D. Pharm. Part I

D.Ph. 101T	Pharmaceutics-I, Theory	75 Hrs

Unit-I

1. Introduction to different dosage forms, their classification with examples—their relative applications. Familiarization with new drug delivery systems.
2. Introduction to Pharmacopoeias with special reference to the Indian Pharmacopoeia.
3. Size reduction—objectives and factors affecting size reduction, methods of size reduction. Study of hammer mill, ball mill, fluid energy mill and disintegrator.
4. Size separation—size separation by sifting. Official standards for powders. Sedimentation methods of size separation. Construction and working of cyclone separator.

Unit-II

5. Metrology—system of weights and measures. Calculations including conversion from one to another system. Percentage calculations and adjustment of products. Use of alligation method in calculations. Isotonic solutions.
6. Mixing and homogenization—liquid mixing and powder mixing. Mixing of semisolids. Study of silverson mixer homogensier, planetary mixer; agitated powder mixer; triple roller mill; propeller mixer, colloid mill and hand homogenizer, double cone mixer.
7. Packaging of pharmaceuticals—desirable features of a container-types of containers. Study of glass and plastics as materials for containers and rubber as a material for closure-their merits and demerits. Introduction to aerosol packaging.

Unit-III

8. Extraction and galenicals—(a) Study of percolation and maceration and their modification, continuous hot extraction—applications in the preparation of tinctures and extracts. (b) Introduction to ayurvedic dosage forms.
9. Clarification and filtration—theory of filtration, filter media; filter aids and selection of filters. Study of the following filtration equipments—filter press, sintered filters, filter candles, metafilter.
10. Heat processes—evaporation-definition, factors affecting evaporation—study of evaporating still and evaporating pan.

11. Introduction to drying processes—study of tray dryers, fluidized bed dryer, vacuum dryer and freeze dryer.

Unit-IV

12. Distillation—simple distillation and fractional distillation, steam distillation and vacuum distillation. Study of vacuum still, preparation of purified water I.P. and water for injection I.P. Construction and working of the still used for the same.
13. Sterilization—concept of sterilization and its differences from disinfection—thermal resistance of micro-organisms. Detailed study of the following sterilization processes.

(i) Sterilization with moist heat,

(ii) Dry heat sterilization,

(iii) Sterilization by radiation,

(iv) Sterilization by filtration and

(v) Gaseous sterilization.

Aseptic techniques, applications of sterilization processes in hospitals particularly with reference to surgical dressings and intravenous fluids. Precautions for safe and effective handling of sterilization equipment.

Unit-V

14. Study of immunological products like sera, vaccines, toxoids and their preparations.
15. Processing of tablets—definition; different type of compressed tablets and their properties. Processes involved in the production of tablets; tablets excipients; defects in tablets; evaluation of tablets; physical standards including disintegration and dissolution. Tablet coating-sugar coating; film coating, enteric coating and microencapsulation (tablet coating may be dealt in an elementary manner).
16. Processing of capsules—hard and soft gelatin capsules; different sizes of capsules; filling of capsules; handling and storage of capsules. Special applications of capsules.

D.Ph. 102P	**Pharmaceutics-I, Practical**	**100 Hrs**

Preparations (minimum number stated against each of the following categories illustrating different techniques involved)

1. Aromatic water (3)
2. Solutions (4)
3. Spirits (2)
4. Tinctures (4)
7. Cosmetic preparations (3)
8. Capsules (2)
9. Tablets (2)
10. Preparations involving sterilization (2)

5. Extracts (2)
6. Creams (2)
11. Ophthalmic preparations (2)
12. Preparations involving aseptic techniques (2)

D.Ph. 103T	Pharmaceutical Chemistry-I, Theory	75 Hrs

1. General discussion on the following inorganic compounds including important physical and chemical properties, medicinal and pharmaceutical uses, storage conditions and chemical incompatibility.

Unit-I

(A) Acids, bases and buffers—boric acid*, calcium hydroxide, hydrochloric acid, strong ammonium hydroxide, sodium hydroxide and official buffers.

(B) Gastrointestinal agents—

(i) Acidifying agents—dilute hydrochloric acid.

(ii) Antacids—sodium bicarbonate, aluminium hydroxide gel, aluminium phosphate, calcium carbonate, magnesium carbonate, magnesium trisilicate, magnesium oxide, combinations of antacid preparations.

(iii) Protectives and adsorbents—bismuth subcarbonate and kaolin.

(iv) Saline cathartics—sodium potassium tartrate and magnesium sulphate.

Unit-II

(C) Antioxidants—hypophosphorous acids, sulphur dioxide, sodium bisulphite, sodium metabisulphite, sodium thiosulphate, nitrogen and sodium nitrite.

(D) Topical agents—

(i) Protectives—talc, zinc oxide, calamine, zinc stearate, titanium dioxide, silicone polymers.

(ii) Antimicrobials and astringents—hydrogen peroxide*, potassium permanganate, chlorinated lime, Iodine, solutions of iodine, povidone iodine, boric acid, borax, silver nitrate, mild silver protein, mercury, yellow mercuric oxide, ammoniated mercury.

(iii) Sulphur and its compounds—sublimed sulphur, precipitated sulphur, selenium sulfide.

(iv) Astringents—alum and zinc sulphate.

Unit-III

(E) Dental products—sodium fluoride, stannous fluoride, calcium carbonate, sodium metaphosphate, dicalcium phosphate, strontium chloride, zinc chloride.

(F) Inhalants—oxygen, carbon dioxide, nitrous oxide.

(G) Respiratory stimulants—ammonium carbonate.

(H) Expectorants and emetics—ammonium chloride*, potassium iodide, antimony potassium tartrate.

(I) Antidotes—sodium nitrite.

2. Major intra and extracellular electrolytes—

(A) Electrolytes used for replacement therapy—sodium chloride and its preparations, potassium chloride and its preparations.

(B) Physiological acid-base balance and electrolytes used—sodium acetate, potassium acetate, sodium bicarbonate injection, sodium citrate, potassium citrate, sodium lactate injection, ammonium chloride and its injection.

(C) Combination of oral electrolyte powders and solutions.

Unit-IV

3. Inorganic official compounds of iron, iodine and calcium; ferrous sulfate and calcium gluconate.

4. Radio pharmaceuticals and contrast media-radioactivity-alpha; beta and gamma radiations, biological effects of radiations, measurement of radioactivity, G.M. counter; radio isotopes—their uses, storage and precautions with special reference to the official preparations. Radio opaque contrast media—barium sulfate.

5. Identification tests for cations and anions as per Indian Pharmacopoeia.

Unit-V

6. Quality control of drugs and pharmaceuticals—importance of quality control, significant errors, methods used for quality control, sources of impurities in pharmaceuticals, limit tests for arsenic, chlorides, sulfates, iron and heavy metals.

D.Ph. 104P	**Pharmaceutical Chemistry-I, Practical**	**75 Hrs**

1. Identification tests for inorganic compounds particularly drugs and pharmaceuticals.

2. Limit test for chlorides, sulfates, arsenic, iron and heavy metals.

3. Assay of inorganic pharmaceutical (involving each of the following methods) compounds marked with (*) under theory.

(a) Acid-base titrations (at least 3)

(b) Redox titrations (one each of permanganometry and iodimetry)

(c) Precipitation titrations (at least 2)

(d) Complexometric titrations (calcium and magnesium).

D.Ph. 105T	Pharmacognosy, Theory	75 Hrs

Unit-I

1. Definition, history and scope of pharmacognosy including indigenous system of medicine.
2. Various systems of classification of drugs of natural origin.
3. Adulteration and drug evaluation; significance of pharmacopoeial standards.

Unit-II

4. Brief outline of occurrence, distribution, outline of isolation, identification tests, therapeutic effects and pharmaceutical applications of alkaloids, terpenoids, glycosides, volatile oils, tannins and resins.
5. Occurrence, distribution, organoleptic evaluation, chemical constituents including tests wherever applicable and therapeutic efficacy of following categories of drugs.

(a) Laxatives—aloes, rhubarb, castor oil, ispaghula, senna.

(b) Cardiotonics—digitalis, arjuna.

(c) Carminatives & G.I. regulators—umbelliferous fruits-coriander, fennel, ajowan, cardamom, ginger, black pepper, asafoetida, nutmeg, cinnamon, clove.

Unit-III

(d) Astringents—catechu.

(e) Drugs acting on nervous systems—hyoscyamus, belladonna, aconite, ashwagandha, ephedra, opium, cannabis, nux vomica.

(f) Anithypertensives—rauwolfia.

(g) Antitussives—vasaka, tolu balsam, tulsi.

(h) Antirheumatics—guggal, colchicum.

(i) Antitumour—vinca.

(j) Antileprotics—chaulmoogra oil.

(k) Antidiabetics—pterocarpus, gymnema sylvestro.

(l) Diuretics—gokhru, punarnava.

(m) Antidysenterics—ipecacuanha.

(n) Antiseptics and disinfectants—benzoin, myrrh, neem, curcuma.

(o) Antimalarials—cinchona.

Unit-IV

(p) Oxytocics—ergot.

(q) Vitamins—shark liver oil and amla.

(r) Enzymes—papaya, diastase, yeast.

(s) Perfumes and flavouring agents—peppermint oil, lemon oil, orange oil, lemon grass oil, sandalwood.

(t) Pharmaceutical aids—honey, arachis oil, starch, kaolin, pectin, olive oil, lanolin, beeswax, acacia, tragacanth, sodium alginate, agar, guar gum, gelatin.

(u) Miscellaneous—liquorice, garlic, picrohiza, dioscorea, linseed, shatavari, shankpushpi, pyrethrum, tobacco.

Unit-V

6. Collection and preparation of crude drugs from the market as exemplified by ergot, opium, rauwolfia, digitalis, senna.

7. Study of source, preparation and identification of fibres used in sutures and surgical dressings—cotton, silk, wool and regenerated fibres.

8. Gross anatomical studies of senna, datura, cinnamon, cinchona, fennel, clove, ginger, nuxvomica and ipecacuanha.

D.Ph. 106P	**Pharmacognosy, Practical**	**75 Hrs**

1. Identification of drugs by morphological characters.

2. Physical and chemical tests for evaluation of drugs wherever applicable.

3. Gross anatomical studies (t.s.) of the following drugs : senna, datura, cinnamon, cinchona, coriander, fennel, clove, ginger, nuxvomica, ipecacuanha.

4. Identification of fibers and surgical dressings.

D.Ph. 107T	Biochemistry and Clinical Pathology, Theory	50 Hrs

Unit-I

1. Introduction to biochemistry.
2. Brief chemistry and role of carbohydrates, classification, qualitative tests. Diseases related to carbohydrate metabolism.

Unit-II

3. Brief chemistry and role of proteins, polypeptides and amino acids, classification, qualitative tests, biological value, deficiency diseases.
4. Role of minerals and water in life processes.

Unit-III

5. Brief chemistry and role of lipids, classification, qualitative tests. Diseases related to lipid metabolism.

Unit-IV

6. Brief chemistry and role of vitamins and coenzymes.
7. Enzymes—brief concept of enzymatic action and factors affecting it, therapeutic and pharmaceutical importance.

Unit-V

8. Brief concept of normal and abnormal metabolism of proteins, carbohydrates and lipids.
9. Introduction to pathology of blood and urine.

(a) Lymphocytes and platelets, their role in health and disease.

(b) Erythrocytes, abnormal cells and their significance.

(c) Abnormal constituents of urine and their significance in diseases.

D.Ph. 108P	Biochemistry and Clinical Pathology, Practical	75 Hrs

1. Detection and identification of proteins, amino acids, carbohydrates and lipids.
2. Analysis of normal and abnormal constituents of blood and urine (glucose, urea, creatine, creatinine, cholesterol, alkaline phosphatase, acid phosphatase, bilirubin, SGPT, SGOT, calcium, diastase, lipase).
3. Examination of sputum and faeces (microscopic & staining).
4. Practice in injecting drugs by intramuscular, subcutaneous and intravenous routes, withdrawal of blood samples.

D.Ph. 109T	Human Anatomy and Physiology, Theory	75 Hrs

Unit-I

1. Scope of anatomy and physiology, definition of various terms used in anatomy.
2. Structure of cell, function of its components with special reference to mitochondria and microsomes.
3. Elementary tissues of the body, i.e. epithelial tissue, muscular tissue, connective tissue and nervous tissue.
4. Structure and function of skeleton, classification of joints and their function, joint disorders.

Unit-II

5. Composition of blood, functions of blood elements, blood group and coagulation of blood, brief information regarding disorders of blood.
6. Name and functions of lymph glands.
7. Structure and functions of various parts of the heart, arterial and venous system with special reference to the names and positions of main arteries and veins, blood pressure and its recording, brief information about cardiovascular disorders.

Unit-III

8. Various parts of respiratory system and their functions. Physiology of respiration.
9. Various parts of urinary system and their functions, structure and functions of kidney. Physiology of urine formation. Pathophysiology of renal diseases and oedema.
10. Reproductive system—physiology and anatomy of reproductive system.

Unit-IV

11. Structure of skeletal muscle. Physiology of muscle contraction, names, positions, attachments and functions of various skeletal muscles. Physiology of neuromuscular junction.
12. Various parts of central nervous system, brain and its parts, functions and reflex action. Anatomy and physiology of autonomic nervous system.
13. Elementary knowledge of structure and functions of the organs of taste, smell, ear, eye and skin. Physiology of pain.

Unit-V

14. Digestive system—names of various parts of digestive system and their functions. Structure and functions of liver, physiology of digestion and absorption.
15. Endocrine glands and hormones. Locations of glands, their hormones and functions—pituitary, thyroid, adrenal and pancreas.

D.Ph. 110P	Human Anatomy and Physiology, Practical	50 Hrs

1. Study of the human skeleton.
2. Study with the help of charts and models, of the following system and organs:

(a) Digestive system (b) Respiratory system
(c) Cardiovascular system (d) Urinary system
(e) Reproductive system (f) Nervous system
(g) Eye (h) Ear

3. Microscopic examination of ephithelial tissue, cardiac muscle, smooth muscle, skeletal muscle. Connective tissue and nervous tissues.
4. Examination of blood films for TLC, DLC and malarial parasite.
5. Determination of clotting time of blood, erythrocyte sedimentation rate and haemoglobin value.
6. Recording of body temperature, pulse, heart rate, blood pressure and ECG.

D.Ph. 111T	Health Education and Community	50 Hrs

	Pharmacy, Theory	

Unit-I

1. Concept of health—definition of physical health, mental health, social health, spiritual health, determinants of health, indicators of health, concept of disease, natural history of diseases, the disease agents, concept of prevention of diseases.
2. Environment and health—sources of water supply, water pollution, purification of water, health and air, noise, light—solid waste disposal and control-medical entomology, arthropod borne diseases and their control, rodents, animals and diseases.

Unit-II

3. First aid—emergency treatment in shock, snake bite, burns, poisoning, heart disease, fractures and resuscitation methods. Elements of minor surgery and dressings.
4. Fundamental principles of microbiology—classification of microbes, isolation, staining techniques of organisms of common diseases.

Unit-III

5. Non-communicable diseases—causative agents, prevention, care and control. Cancer, diabetes, blindness, cardiovascular diseases.
6. Communicable disease—causative agents, modes of transmission and prevention.

(a) Respiratory infections—chicken pox, measles, influenza, diptheria, whooping cough and tuberculosis.

(b) Intestinal infections—poliomyelitis, hepatitis, cholera, typhoid, food poisoning, hookworm infection.

(c) Arthropod borne infections—plague, malaria, filariasis.

(d) Surface infections—rabies, trachoma, tetanus, leprosy.

(e) Sexually transmitted diseases—syphilis, gonorrhoea, AIDS.

Unit-IV

7. Nutrition and health—classification of foods, requirements, diseases induced due to deficiency of proteins, vitamins and minerals—treatment and prevention.
8. Demography and family planning—demography cycle, fertility, family planning, contraceptive methods, behavioural methods, natural family planning methods, chemical methods, mechanical methods, hormonal contraceptives, population problem of India.

Unit-V

9. Epidemiology—scope, methods, uses, dynamics of disease transmission, immunity and immunisation, immunological products and their dose schedule. Principles of disease control and prevention, hospital acquired infection, prevention and control. Disinfection, types of disinfection procedures, for faeces, urine, sputum, room linen, dead bodies and instruments.

D. Pharm. Part II

D.Ph. 201T	Pharmaceutics-II, Theory	75 Hrs

Unit-I

1. Dispensing Pharmacy:

(i) Prescriptions: Reading and understanding of prescription; latin terms commonly used (detailed study is not necessary), modern methods of prescribing, adoption of metric system, calculations involved in dispensing.

(ii) Incompatibilities in prescriptions: Study of various types of incompatibilities—physical, chemical and therapeutic.

(iii) Posology: Dose and dosage of drugs, factors influencing dose, calculations of doses on the basis of age, sex and surface area, veterinary doses.

Unit-II

2. Dispensed Medications:

(Note: A detailed study of the following dispensed medication is necessary. Methods of preparation with theoretical and practical aspects, use of appropriate containers and closures, special labeling requirements and storage conditions should be highlighted).

(i) Powders: Types of powders, advantages and disadvantages of powders, granules, cachets and tablet triturates. Preparation of different types of powders encountered in prescriptions. Weighing methods, possible errors in weighing, minimum weighable amount and weighing of a material below the minimum weighable amount, geometric dilution and proper usage and care of dispensing balance.

(ii) Liquid oral dosage forms:

(a) Monophasic—theoretical aspects including commonly used vehicles, essential adjuvants like stabilizers, colourants and flavours, with examples.

Review of the following monophasic liquids with details of formulation and practical methods.

Liquids for internal administration	***Liquids for external administration or used on mucous membranes***
Mixtures and concentrates,	Gargles,Mouth washes,Throat paints, Douches, Ear
Syrups	drops,
Elixirs	Nasal drops & sprays, Liniments, Lotions

Unit-III

(b) Biphasic liquid dosage forms:

• Suspensions (elementary study)—suspensions containing diffusible solids and liquids and their preparations. Study of the adjuvants used like thickening agents, wetting agents, their necessity and quantity to be incorporated. Suspensions of precipitate forming liquids like tinctures, their preparations and stability. Suspensions produced by chemical reaction. An introduction to flocculated / non-flocculated suspension system.

• Emulsions—types of emulsions, identification of emulsion system, formulation of emulsions, selection of emulsifying agents. Instabilities in emulsions. Preservation of emulsions.

(iii) Dental and cosmetic preparations:

Introduction to dentifrices, facial cosmetics, deodorants, antiperspirants, shampoos, hair dressings and hair removers.

Unit-IV

(iv) Semi-solid dosage forms:

(a) Ointments—types of ointments, classification and selection of dermatological vehicles. Preparation and stability of ointments by the following processes: (i) trituration (ii) fusion (iii) chemical reaction (iv) emulsification.

(b) Pastes—differences between ointments and pastes, bases of pastes, preparation of pastes and their preservation.

(c) Jellies—an introduction to the different types of jellies and their preparation.

(d) An elementary study of poultice.

(e) Suppositories and passaries—their relative merits and demerits, types of suppositories, suppository bases, classification, properties. Preparation and packing of suppositories. Use of suppositories for drug absorption.

Unit-V

(v) Sterile dosage forms:

(a) Parenteral dosage forms—definition, general requirements for parenteral dosage forms, types of parenteral formulations, vehicles, adjuvants, processing, personnel, facilities and quality control. Preparation of intravenous fluids and admixtures—total parenteral nutrition, dialysis fluids.

(b) Sterility testing, particulate matter monitoring, faulty seal packaging.

(c) Ophthalmic products—study of essential characteristics of different ophthalmic preparations. Formulation additives, special precautions in handling and storage of ophthalmic products.

D.Ph. 202P	Pharmaceutics-II, Practical	100 Hrs

Dispensing of at least 100 products covering a wide range of preparations such as mixtures, emulsions, lotions, liniments, ENT preparations, ointments, suppositories, powders, incompatible prescriptions etc.

D.Ph. 203T	Pharmaceutical Chemistry-II, Theory	100 Hrs

Unit-I

1. Introduction to the nomenclature of organic chemical systems with particular reference to heterocyclic system containing upto 3 rings.
2. The chemistry of following pharmaceutical organic compounds covering their nomenclature, chemical structure, uses and the important physical and chemical properties (chemical structure of only those compounds marked with asterisk(*).

The stability and storage conditions and the different types of pharmaceutical formulations of these drugs and their popular brand names.

Antiseptics and disinfectants—proflavine*, benzalkoniumchloride, cetrimide, chlorocresol*, chloroxylene, formaldehyde solution, hexachlorophene, liquified phenol, nitrofurantoin.

Sulfonamides—sulfadiazine, sulfaguanidine*, phthalylsulfathiazole, succinylsulfathiazole, sulfadimethoxine, sulfamethoxypyridazine, sulfamethoxazole, co-trimoxazole, sulfacetamide*.

Antileprotic drugs—clofazimine, thiambutosine, dapsone*, solapsone.

Anti-tubercular drugs—isoniazid*, PAS*, streptomycin, rifampicin, ethambutol*, thiacetazone, ethionamide, cycloserine, pyrazinamide*.

Antiamoebic and anthelminitic drugs—emetine, metronidazole*, halogenated hydroxyquinolines, diloxanide furoate, paromomycin, piperazine*, mebendazole, D.E.C.*.

Antimalarial drugs—chloroquine*, amodiaquine, primaquine, proguanil, pyrimethamine*, quinine, trimethoprim.

Unit-II

Antibiotics—benzyl penicillin*, phenoxy methyl penicillin*, benzathine penicillin, ampicillin*, cloxacillin, carbenicillin, gentamicin, neomycin, erythromycin, tetracycline, cephalexin, cephaloridine, cephalothin, griseofulvin, chloramphenicol.

Antifungal agents—undecyclenic acid, tolnaftate, nystatin, amphotericin B, hamycin.

Tranquilizers—chlorpromazine*, prochlorperazine, trifluoperazine, thiothixene, haloperidol*, triperiodol, oxypertine, chlordizepoxide, diazepam* lorazepam, meprobamate.

Hypnotics—phenobarbitone*, butobarbitone, cyclobarbitone, nitrazepam, glutethimide*, methyprylone, paraldehyde, triclofos sodium.

Unit-III

General anaesthetics—halothane*, cyclopropane*, diethyl ether*, methohexital sodium, thiopental sodium, trichloroethylene.

Antidepressant drugs—amitriptyline, nortryptyline, imipramine*, phenelzine, tranylcypromine.

Analeptics—theophylline, caffeine*, coramine*, dextro-amphetamine.

Adrenergic drugs—adrenaline*, noradrenaline, isoprenaline*, phenylephrine, salbutamol, terbutaline, ephedrine*, pseudoephedrine.

Adrenergic antagonist—tolazoline, propranolol*, practolol.

Cholinergic drugs—neostigmine*, pyridostigmine, pralidoxime, pilocarpine, physostigmine*.

Cholinergic antagonists—atropine*, hyoscine, homatropine, propantheline*, benztropine, tropicamide, biperiden*.

Unit-IV

Diuretic drugs—furosemide*, chlorothiazide, hydrochlorothiazide* benzthiazide, urea*, mannitol*, ethacrynic acid.

Cardiovascular drugs—ethyl nitrite*, glyceryl trinitrate, alpha methyl dopa, guanethidine, clofibrate, quinidine.

Hypoglycemic agents—insulin, chlorpropamide*, tolbutamide, glibenclamide, phenformin*, metformin.

Coagulants and anticoagulants—heparin, thrombin, menadione*, bishydroxycoumarin, warfarin sodium.

Local anaesthetics—lignocaine*, procaine*, benzocaine,

Histamine and antihistaminic agents—histamine, diphenhydramine*, promethazine, cyproheptadine, mepyramine, pheniramine, chlorpheniramine*.

Unit-V

Analgesics and antipyretics—morphine, pethidine*, codeine, methadone, aspirin*, paracetamol*, analgin, dextropropoxyphene, pentazocine.

Nonsteroidal antiinflammatory agents—indomethacin*, phenylbutazone*, oxyphenbutazone, ibuprofen.

Thyroxine and antithyroids—thyroxine*, methimazloe, methylthiouracil, propylthiouracil.

Diagnostic agents—iopanoic acid, propyliodone, sulfobrompthalein, sodium indigotindisulfonate, indigocarmine, evans blue, congo red, fluorescein sodium.

*Anticonvulsants, cardiac glycosides, antiarrhythmics, antihypertensives and vitamins.

Steroidal drugs—betamethasone, cortisone, hydrocortisone, prednisolone, progesterone, testosterone, oestradiol, nandrolone.

Antineoplastic drugs—actinomycin, azathioprine, busulphan, chloramubucil, cisplatin, cyclophosphamide, daunorubicin hydrochloride, fluorouracil, mercaptopurine, methotrexate, mytomycin.

D.Ph. 204P	**Pharmaceutical Chemistry-II, Practical**	**75 Hrs**

1. Systematic qualitative testing of organic drugs involving solubility determination, melting point and/or boiling point, detection of elements and functional groups (10 compounds).
2. Official identification tests for certain groups of drugs included in the I.P., like barbiturates, sulfonamides, phenothiazines, antibiotics etc. (8 compounds).
3. Preparation of three simple organic preparations.

D.Ph. 205T	**Pharmacology and Toxicology, Theory**	**75 Hrs**

Unit-I

1. Introduction to pharmacology, scope of pharmacology.
2. Routes of administration of drugs, their advantages and disadvantages.
3. Various processes of absorption of drugs and the factors affecting them. Metabolism, distribution and excretion of drugs.
4. General mechanism of drugs action and the factors which modify drugs action.

Unit-II

5. Pharmacological classification of drugs. The discussion of drugs should emphasise the following aspects:

(i) Drugs acting on the central nervous system:

(a) General anaesthetics, adjunction to anaesthesia, intravenous anesthetics.

(b) Analgesic, antipyritic and non-steroridal antiinflammatory drugs, narcotic analgesics, antirheumatic and antigout remedies, sedatives and hypnotics, psychopharmacological agents, anti-convulsants, analeptics.

(c) Centrally acting muscle relaxants and antiparkinsonism agents.

Unit-III

(ii) Local anaesthetics.

(iii) Drugs acting on autonomic nervous system.

(a) Cholinergic drugs, anticholinergic drugs, anticholinesterase drugs.

(b) Adrenergic drugs and adrenergic receptor blockers.

(c) Neurone blockers and ganglion blockers.

(d) Neuromuscular blockers, drugs used in myasthenia gravis.

(iv) Drugs acting one eye, mydriactics, drugs used in glaucoma.

Unit-IV

(v) Drugs acting on respiratory system-respiratory stimulants, bronchodilators, nasal decongestants, expectorants and antitussive agents.

(vi) Antacids, physiological role of histamine and serotonin, histamine and antihistamines, prostaglandins.

(vii) Cardiovascular drugs, cardiotonics, antiarrhythmic agents, antianginal agents, antihypertensive agents, peripheral vasodilators and drugs used in atherosclerosis.

(viii) Drugs acting on the blood and blood forming organs. Haematinics, coagulants and anticoagulants, haemostatics, blood substitutes and plasma expanders.

(ix) Drugs affecting renal function—diuretics and antidiuretics.

(x) Hormones and hormone antagonists—hypoglycemic agents, antithyroid drugs, sex hormones and oral contraceptives, corticosteroids.

(xi) Drugs acting on digestive system—carminatives, digestants, bitters, antacids and drugs used in peptic ulcer, purgatives, and laxatives, antidiarrohoeals, emetics, antiemetics, antispasmodics.

Unit-V

6. Chemotherapy of microbial disease: urinary antiseptics, sulfonamides, penicillins, streptomycin, tetracyclines and other antibiotics, antitubercular agents, antifungal agents, antiviral drugs, antileprotic drugs.

7. Chemotherapy of protozoal diseases, anthelminitc drugs.

8. Chemotherapy of cancer.

9. Disinfectants and antiseptics.

A detailed study of the action of drugs on each organ is not necessary.

D.Ph. 206P	Pharmacology and Toxicology, Practical	50 Hrs

The first six of the following experiments will be done by the students while the remaining will be demonstrated by the teacher.

1. Effect of potassium and calcium, acetylcholine and adrenaline on frog's heart.
2. Effect of acetylcholine on rectus abdominis muscle of frog and guinea pig ileum.
3. Effect of spasmogens and relaxants on rabbits intestine.
4. Effect of local anaesthetics on rabbit cornea.
5. Effect of mydriatics and miotics on rabbit eye.
6. To study the action of strychnine on frog.
7. Effect of digitalis on frogs heart.
8. Effect of hypnotics in mice.
9. Effect of convulsants and anticonvulsants in mice or rats.
10. Test for pyrogens.
11. Taming and hypnosis potentiating effect of chlorpormazine in mice/rats.
12. Effect of diphenhydramine in experimentally produced asthma in guinea pigs.

D.Ph. 207T	Pharmaceutical Jurisprudence, Theory	50 Hrs

Unit-I

1. Origin and nature of pharmaceutical legislation in India, its scope and objectives. Evolution of the "Concept of Pharmacy" as an integral part of the health care system.
2. Brief introduction to the study of the following acts:

(i) Poisons Act 1919 (as amended to date)

(ii) Medicinal and toilet preparations (excise duties) Act, 1955 (as amended to date).

(iii) Medical termination of pregnancy act, 1971 (as amended to date).

Unit-II

3. Principles and significance of professional ethics. Critical study of the code of pharmaceutical ethics drafted by Pharmacy Council of India.
4. Pharmacy Act, 1948—the general study of the Pharmacy Act with special reference to education regulations, working of state and central councils, constitution of these councils and functions, registration procedures under the Act.

Unit-III

5. The Drugs and Magic Remedies (Objectionable Advertisement) Act, 1954—general study of the act, objectives, special reference to be laid on advertisements, magic remedies and objectionable and permitted advertisements, diseases which cannot be claimed to be cured.
6. Narcotic Drugs and Psychotropic Substances Act, 1985-a brief study of the act with special reference to its objectives, offences and punishment.

Unit-IV

7. The Drugs and Cosmetics Act, 1940—general study of the Drugs and Cosmetics Act and the rules there under. Definitions and salient features related to retail and wholesale distribution of drugs. Procedure and formalities in obtaining licences under the rule.

Unit-V

8. The powers of inspectors, the sampling procedures.
9. Facilities to be provided for running a pharmacy effectively. General study of the schedules with special reference to schedules C, C1, F, G, J, H, P and X and salient features of labeling and storage conditions of drugs.
10. Latest drugs (price control) order in force.

D.Ph. 208T	**Drug Store and Business Management, Theory**	**50 Hrs**

PART-I COMMERCE (50 hours)

Unit-I

1. Introduction—trade, industry and commerce, functions and subdivision of commerce, introduction to elements of economics and management.
2. Channels of distribution.
3. Drug house management—selection of site, space lay out and legal requirements.

Importance and objectives of purchasing, selection of suppliers, credit information, tenders, contracts and price determination and legal requirements thereto.

Codification, handling of drug stores and other hospital supplies.

Unit-II

4. Forms of business organizations.
5. Recruitment, training, evaluation and compensation of the pharmacist.
6. Banking and finance-service and functions of bank, finance planning and sources of finance.

Unit-III

7. Inventory control—objects and importance, modern techniques like ABC, VED analysis, the lead time, inventory carrying cost, safety stock, minimum and maximum stock levels, economic order quantity, scrap and surplus disposal.
8. Sales promotion, market research, salesmanship, qualities of a salesman, advertising and window display.

PART-II ACCOUNTANCY (25 hours)

Unit-IV

9. Introduction to the accounting concepts and conventions. Double entry book keeping, different kinds of accounts.
10. Cash book.

Unit-V

11. General ledger and trial balance.
12. Profit and loss account and balance sheet.
13. Simple techniques of analyzing financial statements. Introduction to budgeting.

D.Ph. 209T	**Hospital and Clinical Pharmacy , Theory**	**75 Hrs**

PART-I HOSPITAL PHARMACY

Unit-I

1. Hospital—definition, function, classification based on various criteria, organization, management and health delivery system in India.

2. Hospital pharmacy:

(a) Definition

(b) Functions and objectives of hospital pharmaceutical services.

(c) Location, layout, flow chart of materials and men.

(d) Personnel and facilities requirements including equipments based on individual and basic needs.

(e) Requirements and abilities required for hospital pharmacists.

3. Drug distribution system in hospitals.

(a) Out-patient services

(b) In-patient services—(a) types of services (b) detailed discussion of unit dose system, floor ward stock system, satellite pharmacy services, central sterile services, bed side pharmacy.

Unit-II

4. Manufacturing:

(a) Economical considerations, estimation of demand.

(b) Sterile manufacture—large and small volume parenterals, facilities, requirements, layout, production planning, man-power requirements.

(c) Non-sterile manufacture—liquid orals, externals, bulk concentrates.

(d) Procurement of stores and testing of raw materials.

5. Nomenclature and uses of surgical instruments and hospital equipments and health accessories.

6. P.T.C. (Pharmacy Therapeutic Committee), hospital formulary system and their organization, functioning, composition.

7. Drug information service and drug information bulletin.

8. Surgical dressing like cotton, gauze, bandages and adhesive tapes including their pharmacopoeial tests for quality. Other hospital supply eg. I.V. sets, B.G. sets, Ryals tubes, catheters, syringes etc.

PART II CLINICAL PHARMACY

Unit-III

9. Introduction to clinical pharmacy practice—definition, scope.

10. Modern dispensing aspects—pharmacists and patient counseling and advice for the use of common drugs, medication history.
11. Common daily terminology used in the practice of medicine.
12. Disease, manifestation and pathophysiology including salient symptoms to understand the disease like tuberculosis, hepatitis, rheumatoid arthritis, cardiovascular diseases, epilepsy, diabetes, Peptic ulcer, hypertension.
13. Bioavailability of drugs, including factors affecting it.

Unit-IV

14. Physiological parameters with their significance.
15. Drug interactions:

(a) Definition and introduction.

(b) Mechanism of drug interaction.

(c) Drug—drug interaction with reference to analgesics, diuretics, cardiovascular drugs, gastro intestinal agents, vitamins and hypoglycemic agents.

(d) Drug-food interaction.

16. Adverse drug reactions.

(a) Definition and significance.

(b) Drug-induced diseases and teratogenicity.

Unit-V

17. Drugs in clinical toxicity—introduction, general treatment of poisoning, systemic antidotes, treatment of insecticide poisoning, heavy metal poison, narcotic drugs, barbiturate, organophosphorus poisons.
18. Drug dependences, drug abuse, addictive drugs and their treatment, complications.
19. Application of computers in maintenance of records, inventory control, medication monitoring, drug information and data storage and retrieval in hospital retail pharmacy establishment.

D.Ph. 210P	**Hospital and Clinical Pharmacy, Practical**	**75 Hrs**

1. Preparation of transfusion fluids.
2. Testing of raw materials used in (1)
3. Evaluation of surgical dressings.
4. Sterilization of surgical instruments, glassware and other hospital supplies.

5. Handling and use of data processing equipments.