

**Annexure - I**

Pharmacy Council of India New Delhi

**“Syllabus framed under Regulation 7, List of prescribed equipments and apparatus under Appendix-A of**

**The Education Regulations, 2020 For Diploma Course in Pharmacy”**

# ER-2020 D.Pharm Syllabus – Part II

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| **S.**  **No.** | **Course Code** | **Name of the Course** | **Total Theory / Practical Hours** | **Total Tutorial Hours** | **Theory / Practical Hours per**  **Week** | **Tutorial Hours per Week** |
| 1. | ER20-21T | Pharmacology –  Theory | 75 | 25 | 3 | 1 |
| 2. | ER20-21P | Pharmacology –  Practical | 50 | - | 2 | - |
| 3. | ER20-22T | Community Pharmacy & Management –  Theory | 75 | 25 | 3 | 1 |
| 4. | ER20-22P | Community Pharmacy & Management – Practical | 75 | - | 3 | - |
| 5. | ER20-23T | Biochemistry & Clinical  Pathology – Theory | 75 | 25 | 3 | 1 |
| 6. | ER20-23P | Biochemistry & Clinical  Pathology – Practical | 50 | - | 2 | - |
| 7. | ER20-24T | Pharmacotherapeutics  – Theory | 75 | 25 | 3 | 1 |
| 8. | ER20-24P | Pharmacotherapeutics  – Practical | 25 | - | 1 | - |
| 9. | ER20-25T | Hospital & Clinical  Pharmacy – Theory | 75 | 25 | 3 | 1 |
| 10. | ER20-25P | Hospital & Clinical  Pharmacy – Practical | 25 | - | 1 | - |
| 11. | ER20-26T | Pharmacy Law &  Ethics | 75 | 25 | 3 | 1 |

## PHARMACOLOGY – THEORY

**Course Code: ER20-21T 75 Hours (3 Hours/week)**

**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 Objectives:** 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 Outcomes:** Upon successful completion of this course, the students will be able to

* 1. Describe the basic concepts of pharmacokinetics and pharmacodynamics 2. Enlist the various classes and drugs of choices for any given disease condition

1. Advice the dosage regimen, route of administration and contraindications for a given drug
2. Describe the common adverse drug reactions

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| **Chapter** | **Topic** | **Hours** |
| **1** | **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 | **10** |

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| **2** | **Drugs Acting on the Peripheral Nervous System**   * Steps involved in neurohumoral transmission * Definition, classification, pharmacological actions, dose, indications, and contraindications of   1. Cholinergic drugs   2. Anti-Cholinergic drugs   3. Adrenergic drugs   4. Anti-adrenergic drugs   5. Neuromuscular blocking agents   6. Drugs used in Myasthenia gravis   7. Local anaesthetic agents   8. Non-Steroidal Anti-Inflammatory drugs (NSAIDs) | **11** |
| **3** | **Drugs Acting on the Eye**  Definition, classification, pharmacological actions, dose, indications and contraindications of   * Miotics * Mydriatics * Drugs used in Glaucoma | **2** |
| **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 * Anti-psychotics * Nootropic agents * Centrally acting muscle relaxants * Opioid analgesics | **8** |
| **5** | **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 * Drug therapy for shock | **6** |

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| **6** | **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 | **4** |
| **7** | Definition, classification, pharmacological actions, dose, indications, and contraindications of   * Bronchodilators * Expectorants * Anti-tussive agents * Mucolytic agents | **2** |
| **8** | **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 | **5** |
| **9** | **Drugs Acting on the Kidney**  Definition, classification, pharmacological actions, dose, indications, and contraindications of   * Diuretics * Anti-Diuretics | **2** |
| **10** | **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 | **8** |

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| **11** | **Autocoids**   * Physiological role of Histamine, 5 HT and Prostaglandins * Classification, clinical uses, and adverse effects of   antihistamines and 5 HT antagonists | **3** |
| **12** | **Chemotherapeutic Agents:** Introduction, basic principles of chemotherapy of infections, infestations and neoplastic diseases, Classification, dose, indication and contraindications of drugs belonging to following classes:   * 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 | **12** |
| **13** | **Biologicals**  Definition, types, and indications of biological agents with examples | **2** |

## PHARMACOLOGY – PRACTICAL

**Course Code: ER20-21P 50 Hours (2 Hours/week)**

**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 Objectives:** 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 Outcomes:** Upon successful completion of this course, the students will 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
   1. 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) such as ‘Ex Pharm’ or any other suitable software

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. Introduction to Allergy Testing
2. Introduction to Toxicity Studies
3. Drug Facts Labels of US FDA
4. Pre-clinical studies in new drug development
5. Medicines and meals: Before or After food
6. Pre-clinical studies in new drug development
7. Drugs available as paediatric formulations
8. Drug information apps

## COMMUNITY PHARMACY AND MANAGEMENT – THEORY

**Course Code: ER20-22T 75 Hours (3 Hours/week)**

**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 Objectives:** 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 medicines
4. Scope for performing basic health screening in community pharmacy settings

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

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

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| **Chapter** | **Topic** | **Hours** |
| **1** | **Community Pharmacy Practice** – Definition, history and development of community pharmacy - International and Indian  scenarios | **2** |
| **2** | Professional responsibilities of community pharmacists  Introduction to the concept of Good Pharmacy Practice and SOPs. | **3** |
| **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, Good Dispensing Practices, dispensing errors and strategies to minimize them | **7** |

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| **4** | **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** |
| **5** | **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, i mportance and benefits, Scenarios of PPI use in India and other countries * **Patient Information leaflets** - Definition and uses | **10** |
| **6** | **Medication Adherence**  Definition, factors influencing non- adherence, strategies to overcome non-adherence | **2** |
| **7** | **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 | **5** |
| **9** | **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 self-care in conditions such as - Pain management, Cough, Cold, Diarrhea, Constipation, Vomiting, Fever, Sore throat, Skin disorders, Oral health (mouth ulcers, dental pain, gum swelling) | **15** |

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| **10** | **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 | **25** |

## COMMUNITY PHARMACY AND MANAGEMENT – PRACTICAL

**Course Code: ER20-22P 75 Hours (3 Hours/week)**

**Scope:** The course is designed to train the students and improve professional skills to provide various pharmaceuticalcare services in community pharmacy.

**Course Objectives:** 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 medicines
4. Preparation of counselling materials such as patient information leaflets
5. Performing basic health screening tests

**Course Outcomes:** Upon successful completion of this course, the students will 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 medicines
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

1. 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

1. 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.

1. 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
2. Use of Community Pharmacy Software and digital health tools

## 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 medicines
  5. Preparation of window / shelf display materials for the model community pharmacy
  6. Overview of 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 requiring special storage conditions
  11. Role of Community Pharmacists in preventing Antimicrobial Resistance
  12. Jan Aushadhi and other Generic Medicine initiatives in India
  13. Global Overview of Online Pharmacies
  14. Community Pharmacy Practice Standards: Global Vs. Indian Scenario
  15. Overview of pharmacy associations in India

## Field Visit

The students shall be taken in groups to visit community pharmacies and medicine distributors to understand and witness the professional activities of the community pharmacists, and supply chain logistics. Individual reports from each student on their learning experience from the field visit shall be submitted.

## BIOCHEMISTRY & CLINICAL PATHOLOGY – THEORY

**Course Code: ER20-23T 75 Hours (3 Hours/week)**

**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 Objectives:** 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 Outcomes:** Upon successful completion of this course, the students will be able to

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

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| **Chapter** | **Topic** | **Hours** |
| **1** | **Introduction to biochemistry**: Scope of biochemistry in  pharmacy; Cell and its biochemical organization. | **2** |
| **2** | **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 | **5** |

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| **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 levels of organization of protein structure) * Qualitative tests and biological role of proteins and amino acids * Diseases related to malnutrition of proteins. | **5** |
| **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** |
| **5** | **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 | **4** |
| **6** | **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 | **5** |
| **7** | **Vitamins**   * Definition and classification with examples * Sources, chemical nature, functions, coenzyme form, recommended dietary requirements, deficiency diseases of fat-and water-soluble vitamins | **6** |
| **8** | **Metabolism** (Study of cycle/pathways without chemical structures)   * Metabolism of Carbohydrates: Glycolysis, TCA cycle   and glycogen metabolism, regulation of blood glucose | **20** |

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|  | level. Diseases related to abnormal metabolism of Carbohydrates   * Metabolism of lipids: Lipolysis, β-oxidation of Fatty acid (Palmitic acid) ketogenesis and ketolysis. Diseases related to abnormal metabolism of lipids such as Ketoacidosis, Fatty liver, Hypercholesterolemia * Metabolism of Amino acids (Proteins): General reactions of amino acids and its significance– Transamination, deamination, Urea cycle and decarboxylation. Diseases related to abnormal metabolism of amino acids, Disorders of ammonia metabolism, phenylketonuria, alkaptonuria and Jaundice. * Biological oxidation: Electron transport chain   and Oxidative phosphorylation |  |
| **9** | **Minerals**: Types, Functions, Deficiency diseases,  recommended dietary requirements | **05** |
| **10** | **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 | **05** |
| **11** | Introduction to Biotechnology | **01** |
| **12** | **Organ function tests**   * Functions of kidney and routinely performed tests to assess the functions of kidney and their clinical significances * Functions of liver and routinely performed tests to assess the functions of liver and their clinical significances * Lipid profile tests and its clinical significances | **06** |
| **13** | **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 | **06** |

## BIOCHEMISTRY & CLINICAL PATHOLOGY – PRACTICAL

**Course Code: ER20-23P 50 Hours (2 Hours/week)**

**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 Objectives:** 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 Outcomes:** Upon successful completion of this course, the students will 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. i.e., a minimum of THREE assignments per student)

## PHARMACOTHERAPEUTICS - THEORY

**Course Code: ER20-24T 75 Hours (3 Hours/week)**

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

**Course Objectives:** 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 Outcomes:** Upon successful completion of this course, the students will 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

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| **Chapter** | **Topic** | **Hours** |
| 1 | Pharmacotherapeutics – Introduction, scope, and objectives. Rational use of Medicines, Evidence Based Medicine, Essential Medicines List, Standard Treatment Guidelines  (STGs) | **8** |
| 2 | **Definition, etiopathogenesis, clinical manifestations, non-**  **pharmacological and pharmacological management of the diseases associated with** | |
| 1. **Cardiovascular System**    * Hypertension    * Angina and Myocardial infarction    * Hyperlipidaemia    * Congestive Heart Failure | **8** |
| 1. **Respiratory System**    * Asthma    * COPD | **4** |
| 1. **Endocrine System**    * Diabetes    * Thyroid disorders - Hypo and Hyperthyroidism | **5** |
| 1. **Central Nervous System**    * Epilepsy | **8** |

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|  | * Parkinson’s disease * Alzheimer’s disease * Stroke * Migraine |  |
| 1. **Gastro Intestinal Disorders**    * Gastro oesophageal reflux disease    * Peptic Ulcer Disease    * Alcoholic liver disease    * Inflammatory Bowel Diseases (Crohn’s Disease and Ulcerative Colitis) | **8** |
| 1. **Haematological disorders**    * Iron deficiency anaemia    * Megaloblastic anaemia | **4** |
| 1. **Infectious diseases**    * Tuberculosis    * Pneumonia    * Urinary tract infections    * Hepatitis    * Gonorrhoea and Syphilis    * Malaria    * HIV and Opportunistic infections    * Viral Infections (SARS, CoV2) | **12** |
| 1. **Musculoskeletal disorders**    * Rheumatoid arthritis    * Osteoarthritis | **3** |
| 1. **Dermatology**    * Psoriasis    * Scabies    * Eczema | **3** |
| 1. **Psychiatric Disorders**    * Depression    * Anxiety    * Psychosis | **4** |
| 1. **Ophthalmology**    * Conjunctivitis (bacterial and viral)    * Glaucoma | **2** |
| **(l) Anti-microbial Resistance** | **2** |
| 1. **Women’s Health**    * Polycystic Ovary Syndrome    * Dysmenorrhea    * Premenstrual Syndrome | **4** |

## PHARMACOTHERAPEUTICS – PRACTICAL

**Course Code: ER20-24P 25 Hours (1 Hour/week)**

**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 Objectives:** 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 Outcomes:** Upon successful completion of this course, the students will be able to

1. Write 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

1. 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)
2. 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)
3. Simulated cases to enable dose calculation of selected drugs in paediatrics, and geriatrics under various pathological conditions. (Minimum 4 cases)

## HOSPITAL AND CLINICAL PHARMACY – THEORY

**Course Code: ER20-25T 75 Hours (3 Hours/week)**

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

**Course Objectives:** 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 Outcomes:** Upon successful completion of this course, the students will 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

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| **S. No.** | **Topic** | **Hours** |
| **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 * Hospital Pharmacy Standards (FIP Basel Statements, AHSP) * Introduction to NAQS guidelines and NABH Accreditation   and Role of Pharmacists | **6** |
| **2** | **Different Committees in the Hospital**   * Pharmacy and Therapeutics Committee - Objectives, Composition, and functions * Hospital Formulary - Definition, procedure for development and use of hospital formulary | **4** |

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|  | * Infection Control Committee – Role of Pharmacist in preventing Antimicrobial Resistance |  |
| **4** | **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 handling, and disposal. Disposal of Narcotics, cytotoxic drugs * Documentation - purchase and inventory | **14** |
| **5** | **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 | **7** |
| **6** | Compounding in Hospitals. Bulk compounding, IV admixture  services and incompatibilities, Total parenteral nutrition | **4** |
| **7** | **Radio Pharmaceuticals -** Storage, dispensing and disposal of  radiopharmaceuticals | **2** |
| **8** | Application of computers in Hospital Pharmacy Practice,  Electronic health records, Softwares used in hospital pharmacy | **2** |
| **9** | **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, Anti-natal Care, Post-natal Care, etc. | **12** |

|  |  |  |
| --- | --- | --- |
|  | **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** |  |
| **10** | **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 | **10** |
| **11** | **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 | **6** |
| **12** | **Pharmacovigilance**   * Definition, aim and scope * Overview of Pharmacovigilance | **2** |
| **13** | **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 | **6** |

## HOSPITAL AND CLINICAL PHARMACY – PRACTICAL

**Course Code: ER20-25P 25 Hours (1 Hour / Week)**

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

**Course Objectives:** 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 common laboratory reports to understand the need for optimizing dosage regimens
3. How to report suspected adverse drug reactions to the concerned authorities
4. Uses and methods of handling various medical/surgical aids and devices
5. How to interpret drug-drug interactions in the treatment of common diseases.

**Course Outcomes:** 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 –minimum 2 cases)
7. Vaccination and injection techniques (IV, IM, SC) using mannequins (5 activities)
8. Use of Hospital Pharmacy Software and various digital health tools

## 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. Role of Pharmacists in Transition of Care: Discharge cards, post hospitalization care, medicine reconciliation activities in developed countries
6. Total parenteral nutrition and IV admixtures and their compatibility issues
7. Concept of electronic health records
8. Invasive and Non-invasive diagnostic tests - HRCT, MRI, Sonography, 2D ECHO, X-rays, Mammography, ECG, EMG, EEG
9. Home Diagnostic Kits - Pregnancy Test, COVID testing etc
10. Measures to be taken in hospitals to minimize Antimicrobial Resistance
11. Role and responsibilities of a pharmacist in public hospital in rural parts of the country
12. Safe waste disposal of hospital waste

## Field Visit

The students shall be taken in groups to visit a Government / 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 field visit shall be submitted.

## PHARMACY LAW AND ETHICS – THEORY

**Course Code: ER20-26T 75 Hours (3 Hours/week)**

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

**Course Objectives:** 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 Outcomes:** Upon successful completion of this course, the students will 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

|  |  |  |
| --- | --- | --- |
| **Chapter** | **Topics** | **Hours** |
| **1** | General Principles of Law, History and various Acts related  to Drugs and Pharmacy profession | **2** |
| **2** | **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** | **5** |
| **3** | **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. | **23** |

|  |  |  |
| --- | --- | --- |
|  | **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, and X.  ***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. |  |
| **4** | **Narcotic Drugs and Psychotropic Substances Act 1985 and Rules** Objectives, Definitions, Authorities and Officers, Prohibition, Control and Regulation, Offences and  Penalties. | **2** |
| **5** | **Drugs and Magic Remedies (Objectionable Advertisements) Act 1954**  Objectives, Definitions, Prohibition of certain advertisements, Classes of Exempted advertisements,  Offences and Penalties. | **2** |
| **6** | **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. | **2** |
| **7** | **Poisons Act-1919**: Introduction, objective, definition,  possession, possession for sales and sale of any poison, import of poisons | **2** |
| **8** | **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 | **2** |

|  |  |  |
| --- | --- | --- |
| **9** | **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) | **5** |
| **10** | **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. | **5** |
| **11** | Medical Termination of Pregnancy Act and Rules – basic understanding, salient features, and Amendments | **2** |
| **12** | Role of all the government pharma regulator bodies – Central Drugs Standards Control Organization (CDSCO),  Indian Pharmacopoeia Commission (IPC) | **1** |
| **13** | 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 | **3** |
| **14** | Introduction to BCS system of classification, Basic concepts of Clinical Trials, ANDA, NDA, New Drug development, New Drugs and Clinical Trials Rules, 2019. Brand v/s Generic, Trade name concept, Introduction to Patent Law and Intellectual Property Rights, Emergency Use  Authorization | **7** |
| **15** | Blood bank – basic requirements and functions | **2** |
| **16** | Clinical Establishment Act and Rules – Aspects related to  Pharmacy | **2** |
| **17** | Biomedical Waste Management Rules 2016 – Basic aspects, and aspects related to pharma manufacture to disposal of pharma / medical waste at homes, pharmacies,  and hospitals | **2** |
| **18** | Bioethics - Basic concepts, history and principles. Brief overview of ICMR’s National Ethical Guidelines for Biomedical and Health Research involving human  participants | **2** |
| **19** | Introduction to the Consumer Protection Act | **1** |
| **20** | Introduction to the Disaster Management Act | **1** |
| **21** | Medical Devices – Categorization, basic aspects related to  manufacture and sale | **2** |

## 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. Requirements for Ayurvedic, Homeopathic manufacturing, sale, and licensing requirements
2. Layout and contents of official websites of various agencies regulating the profession of pharmacy in India: e.g., CDSCO, SUGAM portal, PCI, etc.
3. Licenses required, application processes (online/offline), drug regulatory office website of the respective state
4. Case studies – actions taken on violation of any act / rule related to pharmacy
5. Schedule H1 drugs and its implementation in India
6. Counterfeit / Spurious medicines
7. Drug Testing Labs in India
8. Overview of Pharma marketing practices
9. Generic Medicines

# 9. Appendices

|  |  |
| --- | --- |
| **No** | **Appendix Document** |
| 1. | A typical format for the assessment of an Assignment |
| 2. | A typical format for the assessment of a Field Visit Report |
| 3. | List of instruments and equipment required for the conduct of D.Pharm program as per ER-2020 |

**Appendix – 1**

**A typical format for the assessment of an Assignment**

## Name of the College:

|  |  |
| --- | --- |
| **Name of the Student:** |  |
| **Academic Year of the Student:** |  |
| **Name of the Subject:** |  |
| **Title of the Assignment:** |  |
| **Date on which the Assignment was given:** |  |
| **Date on which the Assignment was submitted:** |  |
| **Name & Designation of the Evaluator:** |  |
| **Signature of the Evaluator with Date:** |  |

**Directions:** For **evaluation,** enter rating of the student utilizing the following scale: 5 – Excellent; 4 - Very Good; 3 – Good; 2 – Satisfactory; 1 - Poor

|  |  |  |
| --- | --- | --- |
| **Assessment Criteria** | **Score** | **Comments if any** |
| a. Relevance with the content |  |  |
| b. Use of resource material |  |
| c. Organization & mechanical accuracy |  |
| d. Cohesion & coherence |  |
| e. Language proficiency & Timely submission |  |
| **Total Score** |  |

## Signature of the Student with Date:

**Note**: Subject teacher should try to cover all assignments mentioned in the list for each practical subject by assigning the topics to the students. Students should be encouraged to submit an assignment (in a format decided by the Institute) and encouraged to present assignments (at least any one assignment per subject) in the class**.**

**Appendix – 2**

**A typical format for the assessment of a Field Visit Report**

**Name of the College:**

|  |  |
| --- | --- |
| **Name of the Student:** |  |
| **Academic Year of the Student:** |  |
| **Name of the Subject:** |  |
| **Name & full address of the organization visited:** |  |
| **Date and Duration of Visit:** |  |
| **Name & Designation of the Evaluator:** |  |
| **Signature of the Evaluator with Date:** |  |

|  |
| --- |
| **Objectives set for the field visit: (give 2 – 4 objectives one by one)** |
| **Prior preparation of the student for the field visit: (minimum 100 words)** |
| **Describe the general experiences during the field visit: (minimum 100 words)** |
| **Learning points: Describe what theoretical concept that is correlated during the field visit: (minimum 300 words)** |

**Appendix – 3**

**List of Instruments and Equipment required for the Conduct of D.Pharm program as per ER-2020**

## As per ER 2020 regulation;

At least four laboratories specified below should be provided for:

* 1. Pharmaceutics Lab.
  2. Pharm. Chemistry Lab.
  3. Physiology, Pharmacology and Pharmacognosy Lab.
  4. Biochemistry, Clinical Pathology, Hospital and Clinical Pharmacy Lab.

The institutions shall provide “Model Pharmacy” as per following details

|  |  |  |
| --- | --- | --- |
| **Model Pharmacy** | **No.** | **Area** |
| **Essential:** | 01 | 80 Sq. Mts. (Including 10 Sq. mt. for Drug Information Centre & 10 Sq. mt. for Patient Counselling) |
| Running Model Community Pharmacy |  |
| **Desirable**: |  |
| Drug Model Store |  |

**NOTE**: Wherever animal experimentations are prescribed in the curriculum, the required knowledge and skill should be imparted by using computer assisted modules. Animal hold area shall be as per the Committee for the Purpose of Control and Supervision of Experiments on Animals (CPCSEA) guidelines.

Practical of Social Pharmacy, Pharmacotherapeutics can be conducted in any one of the laboratories by making necessary provisions.

**Department wise List of Minimum Equipment required for D.Pharm (For a practical batch of 20 students)**

1. **Physiology, Pharmacology and Pharmacognosy Lab.**

|  |  |  |
| --- | --- | --- |
| **S. No.** | **Name** | **Minimum required Nos. for DPharm 60 intake** |
| 1 | Microscopes | 20 |
| 2 | Haemocytometer with Micropipettes | 20 |
| 3 | Sahli’s haemoglobinometers | 20 |
| 4 | Sphygmomanometers | 5 |
| 5 | Stethoscopes | 10 |
| 6 | Human Permanent Slides for various tissues | One pair of each tissue Organs and endocrine  glands |
| 7 | Models for various organs | One model of each organ  system |
| 8 | Specimen for various organs and systems | One model for each organ system |
| 9 | Human Skeleton and bones | One set of skeleton and  one spare bone |
| 10 | Different Contraceptive Devices and Models | One set of each device |
| 11 | Digital Balance (10 mg Sensitivity) | 1 |
| 12 | Computer with LCD | 1 |
| 13 | Licensed Software packages for Physiological  & Pharmacological experiment | 1 |
| 14 | IR Thermometer | 2 |
| 15 | Refrigerator | 1 |
| 16 | First aid equipment | Adequate number |
| 17 | Stop watch | 20 |
| 18 | Dummy Inhalers and Nebulizer | 1 |
| 19 | Pharmacotherapeutic charts for various diseases & disorders | Adequate number |
| 20 | Surgical devices and Sutures | Adequate number |
| 21 | Digital BP Instrument | 5 |
| 22 | Mercury Thermometer | 10 |
| 23 | Digital Thermometer | 10 |
| 24 | Pulse Oximeter | 5 |
| 25 | ESR Apparatus (Westergren and Wintrobe) | 10 |
| 26 | Peak Flow meter | 10 |
| 27 | Stadiometer | 2 |
| 28 | Adult Weighing Scale (150 kg) | 5 |
| 29 | Glucometer | 10 |
| 30 | Projection microscope | 1 |
| 31 | Permanent slide set of plants and charts for  Pharmacognosy Lab | Adequate number |
| 32 | Drug information resources | Adequate number |
| 33 | Various types of PPE Kits, | Adequate number |

|  |  |  |
| --- | --- | --- |
| 34 | Charts /displays/ AVs on tobacco control, glycemic index of foods, nutrition, reproductive health | Adequate number |
| 35 | Menstrual hygiene products | Adequate number |
| 36 | Display for various disinfectants, mosquito  repellents etc | Adequate number |
| 37 | Water Testing Kit | Adequate number |
| 38 | Permanent slide of different microbes | Adequate number |

**NOTE:** Adequate number of glassware commonly used in the laboratory should be provided in each laboratory and department

## Pharmaceutical Chemistry/ Biochemistry, Clinical Pathology

|  |  |  |
| --- | --- | --- |
| **S. No.** | **Name** | **Minimum required Nos.**  **for DPharm 60 intake** |
| 1 | Hot plates | 5 |
| 2 | Hot Air Oven | 1 |
| 3 | Refrigerator | 1 |
| 4 | Analytical Balances for demonstration | 1 |
| 5 | Digital balance 10mg sensitivity | 5 |
| 6 | Magnetic Stirrers with Thermostat | 10 |
| 7 | Vacuum Pump | 1 |
| 8 | Digital pH meter | 1 |
| 9 | Wall Mounted Water Distillation Unit | 2 |
| 10 | Nessler’s Cylinders | 40 |
| 11 | Digital Melting Point Apparatus | 2 |
| 12 | Thieles Tube | 20 |
| 13 | Digital Colorimeter | 2 |
| 14 | Thermostatic Water Bath | 1 |

**NOTE:** Adequate number of glassware commonly used in the laboratory should be provided in each laboratory and department

## Pharmaceutics

|  |  |  |
| --- | --- | --- |
| **S. No.** | **Name** | **Minimum required Nos.**  **for DPharm 60 intake** |
| 1 | Digital balance (10mg) | 5 |
| 2 | Microscopes | 10 |
| 3 | Autoclave | 1 |
| 4 | Vacuum Pump | 1 |
| 5 | Standard sieves, sieve no. 8, 10, 12,22,24,  44, 54, 60, 80, 85, 100, 120 | 10 sets |
| 6 | Tablet dissolution test apparatus IP (Digital  single/double Unit) | 1 |
| 7 | Magnetic stirrer, 500ml and 1 litter capacity with speed control | 5 |

|  |  |  |
| --- | --- | --- |
| 8 | Digital pH meter | 1 |
| 9 | Capsule Counter | 2 |
| 10 | Hot Plate | 2 |
| 11 | Distillation Unit | 1 |
| 12 | Tablet counter – small size | 2 |
| 13 | Hot air oven | 1 |
| 14 | Electric water bath unit | 2 |
| 15 | Stalagmometer | 5 |
| 16 | Desiccator | 5 |
| 17 | Buchner Funnels (Medium) | 10 |
| 18 | Filtration assembly with Vacuum Pump | 1 |
| 19 | Andreasen’s Pipette | 5 |
| 20 | Ointment slab | 20 |
| 21 | Ointment spatula | 20 |
| 22 | Pestle and mortar porcelain | 20 |
| 23 | Refrigerator | 1 |
| 24 | Micrometre slide Eyepiece | 5 |
| 25 | Micrometre slide Stage | 5 |
| 26 | Viscometer Ostwald/Brookfield | 1 |
| 27 | Stop watch | 1 |
| 28 | Sintered glass filter with vacuum | 4 |

**NOTE:** Aseptic cabinet or area should be provided as per Appendix A of ER 2020 Adequate number of glassware commonly used in the laboratory should be provided in each laboratory and department

## Machine Room

|  |  |  |
| --- | --- | --- |
| **S. No.** | **Name** | **Minimum required Nos. for D.Pharm 60 intake** |
| 1 | Capsule filling machine | 1 |
| 2 | Automated Single Station Tablet punching  machine | 1 |
| 3 | Tablet disintegration test apparatus IP  (Digital Single/Double unit) | 1 |
| 4 | Monsanto’s hardness tester | 2 |
| 5 | Pfizer type hardness tester | 2 |
| 6 | Friability test apparatus (Digital  Single/Double unit) | 1 |
| 7 | Sieve shaker with sieve set | 1 |
| 8 | Ointment filling machine | 1 |
| 9 | All-purpose equipment with all accessories | 1 |
| 10 | Bottle washing Machine | 1 |
| 11 | Bottle Sealing Machine | 1 |
| 12 | Liquid Filling Machine | 1 |
| 13 | Ampoule washing machine | 1 |
| 14 | Ampoule filling and sealing machine (Jet  Burner) | 1 |

|  |  |  |
| --- | --- | --- |
| 15 | Clarity test apparatus | 1 |
| 16 | Collapsible tube – Filling and Sealing | 1 |
| 17 | Liquid Mixer | 1 |

**NOTE:** Adequate number of glassware commonly used in the laboratory should be provided in each laboratory and department

## Hospital and Clinical Pharmacy Lab

|  |  |  |
| --- | --- | --- |
| **S. No.** | **Name** | **Minimum required Nos for D.Pharm 60 intake** |
| 1 | Orthopaedical & Surgical Aids such as knee cap, LS belts, abdominal belt, walker, walking  sticks, etc | Adequate Number |
| 2 | Different Types of bandages such as sterile  gauze, cotton, crepe bandages, roll bandage etc | Adequate Number |
| 3 | Mannequins for CPR-1  (with indication Signals) | 2 |
| 4 | Mannequins for injection IV Arm | 2 |
| 5 | Variety of Needles | 20 |
| 6 | Variety of Syringes | 20 |
| 7 | Variety of catheters | 5 |
| 8 | IV set | 20 |
| 9 | Urine Bag | 2 |
| 10 | RYLE’s tube | 2 |
| 11 | Urine pots | 2 |
| 12 | Colostomy bags | 2 |
| 13 | Oxygen masks | 10 |
| 14 | Inventory Software for Retail Pharmacy | 1 |

**NOTE:** Adequate number of glassware commonly used in the laboratory should be provided in each laboratory and department

## Model Pharmacy

|  |  |  |
| --- | --- | --- |
| **S. No.** | **Name** | **Minimum required Nos. for D.Pharm 60 intake (** |
| 1 | * Empty cartons of variety medicines (across variety dosage forms) * Various name plates indicating different parts of Pharmacy, * Proper arrangement of medicines, shelves, racks, drawers * Box/area for expiry medicines, * Display windows, shelves * Computer * Refrigerator * Designated patient counselling area, * Patient Information .Leaflets/Cards * Patient waiting area, * Drug Information books * Health information display, * Various devices for screening services (B.P. monitor, glucometer etc) * Height and body weight chart * Dummy devices (eg. Inhalers) * Display of pharmacist registration, license and other licenses * Display of name of owner * Inspection book, * Lock and key arrangement for Schedule X and NDPS medicines, * Bill book (dummy) , Computer stationary for bill printing | Adequate |
| 2 | Computers: hospital and community pharmacy management software | 1 |
|  |  |  |

**APPENDIX 4**

## Subject wise list of Recommended Books (Latest Edition) Pharmaceutics

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

## Pharmaceutical Chemistry

* + 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

## Pharmacognosy

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

## Human Anatomy and Physiology

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 P Sambulingam
8. Ranade V.G. Text Book of Practical Physiology
9. Goyal R.K., Natvar M.P. and Shah S.A., Practical Anatomy, Physiology and Biochemistry, Experimental Physiology

## Social Pharmacy

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. Textbook by Dandiya PC, Zafer ZYK, Zafer A. Health education & Community Pharmacy. Vallabh Prakashan.
7. Websites of Ministry of Health and Family Welfare, National Health Portal
8. Pharmacists at the Frontlines: A Novel Approach at Combating TB [www.ipapharma.org](http://www.ipapharma.org/) Visit Publications
9. Where There Is No Doctor: A Village Health Care Handbook by David Werner

,2015 updated version

1. Various WHO publications [www.who.int](http://www.who.int/)

## Pharmacology

* 1. Pharma 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

## Community Pharmacy and Management

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
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