D Pharm 1st year: Pharmaceutics

Ch	Topics	Hours
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	7
2	**Packaging materials**: Types, selection criteria,advantages and disadvantages of glass, plastic, metal, rubber as packaging materials	5
3	**Pharmaceutical aids:** Organoleptic (Colouring, flavouring,and sweetening) agents. ● **Preservatives:** Definition, types with examples and uses	3
4	**Unit operations:** Definition, objectives/applications, principles, construction, and workings of:	9
	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	
5	**Tablets** – coated and uncoated, various modified tablets (sustained release, extended-release, fast dissolving, multi-layered, etc.)	8
	Capsules - hard and soft gelatine capsules	4
	Liquid oral preparations - solution, syrup, elixir, emulsion, suspension, dry powder for reconstitution	6
	Topical preparations - ointments, creams, pastes, gels, liniments and lotions, suppositories, and pessaries	8
	Nasal preparations, Ear preparations	2
	Powders and granules - Insufflations, dusting powders, Effervescent powders, and effervescent granules	3
	Sterile formulations – Injectables, eye drops and eye ointments	6
	Immunological products: Sera, vaccines, toxoids, and their manufacturing methods.	4
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	5
7	**Novel drug delivery systems:** Introduction, Classification with examples, advantages, and challenges -	5

Study of dosage forms, formulation aspects, advantages, disadvantages, and quality control tests

D Pharm 1st year: Pharmacognosy

Ch	Topic		Hours
1	Definition, history, present status and scope of Pharmacognosy		2
2	**Classification of drugs:** ● Alphabetical; ● Taxonomical; ● Morphological; ● Pharmacological; ● Chemical; ● Chemo-taxonomical		4
3	**Quality control of crude drugs:** ● Different methods of adulteration of crude drugs; ● Evaluation of crude drugs		6
4	Brief outline of occurrence, distribution, isolation, identification tests, therapeutic activity and pharmaceutical applications of alkaloids, terpenoids, glycosides, volatile oils, tannins and resins.		6
5	Biological source, chemical constituents and therapeutic efficacy of the following categories of crude drugs.		30
	Laxatives	Aloe, Castor oil, Ispaghula, Senna	
	Cardiotonic	Digitalis, Arjuna	
	Carminatives and G.I. regulators	Coriander, Fennel, Cardamom, Ginger, Clove, Black Pepper, Asafoetida, Nutmeg, Cinnamon	
	Astringents	Myrobalan, Black Catechu, Pale Catechu	
	Drugs acting onnervous system	Hyoscyamus, Belladonna, Ephedra, Opium, Tea leaves,Coffee seeds, Coca	
	Anti-hypertensive	Rauwolfia	
	Anti-tussive	Vasaka, Tolu Balsam	
	Anti-rheumatics	Colchicum seed	
	Anti-tumour	Vinca, Podophyllum	
	Antidiabetics	Pterocarpus, Gymnema	
	Diuretics	Gokhru, Punarnava	
	Anti-dysenteric	Ipecacuanha	
	Antiseptics &disinfectants	Benzoin, Myrrh, Neem, Turmeric	
	Antimalarials	Cinchona, Artemisia	
	Oxytocic	Ergot	
	Vitamins	Cod liver oil, Shark liver oil	
	Enzymes	Papaya, Diastase, Pancreatin, Yeast	
	PharmaceuticalAids	Kaolin, Lanolin, Beeswax, Acacia, Tragacanth, Sodium alginate, Agar,Guar gum, Gelatine	
	Miscellaneous	Squill, Galls, Ashwagandha, Tulsi, Guggul	
6	**Plant fibres used as surgical dressings:** Cotton, silk, wooland regenerated fibres; Sutures – Surgical Catgut and Ligatures		3
7	● Basic principles involved in the traditional systems ofmedicine like**:** Ayurveda, Siddha, Unani and Homeopathy ● Method of preparation of Ayurvedic formulations like**:** Arista, Asava, Gutika, Taila, Churna, Lehya and Bhasma		8
8	Role of medicinal and aromatic plants in national economy and their export potential		2
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		4
10	Introduction to herbal formulations		4
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		4
12	Phytochemical investigation of drugs		2

D Pharm 1st year: Human Anatomy and Physiology

Ch	Topic	Hrs
1	**Scope of Anatomy and Physiology**; Definition of various terminologies	2
2	**Structure of Cell**: Components and its functions	2
3	**Tissues of the human body**: Epithelial, Connective, Muscular and Nervous tissues. Their sub-types and characteristics.	4
4	**Osseous system**: Structure and functions of bones of axial and appendicular skeleton Classification, types and movements of joints, disorders of joints	3
5	**Haemopoietic system** ● Composition and functions of blood; ● Process of Hemopoiesis; ●Mechanism of Blood Clotting; ● Characteristics and functions of RBCs, WBCs, and platelets;●Importance of Blood groups;	8
6	**Lymphatic system** ●Lymph and lymphatic system, composition, function and its formation; ●Structure and functions of spleen and lymph node.	3
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.	8
8	**Respiratory system** ●Anatomy of respiratory organs and their functions; ●Regulation, and Mechanism of respiration; ●Respiratory volumes and capacities – definitions.	4
9	**Digestive system** ●Anatomy and Physiology of the GIT ; ●Anatomy and functions of accessory glands ●Physiology of digestion and absorption	8
10	**Skeletal muscles** ●Histology; ●Physiology of muscle contraction; ●Disorder of skeletal muscles	2
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)	8
12	**Sense organs - Anatomy and physiology of** ●Eye; ●Ear; ●Skin; ●Tongue; ●Nose	6
13	**Urinary system** ●Anatomy and physiology of urinary system; ●Physiology of urine formation; ●Renin - angiotensin system; ●Clearance tests and micturition	4
14	**Endocrine system (Hormones and their functions)** ●Pituitary gland; ●Adrenal gland; ●Thyroid and parathyroid gland; ●Pancreas and gonads	6
15	**Reproductive system** ●Anatomy of male and female reproductive system; ●Physiology of menstruation; ●Spermatogenesis and Oogenesis; ●Pregnancy and parturition	4

D Pharm 1st year: Social Pharmacy

Ch	Topic	Hrs
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, NationalHealth Mission (2) ● **Introduction to Millennium Development** Goals,Sustainable Development Goals, FIP Development Goals (1)	**9**
2	**Preventive healthcare – Role of Pharmacists in thefollowing** ●**Demography and Family Planning** (3) ●**Mother and child health**, importance of breast feeding, illeffects 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)	**18**
3	**Nutrition and Health** ●**Basics of nutrition** – Macronutrients and Micronutrients (3) ●**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)	10
4	**Introduction to Microbiology** and common microorganisms (3) **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)	28
5	**Introduction to health systems** and all ongoing National Health programs in India, their objectives, functioning, outcome, and the role of pharmacists.	8
6	**Pharmacoeconomics** – Introduction, basic terminologies, importance of pharmacoeconomics	2

D Pharm 1st year: Pharmaceutical Chemistry

Ch	Topic	Hours
1	**Introduction to Pharmaceutical chemistry:** Scope and objectives **Sources and types of errors:** Accuracy, precision, significant figures **Impurities in Pharmaceuticals**: Source and effect of impurities in Pharmacopoeial substances, importance of limit test, Principle and procedures of Limit tests for chlorides, sulphates, iron, heavy metals and arsenic.	8
2	**Volumetric analysis**: Fundamentals of volumetric analysis, Acid-base titration, non-aqueous titration,precipitation titration, complexometric titration, redox titration. **Gravimetric analysis:** Principle and method.	8
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	7
4	Introduction to nomenclature of organic chemical systems with particular reference to heterocyclic compounds containing up to Three rings.	2
	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.	
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	9

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*	**9**
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	**5**
8	**Diuretics:**Acetazolamide,Frusemide*, Bumetanide, Chlorthalidone, Benzthiazide, Metolazone, Xipamide,Spironolactone	**2**
9	**Hypoglycemic Agents**: Insulin and Its Preparations, Metformin*,Glibenclamide*, Glimepiride, Pioglitazone,Repaglinide, Gliflozins, Gliptins	**3**
10	**Analgesic And Anti-Inflammatory Agents:** Morphine Analogues, Narcotic Antagonists; Nonsteroidal Anti- Inflammatory Agents (NSAIDs) - Aspirin*, Diclofenac, Ibuprofen*, Piroxicam, Celecoxib, Mefenamic Acid, Paracetamol*, Aceclofenac	**3**
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, Sulfamethoazole, Sulfacetamide*, Mafenide Acetate, Cotrimoxazole, Dapsone*	**8**
12	**Antibiotics:** Penicillin G, Amoxicillin*, Cloxacillin, Streptomycin, ***Tetracyclines***: Doxycycline, Minocycline, ***Macrolides:*** Erythromycin, Azithromycin, ***Miscellaneous:***Chloramphenicol* Clindamycin	**8**
13	***Anti-Neoplastic Agents***: Cyclophosphamide*, Busulfan, Mercaptopurine, Fluorouracil*, Methotrexate, Dactinomycin, Doxorubicin Hydrochloride, Vinblastine Sulphate, Cisplatin*, Dromostanolone Propionate	**3**

ER-2020 D. Pharm Syllabus – Part I

S. No.	Course Code	Subject	In hours			
			Th / Pr	Tutorial	Hrs/Wk	Tu/Wk
1.	ER20-11T	Pharmaceutics–**Th**eory	75	25	3	1
2.	ER20-11P	Pharmaceutics–**Pr**actical	75	-	3	-
3.	ER20-12T	Pharmaceutical Chem–Th	75	25	3	1
4.	ER20-12P	Pharmaceutical Chem–Pr	75	-	3	-
5.	ER20-13T	Pharmacognosy-Th	75	25	3	1
6.	ER20-13P	Pharmacognosy–Pr	75	-	3	-
7.	ER20-14T	Human Anatomy & Physiology(HAP) —Th	75	25	3	1
8.	ER20-14P	HAP –Pr	75	-	3	-
9.	ER20-15T	Social Pharmacy –Th	75	25	3	1
10.	ER20-15P	Social Pharmacy – Pr	75	-	3	-

Assignments & Field Visit

SN	Code	Name of the Course	Assignments	Field Visit
1.	ER20-11P	Pharmaceutics–**Pr**actical	03	01(industrial)
2.	ER20-12P	Pharmaceutical Chem–Pr	03	--
3.	ER20-13P	Pharmacognosy–Pr	03	01(Medicinal garden)
4.	ER20-14P	HAP –Pr	--	--
5.	ER20-15P	Social Pharmacy – Pr	03	03

Sessional Examinations

There shall be two or more periodic sessional (internal assessment) examinations during each academic year. The duration of the sessional exam shall be 90 minutes. The highest aggregate of any two performances shall form the basis of calculating the sessional marks. The scheme of the question paper for theory sessional examinations shall be as given below.

I.	Long Answers (Answer 3 out of 4)	3 x 5 = 15
II.	Short Answers (Answer 5 out of 6)	5 x 3 = 15
III.	Objective type Answers (Answer all 10 out of 10) (Multiple Choice Questions / Fill-in the Blanks / One word OR one Sentence questions)	10 x 1 =10
	Total	40 marks

Internal assessment: The marks secured by the students out of the total 40 shall be reduced to 20 in each sessional, and then the internal assessment shall be calculated based on the best two averages for 20 marks.