect of drugs on ciliary motility on frog's buccal cavity

Recommended Books

1. Satoskar, R.S. and Bhandarkar, S.D. Pharmacology and Pharmacotherapeutics
2. B. Suresh, A Text Book of Pharmacology
3. Derasari and Ghandhi, Elements of Pharmacology
4. S.K.Kulkarni ,Practical Pharmacology and Clinical Pharmacy
5. Ex- pharm 1.00 soft ware
6. H.K.Sharma. Principles of Pharmacology
7. Mary J.Mycek, Lippincott Williams and Wilkins. Lippincott's illustrated Reviews:Pharmacology
8. Tripathi, K.D. Essentials of Medical Pharmacology.

Subject Name: COMMUNITY PHARMACY & MANAGEMENT

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.

Objectives: Upon completion of the course, the student shall be able to understand the procedure to set up and manage the community pharmacy

- To review and fill the prescriptions
 - To counsel the patients about the disease and medications.
 - To check Blood Pressure, capillary blood glucose and lung function
1. Community Pharmacy Practice – Definition, history and development of community pharmacy- International and Indian scenario
 2. Professional responsibilities of community pharmacist. Introduction to concept of Good Pharmacy Practice
 3. **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, dispensing errors and strategies to minimize them

4. **Patient counselling**

- Definition and Benefits of patient counselling,
- Stages – counselling Introduction, counselling content, counselling process and counselling conclusion,
- Barriers –Types and strategies to overcome the barriers
- Counselling points for the selected chronic diseases (Hypertension, Diabetes, Asthma, Tuberculosis, Chronic obstructive pulmonary disease and AIDS)
- PPIs – (Patient Package Insert) - Definition, Importance and benefits of PPIs. Scenario of PPI use in India and other countries.
- Patient Information leaflets- Definition and uses

5. **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

6. **Medication Adherence**

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

7. **Health Screening services**

- Introduction and usefulness of health screening services
- Blood Pressure measurement
- Recording of capillary blood glucose
- Lung function assessment using peak flow meter
- Calculation of Body mass index

8. **Over the Counter (OTC) medications**

- Definition, need and role of Pharmacist in OTC medication dispensing.
- OTC medications in India, counseling for OTC products.
- Self medication and role of pharmacist in promoting safe self-medication

9. **Responding to symptoms/minor ailments**

Etiopathogenesis, clinical presentations, non-pharmacological and pharmacological drug therapy of following minor ailments

- Head ache,
- GI disturbances (Nausea, Vomiting, Dyspepsia, diarrhea, constipation),
- Worm infestations,
- Pyrexia,
- Ophthalmic disorders (Glaucoma and Conjunctivitis)

- Upper Respiratory Tract infections,
- Skin infections,
- Oral and dental disorders.

11 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.
- a) Standard Operating Procedures (SOP) of Pharmacy management

Practical

1. Introduction to community pharmacy practice
2. Review of prescriptions for legality and completeness
3. Review of prescriptions for drug-drug interactions
4. Preparation of dispensing labels for medicines
5. Health Screening services – B.P recording, Capillary Blood Glucose checkup, Lung function assessment through peak flow meter.
6. Counselling of patients for chronic diseases and medications
7. Counselling of patients in minor ailments
8. Visit to other community pharmacies and study of the activities and prepare a report

Recommended Books

1. Health Education and Community Pharmacy by N.S.Parmar.
2. WHO consultative group report.
3. Drug store & Business management by Mohammed Ali & Jyoti.
4. Handbook of pharmacy – health care. Edt. Robin J Harman. The Pharmaceutical Press
5. Comprehensive Pharmacy Review – Edt. Leon Shargel. Lippincott Williams & 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.

Subject Name: BIOCHEMISTRY & CLINICAL PATHOLOGY

Scope: This course is designed to impart basic knowledge on the study of structure and functions of bio molecules and the chemical process associated with living cells in normal and abnormal state. The course is emphasize on the clinical pathology of blood and urine

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

- The structure and functions of biomolecules
 - The catalytic activity, diagnostic and therapeutic importance of enzymes
 - The metabolic pathways of biomolecules in health and illness (metabolic disorders)
 - The biochemical principles of organ function tests and their clinical significance
 - Qualitative and quantitative determination of biomolecules/metabolites in the body fluids.
 - The clinical pathology of blood and urine
1. **Introduction to biochemistry:** Scope of biochemistry in pharmacy; Cell and its biochemical organization.
 2. **Carbohydrates**
 - Definition, classification with examples
 - 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 carbohydrates
 3. **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 level of organization of protein structure)
 - Qualitative tests and biological role proteins and amino acids.
 - Diseases related to malnutrition of proteins.
 4. **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
 5. **Nucleic acids**
 - Definition, purine and pyrimidine bases
 - Components of nucleosides and nucleotides with examples
 - Structure of DNA (Watson & Crick model), RNA and their functions
 6. **Enzymes**

- Definition, properties and IUB & MB classification
- Factors affecting enzyme activity
- Enzyme inhibitors,
- Therapeutic and pharmaceutical importance of enzymes

7. **Vitamins**

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

8. **Metabolism (Study of cycle/pathways without chemical structures)**

- **Metabolism of Carbohydrates:** Glycolysis, TCA cycle and glycogen metabolism, regulation of blood glucose level. Diseases related to abnormal metabolism of Carbohydrates
- **Metabolism of lipids:** Lipolysis, β -oxidation of Fatty acid (Palmitic acid) and its energetic, 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

9. **Minerals:** Functions, Deficiency diseases, recommended dietary requirements of calcium, phosphorus, iron, sodium and chloride

10. **Water and Electrolytes**

- Distribution, functions of water in the body
- Water turnover & balance.
- Electrolyte composition of the body fluids, Dietary intake of electrolyte and Electrolyte balance.
- Dehydration, causes of dehydration and oral dehydration therapy.

11. **Organ function tests**

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

12. **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

Practical

- Qualitative analysis of carbohydrates

4 experiments

- Qualitative analysis of Proteins & amino acids 4 experiments
- Qualitative analysis of lipids 2 experiments
- Qualitative analysis of urine for normal and abnormal constituents 4 experiments
- Determination of constituents of urine (glucose, creatinine, chlorides) 2 experiments
- Determination of constituents of blood/serum (Creatine, glucose, cholesterol, Calcium, Urea, SGOT/SGPT) 5 experiments
- Study the hydrolysis of starch from acid and salivary amylase enzyme 1 experiment

Recommended Books

1. Essentials of Biochemistry by U. Satyanarayan, 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. Bhargavan.
4. Laboratory manual of Biochemistry by Pattabiraman and Sitaram Acharya

Subject Name: PHARMACOTHERAPEUTICS

Scope: The course is designed to impart basic knowledge of etiopathogenesis, disease management and drug related problems.

Objectives: Upon completion of the course, the student shall be able to understand the clinical manifestations of various diseases

- Drug therapy of various diseases
- Medication counselling points

I Pharmacotherapeutics – Introduction, scope and objectives

II. Definition, etiopathogenesis, clinical manifestations, non-pharmacological and pharmacological management of the diseases associated with

1. Cardiovascular System

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

2. Respiratory System

- Asthma
- COPD

3. Endocrine System

- Diabetes.

- Thyroid disorders- Hypo and Hyperthyroidism

4. **CNS**

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

5. **GI Disorders**

- Gastro esophageal reflux disease
- Acid Pepsin Disease,
- Alcoholic liver disease
- Inflammatory Bowel Diseases (Crohns disease and Ulcerative colitis).

6. **Hematological disorders**

- Iron deficiency anemia,
- Megaloblastic anemia

8. **Infectious diseases**

- Tuberculosis
- Pneumonia
- Urinary tract infections,
- Gonorrhoea and Syphilis
- Malaria
- HIV & Opportunistic infections

9. **Musculoskeletal disorders**

- Rheumatoid arthritis,
- Osteoarthritis

10. **Dermatology:**

- Psoriasis,
- Scabies,
- Eczema
- Impetigo

11. **Ophthalmology**

- Conjunctivitis (bacterial and Viral)
- Glaucoma

12. **Women's Health**

- Contraception – Chemical Methods, IUDs
- Disorders related to Menstrual Cycle – Polycystic ovary Syndrome, Dysmenorrhea, Premenstrual Syndrome.

Recommended Books

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]

Subject Name: HOSPITAL & CLINICAL PHARMACY

Scope: This course is designed to impart basic knowledge on drug procurement and distribution to out- patients and in- patients and clinical pharmacy services in the hospital.

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

- The responsibilities of hospital pharmacist and clinical pharmacist
- The drug distribution methods and inventory control techniques
- The biochemical parameters and their significance
- The adverse drug reaction monitoring and reporting

1. 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.

2. Pharmacy and Therapeutic Committee

Objectives, Composition, functions of Pharmacy and Therapeutics committee. Hospital Formulary Definition, procedure for development and use of hospital formulary

3. Supply chain & Inventory Control

- Procedures of Drug Purchases – Drug selection, short term, long term and tender process
- Inventory control techniques: Economic Order Quantity, Reorder Quantity Level, Inventory Turnover etc
- Inventory Management of Central Drug Store – Storage conditions, Distribution
- Documentation- purchase and inventory

4. Drug distribution

- Drug distribution – 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/Emergency wards.
- Automated drug dispensing systems and devices
- Distribution of Narcotic and Psychotropic substances

5. Radio Pharmaceuticals

Storage, dispensing and disposal of radiopharmaceuticals

6. **Clinical Pharmacy:** Definition, scope and development,
Daily activities of clinical pharmacist: Definition, goal and procedure of -
 - Ward round participation
 - Treatment Chart Review
 - Adverse drug reaction monitoring
 - Drug information and poisons information
 - Medication history
 - Patient counselling**Pharmaceutical care:** Definition, classification of drug related problems. Principles and procedure to provide pharmaceutical care
7. Clinical laboratory tests used in the evaluation of disease states and interpretation of test results
 - Hematological, Liver function, Renal function, thyroid function tests
 - Tests associated with cardiac disorders
 - Fluid and electrolyte balance
 - Pulmonary Function Tests
8. Drugs and Poison information services – Definition, Information resources with examples, and their advantages and disadvantages, Drug Information Centre services.
9. Pharmacovigilance
 - Definition, aim and scope
 - Overview of Pharmacovigilance
10. **Medication errors:** Definition, types, consequences, and strategies to minimize the medication errors
Drug Interactions: Definition, types, clinical significance of drug interactions
11. **Poisoning:** Types of poisoning: Clinical manifestations and antidotes
12. Application of computers in Hospital Pharmacy Practice, Software used in hospital pharmacy
13. Medical and Surgical devices

Recommended Books

1. A text book of Clinical Pharmacy Practice; Essential concepts and skills, Dr.G.Parthasarathi et al, Orient Orient Langram Pvt.Ltd. ISSN8125026.
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. Gennaro et al., Ed. "Remington: The Science & Practice of Pharmacy," 20th ed., Lippincott Williams & Wilkins, 2000.
5. The Theory and Practice of Industrial Pharmacy. Leon Lachman, Herbert Lieberman, and Joseph Kanig, editors. Lea & Febiger, Philadelphia.

6. Chittion & Witcofski: "Nuclear Pharmacy," Lea & Febiger. Aiiwodd & Fell
7. Australian drug information - Procedure manual. The Society of Hospital Pharmacists of Australia.

Subject Name: PHARMACY LAW & ETHICS

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

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

- The Pharmaceutical legislations and their implications in the development and marketing
- Various Indian pharmaceutical Acts and Laws
- The regulatory authorities and agencies governing the manufacture and sale of pharmaceuticals
- The code of ethics during the pharmaceutical practice

1. General Principals of Law, History and various Acts related to Drugs and Pharmacy profession
2. **Pharmacy Act-1948 & 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.
3. **Drugs and Cosmetics Act 1940 and Rules 1945 & 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 & C1, G, H, K, P, M, N, and X.

Sale of Drugs – Wholesale, Retail sale and restricted license. 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.

4. **Medicinal and Toilet Preparations Act 1955:** Objectives, Definitions, Licensing, Offences and Penalties
5. **Narcotic Drugs and psychotropic substance Act 1985** and Rules Objectives, Definitions, Authorities and Officers, Prohibition, Control and Regulation, Offences and Penalties.
6. **Drugs and Magic remedies (Objectionable Advertisement) Act 1955** Objectives, Definitions, Prohibition of certain advertisements, Classes of Exempted advertisements, Offences and Penalties.
7. **Prevention of cruelty to Animals Act-1960:** Objectives, Definitions, Institutional Animal Ethics Committee, Breeding and Stocking of Animals, Performance of Experiments, Transfer and Acquisition of animals for experiment, Records, Power to suspend or revoke registration, Offences and Penalties.
8. **Poisons Act-1919:** Introduction, objective, definition, possession, possession for sales and sale of any poison, import of poisons

9. **Prevention of food adulteration Act, 1954 and Rules:** Objective, definition, central committee for food standards, FSSAI (Food Safety and Standards Authority of India), prohibition of import, prohibition of sale, and manufacture, offences and penalties
10. **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)
11. **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.

Recommended books

1. Forensic Pharmacy by B. Suresh
2. Text book of Forensic Pharmacy by B.M. Mithal
3. Hand book of drug law-by M.L. Mehra
4. A text book of Forensic Pharmacy by N.K. Jain
5. Drugs and Cosmetics Act/Rules by Govt. of India publications.
6. Medicinal and Toilet preparations act 1955 by Govt. of India publications.
7. Narcotic drugs and psychotropic substances act by Govt. of India publications
8. Drugs and Magic Remedies act by Govt. of India publications.