D.Pharm Syllabus

Year 01

Subjects

Subject	PDF page	Open
Pharmaceutics	2	Click here
Pharmaceutical Chemistry	4	Click here
Pharmacognosy	7	Click here
Human Anatomy and Physiology	9	Click here
Social Pharmacy	12	Click here

ER20-11T / ER20-11P - Pharmaceutics

Theory

Chapter 1

- 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

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

Chapter 3

- Pharmaceutical aids: Organoleptic (Colouring, flavouring, and sweetening) agents Preservatives: Definition, types with examples and uses

Chapter 4

- Unit operations: Definition, objectives/applications, principles, construction, and workings of:
- Size reduction: hammer mill and ball mill
- Size separation: Classification of powders 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

- Tablets - coated and uncoated, various modified tablets (sustained release, extended-release, fast dissolving, multi-layered, etc.)
- Capsules - hard and soft gelatine capsules
- Liquid oral preparations - solution, syrup, elixir, emulsion, suspension, dry powder for reconstitution
- Topical preparations - ointments, creams, pastes, gels, liniments and lotions, suppositories, and pessaries
- Nasal preparations, Ear preparations
- Powders and granules - Insufflations, dusting powders, effervescent powders, and effervescent granules
- Sterile formulations - Injectables, eye drops and eye ointments
- Immunological products: Sera, vaccines, toxoids, and their manufacturing methods.

Chapter 6

- Basic structure, layout, sections, and activities of pharmaceutical manufacturing plants Quality control and quality assurance: Definition and concepts of quality control and quality assurance, current good manufacturing practice (cGMP), Introduction to the concept of calibration and validation

Chapter 7

- Novel drug delivery systems: Introduction, Classification with examples, advantages, and challenges

Practical

- Handling and referring the official references: Pharmacopoeias, Formularies, etc.
- for retrieving formulas, procedures, etc.
- Formulation of the following dosage forms as per monograph standards and dispensing with appropriate packaging and labelling
- Liquid Oral: Simple syrup, Piperazine citrate elixir, Aqueous Iodine solution
- Emulsion: Castor oil emulsion, Cod liver 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 granules, Dusting powder
- Sterile Injection: Normal Saline, Calcium gluconate Injection
- Hard Gelatine Capsule: Tetracycline capsules
- Tablet: Paracetamol tablets
- Formulation of commonly used cosmetic preparations - e.g. cold cream, shampoo, lotion, toothpaste etc
- Demonstration on various stages of tablet manufacturing processes
- Appropriate methods of usage and storage of all dosage forms including special dosage such as different types of inhalers, spacers, insulin pens
- Demonstration of quality control tests and evaluation of common dosage forms viz. tablets, capsules, emulsion, sterile injections as per the monographs

ER20-12T / ER20-12P - Pharmaceutical Chemistry

Theory

Chapter 1

- Introduction to Pharmaceutical chemistry. 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

- 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

- Inorganic
- Pharmaceuticals: Pharmaceutical formulations, market preparations, storage conditions and uses of ● Haematinics: Ferrous sulphate, Ferrous fumarate, Ferric ammonium citrate, Ferrous ascorbate, Carbonyl iron ● Gastro-intestinal
- Agents: Antacids :Aluminium hydroxide gel, Magnesium hydroxide, Magaldrate, Sodium bicarbonate, Calcium Carbonate, Acidifying agents, Adsorbents, Protectives, Cathartics ● Topical 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

- 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

- 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

- 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

- 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

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

Chapter 9

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

Chapter 10

- 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

- 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, Sulfametho xazole, Sulfacetamide*, Mafenide Acetate, Cotrimoxazole, Dapsone*

Chapter 12

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

Chapter 13

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

Practical

- No. Experiment 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, 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 iodometry ● Ibuprofen by alkalimetry 5 Fundamentals of preparative organic chemistry Determination of Melting point and boiling point of organic compounds 6 Preparation of organic compounds
- Benzoic acid from Benzamide
- Picric acid from Phenol 7 Identification and test for purity of pharmaceuticals Aspirin, Caffeine, Paracetamol, Sulfanilamide 8 Systematic Qualitative analysis experiments (4 substances)

ER20-13T / ER20-13P - Pharmacognosy

Theory

Chapter 1

- Definition, history, present status and scope of Pharmacognosy

Chapter 2

- Classification of drugs: ● Alphabetical ● Taxonomical ● Morphological ● Pharmacological ● Chemical ● Chemo-taxonomical

Chapter 3

- Quality control of crude drugs: ● Different methods of adulteration of crude drugs ● Evaluation of crude drugs

Chapter 4

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

Chapter 5

- Biological source, chemical constituents and therapeutic efficacy of the following categories of crude drugs.
- Aloe, Castor oil, Ispaghula, Senna
- Digitalis, Arjuna
- Coriander, Fennel, Cardamom, Ginger, Clove, Black Pepper, Asafoetida, Nutmeg, Cinnamon
- Myrobalan, Black Catechu, Pale Catechu
- Hyoscyamus, Belladonna, Ephedra, Opium, Tea leaves, Coffee seeds, Coca
- Anti-hypertensive
- Vasaka, Tolu Balsam
- Anti-rheumatics
- Vinca, Podophyllum
- Pterocarpus, Gymnema
- Gokhru, Punarnava
- Anti-dysenteric
- Benzoin, Myrrh, Neem, Turmeric
- Cinchona, Artemisia
- Oxytocic
- Cod liver oil, Shark liver oil
- Papaya, Diastase, Pancreatin, Yeast

- Kaolin, Lanolin, Beeswax, Acacia, Tragacanth, Sodium alginate, Agar, Guar gum, Gelatine
- Squill, Galls, Ashwagandha, Tulsi, Guggul

Chapter 6

- Plant fibres used as surgical dressings: Cotton, silk, wool and regenerated fibres Sutures - Surgical Catgut and Ligatures

Chapter 7

- ● 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

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

Chapter 9

- 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

- Introduction to herbal formulations

Chapter 11

- 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 12

- Phytochemical investigation of drugs

Practical

- Morphological Identification of the following drugs: Ispaghula, Senna, Coriander, Fennel, Cardamom, Ginger, Nutmeg, Black Pepper, Cinnamon, Clove, Ephedra, Rauwolfia, Gokhru, Punarnava, Cinchona, Agar.
- Gross anatomical studies (Transverse Section) of the following drugs: Ajwain, Datura, Cinnamon, Cinchona, Coriander, Ashwagandha, Liquorice, Clove, Curcuma, Nux vomica, Vasaka
- 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.

ER20-14T / ER20-14P - Human Anatomy and Physiology

Theory

Chapter 1

- Scope of Anatomy and Physiology Definition of various terminologies

Chapter 2

- Structure of Cell: Components and its functions

Chapter 3

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

Chapter 4

- Osseous system: structure and functions of bones of axial and appendicular skeleton Classification, types and movements of joints, disorders of joints

Chapter 5

- 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

- Lymphatic system ● Lymph and lymphatic system, composition, function and its formation.
- ● Structure and functions of spleen and lymph node.

Chapter 7

- 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

- Respiratory system ● Anatomy of respiratory organs and their functions.
- ● Regulation, and Mechanism of respiration.
- ● Respiratory volumes and capacities - definitions

Chapter 9

- Digestive system ● Anatomy and Physiology of the GIT ● Anatomy and functions of accessory glands ● Physiology of digestion and absorption

Chapter 10

- Skeletal muscles ● Histology ● Physiology of muscle contraction ● Disorder of skeletal muscles

Chapter 11

- 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

- Sense organs - Anatomy and physiology of ● Eye ● Ear ● Skin ● Tongue ● Nose

Chapter 13

- Urinary system ● Anatomy and physiology of urinary system ● Physiology of urine formation ● Renin - angiotensin system ● Clearance tests and micturition

Chapter 14

- Endocrine system (Hormones and their functions) ● Pituitary gland ● Adrenal gland ● Thyroid and parathyroid gland ● Pancreas and gonads

Chapter 15

- Reproductive system ● Anatomy of male and female reproductive system ● Physiology of menstruation ● Spermatogenesis and Oogenesis ● Pregnancy and parturition

Practical

- Study of compound microscope
- General techniques for the collection of blood
- Microscopic examination of Epithelial tissue, Cardiac muscle, Smooth muscle, Skeletal muscle, Connective tissue, and Nervous tissue of ready / pre-prepared slides.
- Study of Human Skeleton-Axial skeleton and appendicular skeleton
- Determination of
- Blood group
- ESR
- Haemoglobin content of blood
- Bleeding time and Clotting time
- Determination of WBC count of blood
- Determination of RBC count of blood
- Determination of Differential count of blood
- Recording of Blood Pressure in various postures, different arms, before and after exertion and interpreting the results
- Recording of Body temperature (using mercury, digital and IR thermometers at various locations), Pulse rate/ Heart rate (at various locations in the body, before and after exertion), Respiratory Rate
- Recording Pulse Oxygen (before and after exertion)
- Recording force of air expelled using Peak Flow Meter

- Measurement of height, weight, and BMI
- Study of various systems and organs with the help of chart, models, and specimens
- Cardiovascular system
- Respiratory system
- Digestive system
- Urinary system
- Endocrine system
- Reproductive system
- Nervous system
- Eye
- Ear
- Skin SOCIAL PHARMACY - THEORY

ER20-15T / ER20-15P - Social Pharmacy

Theory

Chapter 1

- 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)
- Public and Private Health System in India, National Health Mission (2)
- Introduction to Millennium Development Goals, Sustainable Development Goals, FIP Development Goals (1)

Chapter 2

- 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 (4)
- 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 (7)
- 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

- Nutrition and Health
- Basics of nutrition - Macronutrients and Micronutrients
- Importance of water and fibres in diet (1)
- Balanced diet, Malnutrition, 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

- Introduction to Microbiology and common microorganisms Epidemiology: Introduction to epidemiology, and its applications. Understanding of terms such as epidemic, pandemic, endemic, mode of transmission, outbreak, quarantine, isolation, incubation period, contact tracing, morbidity, mortality, . (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 (7)
- Intestinal infections - poliomyelitis, viral hepatitis, cholera, acute diarrheal diseases, typhoid, amebiasis, worm infestations, food poisoning (7)
- Arthropod-borne infections - dengue, malaria, filariasis and, chikungunya (4)
- Surface infections - trachoma, tetanus, leprosy (2)
- STDs, HIV/AIDS (3)

Chapter 5

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

Chapter 6

- Pharmacoeconomics - Introduction, basic terminologies, importance of pharmacoeconomics

Practical

- National immunization schedule for children, adult vaccine schedule, Vaccines which are not included in the National Immunization Program.
- RCH - reproductive and child health - nutritional aspects, relevant national health programmes.
- Family planning devices
- Microscopical observation of different microbes (readymade slides)
- Oral Health and Hygiene
- Personal hygiene and etiquettes - hand washing techniques, Cough and sneeze etiquettes.
- Various types of masks, PPE gear, wearing/using them, and disposal.
- Menstrual hygiene, products used
- First Aid - Theory, basics, demonstration, hands on training, audio-visuals, and practice, BSL (Basic Life Support) Systems [SCA - Sudden Cardiac Arrest, FBAO - Foreign Body Airway Obstruction, CPR, Defibrillation (using AED) (Includes CPR techniques, First Responder).
- Emergency treatment for all medical emergency cases viz. snake bite, dog bite, insecticide poisoning, fractures, burns, epilepsy etc.
- Role of Pharmacist in Disaster Management.
- Marketed preparations of disinfectants, antiseptics, fumigating agents, antilarval agents, mosquito repellents, etc.

- Health Communication: Audio / Video podcasts, Images, Power Point Slides, Short Films, etc. in regional language(s) for mass communication / education / Awareness on 5 different communicable diseases, their signs and symptoms, and prevention.
- Water purification techniques, use of water testing kit, calculation of Content/percentage of KMnO4, bleaching powder to be used for wells/tanks
- Counselling children on junk foods, balanced diets - using Information, Education and Communication (IEC), counselling, etc. (Simulation Experiments).
- Preparation of various charts on nutrition, sources of various nutrients from Locally available foods, calculation of caloric needs of different groups (e.g.
- child, mother, sedentary lifestyle, etc.). Chart of glycemic index of foods.
- Tobacco cessation, counselling, identifying various tobacco containing products through charts/pictures

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