

**ISBM UNIVERSITY, NAWAPARA (KOSMI), GARIYABAND (C.G.)**

Course of study and scheme of Examination

Diploma in Pharmacy (Part-I) Examination

**FIRST YEAR**

S. No	Subject Code	Department	Subject	Periods per week			Scheme of Examination				Total Marks
							Theory		Practical		
				L	T	P	EYE	Sessi onal	EYE	Sessi onal	
1	PHS1101	Pharmacy	Pharmaceutics-I	3	-	-	80	20	-	-	100
2	PHS1102	Pharmacy	Pharm. Chem-I	3	-	-	80	20	-	-	100
3	PHS1103	Pharmacy	Pharmacognosy	3	-	-	80	20	-	-	100
4	PHS1104	Pharmacy	Biochemistry & Clinical Pathology	2	-	-	80	20	-	-	100
5	PHS1105	Pharmacy	Human Anatomy & Physiology	3	-	-	80	20	-	-	100
6	PHS1106	Pharmacy	Health Education & Community Pharmacy	2	-	-	80	20	-	-	100
7	PHS1107	Pharmacy	Pharmaceutics-I Lab	-	-	4	-	-	80	20	100
8	PHS1108	Pharmacy	Pharm. Chem-I Lab	-	-	3	-	-	80	20	100
9	PHS1109	Pharmacy	Pharmacognosy Lab	-	-	3	-	-	80	20	100
10	PHS1110	Pharmacy	Biochemistry & Clinical Pathology Lab	-	-	3	-	-	80	20	100
11	PHS1111	Pharmacy	Human Anatomy & Physiology Lab	-	-	2	-	-	80	20	100
Total				16	-	15	480	120	400	100	1100

**L- Lecture, T- Tutorial, P- Practical, EYE- End Year Exam**

**Hints for Course code:** PHS denotes Pharmaceutical Sciences, **First Digit** denotes Semester/Year No., **Second Digit** denotes Course Level 1 for Diploma 2 for UG, 3 for PG, **Third Digit(s)** denotes paper No.

**Year– 1st Year (Diploma)**

**Theory Code PHS1101**

**SUBJECT - PHARMACEUTICS-I**

**Branch/Discipline – Pharmacy**

**Course Contents –**

**Theory (75 hours)**

1. Introduction of different dosage forms. Their classification with examples – their relative Applications. Familiarization with new drug delivery systems.
  2. Introduction to Pharmacopoeias with new drug delivery systems.
  3. Metrology-Systems of weights and measures. Calculations including conversion from one to another system, Percentage calculations and adjustment of products. Use of allegation method in calculations. Isotonic solutions.
  4. 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 closures their merits and demerits. Introduction to aerosol packaging.
  5. Size reduction- Objectives, and factors affecting size reduction, methods of size reduction-Study of hammer mill, ball mill, Fluid energy Mill and Disintegrator.
  6. Size separation - Size separation by sifting. Official standards for powders. Sedimentation Methods of size separation. Construction and working of Cyclone separator.
  7. Mixing and Homogenization - Liquid mixing and power mixing, Mixing of semisolids. Study of silvers on Mixer-Homogeniser, Planetary Mixer Agitated Powder mixer, Triple roller Mill, Propeller Mixer, Colloid mill and hand Homoeniser. Double cone mixer.
  8. Clarification and Filtration-Theory of filtration, Filter media: Filter aids and selection of filters. Study of the following.
  9. Extraction and Galenicals (a) Study of percolation and maceration and their modifications, continuous hot retraction-
  10. Heat Processes:- Evaporation, Definition, factors affecting evaporation – Study of evaporating Still and evaporating Pan.
  11. Distillation:- Simple Distillation and fractional distillation, Steam distillation and vaccum distillation Study vaccum Still, Preparation of Puri fied water I.P. and water fpr Injection I.P. Construction and working of The Still used for the same.
  12. Introduction to drying process – Study of Tray Dryers. Fluidized Bed Dryer, Vacuum Dryer and Freeze Dryer.
  13. Sterilization – Concept of Sterilization and its differences from disinfections – Thermal resistance of microorganisms. Detailed study of following sterilization processes.
    - (i) Sterilization with moist heat,
    - (ii) Dry heat sterilization,
    - (iii) Sterilization by radiation,
    - (iv) Sterilization filtration and
    - (v) Gaseous sterilization
- Aseptic techniques – Application of sterilization processes in hospitals particularly with reference to surgical dressings and intravenous fluids. Precautions for safe and effective handling of sterilization equipment.
14. Processing of Tablets- Definition, Different types of compressed tablets and their properties. Process involved in the production of tablets: Tablets excipients; Defects in tablets; Evaluation Tablets; Physical standards including Disintegration and dissolution. Tablet coating-Sugar Coating, film coating, enteric coating and micro encapsulation (Tablet coating may be dealt in an elementary manner)

15. Processing of Capsules-Hard and soft gelatin capsules different sizes of capsules; filling of capsules; handling and storage of capsules. Special applications of capsules.
16. Study of immunological products like sera, vaccines, toxoids and their preparations.

**Practical Code –PHS1107**

**PRACTICAL (100 hours)**

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

1.	Aromatic waters	3
2.	Solutions	4
3.	Spirits	2
4.	Tinctures	4
5.	Extracts	2
6.	Creams	2
7.	Cosmetic Preparations	3
8.	Capsules	2
9.	Tablets	2
10.	Preparations involving sterilization	2
11.	Ophthalmic preparations	2
12.	Preparations involving aseptic techniques	2

Books Recommended: (Latest editions)

1. Remington's Pharmaceutical Science
2. The Extra Pharmacopoeia- Martindale

**Year– 1st Year (Diploma)**

**Theory Code PHS1102**

**SUBJECT - PHARMACEUTICAL CHEMISTRY-**

**I Branch/Discipline – Pharmacy**

**Course Contents –**

**Theory (75 hours)**

1. General discussion on the following inorganic compounds including important physical & chemical properties: medicinal & Pharmaceutical uses, storage conditions & chemical in compatibility.
  - (A) Acids, bases & buffers-Boric acid\*, Hydrochloric acid, storage ammonium hydroxide, Calcium hydroxide, Sodium hydroxide & official buffers.
  - (B) Antioxidants-Hypo phosphorous acid, Sulphur dioxide, Sodium bisulphate, Sodium meta-bisulphate, Sodium thiosulphate, Nitrogen & Sodium Nitrite.
  - (C) 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 sub-carbonate and Kaolin.
    - iv. Saline cathartics-Sodium Potassium tartrate and Magnesium sulphate.
  - (D) Topical Agents-
  - (E) Dental Products-Sodium fluoride, stannous fluoride, Calcium carbonate, Sodium Meta phosphate, Dicalcium phosphate, Strontium chloride, Zinc chloride.
  - (F) Inhalants-Oxygen, Carbon dioxide, Nitrous oxide.
  - (G) Respiratory stimulants-Ammonium chloride.
  - (H) Expectorants & Emetics-Ammonium chloride\*, Potassium iodide, Antimony Potassium tartrate.
  - (I) Antidotes-Sodium nitrite.
2. Major Intra & Extra cellular electrolytes
  - A. Electrolytes used for replacement therapy-Sodium Chloride & its Preparations, Potassium Chloride & its Preparation.
  - B. Physiological acid base balance & electrolytes used Sodium acetate, Potassium acetate, Sodium bicarbonate injection, Sodium citrate, Potassium citrate, Sodium lactate injections, Ammonium chloride and its injection.
  - C. Combination of oral electrolyte powders & solutions.
3. Inorganic Official compounds of Iron, Iodine, & Calcium Ferrous Sulphate & Calcium gluconate.
4. Radio pharmaceuticals & Contrast media-Radio activity-Alpha, Beta & Gamma Radiations, Biological effects of radiations, Measurement of radioactivity G.M. Counter-Radio isotopes-their uses, storage & precautions with special reference to the official preparations Radio opaque Contrast Media-Barium sulphates.

5. Quality control of Drugs & Pharmaceuticals-Importance of quality control, significant errors, methods used for quality control, sources of impurities in Pharmaceuticals. Limit tests for Arsenic chloride, sulphate, iron & Heavy metals.
6. Identification tests for cations & anions as per Indian Pharmacopoeia.

**Practical Code – PHS1108**

**PRACTICAL (75 Hours)**

1. Identification tests for inorganic compounds particularly drugs & pharmaceuticals.
2. Limit test for chloride, sulphate, Arsenic, Iron & Heavy metals.
3. Assay of inorganic Pharmaceuticals involving each of the following methods of compounds marked with (\*) under theory.
  - a. Acid-base titrations (at least 3)
  - b. Redox titrations (One each of Permanganometry and iodimetry).
  - c. Precipitation titration (at least 2)
  - d. Complexometric titrations (Calcium and Magnesium).

Book recommended: 1. Indian Pharmacopoeia (Latest edition)

**Year– 1st Year (Diploma)**

**Theory Code PHS1103**

**SUBJECT - PHARMACOGNOSY**

**Branch/Discipline – Pharmacy**

**Course Contents –**

**Theory (75 hours)**

1. Definition, history & scope of Pharmacognosy including indigenous system of medicine.
2. Various systems of classification of drugs of natural origin.
3. Adulteration & drug evaluation; significance of Pharmacopoeial standards.
4. Brief outline of occurrence, distribution outline of isolation, identification tests, therapeutic effects & pharmaceutical applications of alkaloids, terpenoids, glycosides, volatile oils, tannins & resins.
5. Occurrence, distribution, Organoleptic evaluation, chemical constituents including tests wherever applicable & therapeutic efficacy of following categories of drugs:
  - a. Laxatives: Aloes, Rhuburb, 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.
  - d. Astringents-Catechu.
  - e. Drugs acting on nervous system-Hyoscyamus, Belladonna, Aconite, Ashwagandha, Ephedra, opium, Cannabis, Nux vomia.
  - f. Antihypertensives-Rauwolfia.
  - g. Ntitussives-Vasaka, Tolu balsam, Tulsi.
  - h. Antirheumatics-Guggul, Colchicum.
  - i. Antitumour-Vinca.
  - j. Antileprotics-Chaulmoogra oil.
  - k. Antidiabetics-Pterocarpus, Gymnema, Sylvestro.
  - l. Diuretics-Gokhru, Punarnava.
  - m. Antidysenterics-Ipecacuanha.
  - n. Antiseptics & disinfectants Benzoin, Myrrh, Nim, Curcuma.
  - o. Antimalarials-Cinchona.
  - p. Oxytocics-Ergot.
  - q. Vitamines-Shark liver oil & Amla.
  - r. Enzymes-Papaya, Diastase, yeast.
  - s. Perfumes & 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, Picrorhiza, Dioscorea, Linseed, Shatavari, Shankhupushpi, Pyrethrum, Tobacco.
6. Collection & preparation of cude drugs for the market as exemplified by Ergot, opium, Rauwolfia, Digitalis, Senna.  
& Study of source, preparation & identification of fibres used in sutures & surgical dressings-cotton, silk, wool & regenerated fibres.

7. Gross anatomical studies of-Senna, Datura, Cinnamon, Cinchona, Fennel, Clove, Ginger, Nuxvomica & ipecacuanha.

**Practical Code –PHS1109**

**PRACTICAL (75 Hours)**

1. Identification of drugs by morphological characters.
2. Physical & chemical tests for evaluations 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 & surgical dressings.

**Year– 1st Year (Diploma)**

**Theory Code PHS1104**

**SUBJECT – BIOCHEMISTRY AND CLINICAL  
PATHOLOGY Branch/Discipline – Pharmacy**

**Course Contents –**

**Theory (75 hours)**

1. Introduction to Biochemistry.
2. Brief chemistry & role of proteins, polypeptides & amino acids, classification, Qualitative tests, Biological value, Deficiency diseases.
3. Brief chemistry & role of Carbohydrates, Classification, qualitative tests. Diseases related to carbohydrate metabolism.
4. Brief chemistry & role of Lipids, Classification, qualitative tests. Diseases related to lipids metabolism.
5. Brief chemistry & role of Vitamins & Coenzymes.
6. role of minerals & water in life processes.
7. Enzymes: Brief concept of enzyme action. Factors affecting it. Therapeutic & pharmaceutical importance.
8. Brief concept of normal & abnormal metabolism of proteins, carbohydrates & lipids.
9. Introduction to pathology of blood & urine.
  - a. Lymphocytes & Platelets, their role in health & disease.
  - b. Erythrocytes-Abnormal cells & their significance.
  - c. Abnormal constituents of urine & their significance in diseases.

**Practical Code – PHS1110**

**PRACTICAL (75 Hours)**

1. Detection and identification of Proteins, Amino acid, Carbohydrates & Lipids.
2. Analysis of normal and abnormal constituents of blood & urine (Glucose, Urea, Creatine Creatinene Cholesterol, alkaline phosphates, acid phosphates, Bilirubin, SGPT, SGOT, Calcium, Diastase, Lipase.)
3. Examination of sputum and faeces (microscope staining).
4. Practice in injecting drugs by intramuscular and intravenous routes. Withdrawal of blood.

**Year– 1st Year (Diploma)**

**Theory Code PHS1105**

**SUBJECT – HUMAN ANATOMY AND  
PHYSIOLOGY Branch/Discipline – Pharmacy**

**Course Contents –**

**Theory (75 hours)**

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.
5. Composition of blood, functions of blood elements. Blood group and Coagulation of blood. BRIEF information regarding disorders of blood.
6. Name & functions of lymph glands.
7. Structure & functions of various parts of the heart. Arterial & venous system with special reference to the names & positions of main arteries & veins. Blood pressure & its recording. Brief information about cardiovascular disorders.
8. Various parts of respiratory system & their functions. Physiology of respiration.
9. Various parts of urinary systems & their functions, structure & functions of kidney. Physiology of Urine formation. Pathophysiology of renal diseases & oedema.
10. Structure of skeletal muscle. Physiology of muscle contraction. Names, positions, attachments & functions of various skeletal muscles. Physiology of neuromuscular junction.
11. Various parts of central nervous system, brain & parts, functions & reflex action. Anatomy & Physiology autonomic nervous system.
12. Elementary knowledge of structure & functions of organs of taste, smell, ear, eye & skin. Physiology of part.
13. Digestive system: Names of the various parts of dig system & their functions. Structure & functions of liver physiology of digestion & absorption.
14. Endocrine glands & Hormones. Location of the gland their hormones & functions. Pituitary, Thyroid, adrenal & Pancreas.
15. Reproductive system-Physiology & Anatomy of Reproductive system.

**Practical Code – PHS1111**

**PRACTICAL (50 Hours)**

1. Study of the human skeleton.
2. Study with the help of charts & models of the following systems & organs:  
following systems & organs:
3. Microscopic examination of epithelial tissue, cardiac muscle, smooth muscle, skeletal muscle. Connective tissue & nervous tissues.
4. Examination of blood films for TDC, DLC & malarial parasite.
5. Determination of clotting time of blood, erythrocyte sedimentation rate & Hemoglobin value.
6. Recording of body temperature, pulse, heart rate, blood pressure & ECG.

**Year– 1st Year (Diploma)**

**Theory Code PHS1106**

**SUBJECT – HEALTH EDUCATION AND COMMUNITY**

**PHARMACY Branch/Discipline – Pharmacy**

**Course Contents –**

**Theory (75 hours)**

1. Concept of health-Definition of physical health, mental health, social health, spiritual health determinates of health, indicators of health, concept of disease, natural history of diseases, the disease agents, concept of prevention of diseases.
2. Nutrition & health-Classification of foods, requirements, diseases induced due to deficiency of proteins, vitamins, & minerals-treatment & prevention.
3. Demography & family planning – Demography cycle, fertility, family planning, contraceptive methods, behavioral methods, natural family planning method, chemical method, mechanical methods, hormonal contraceptives, population problem of India.
4. First aid-Emergency treatment in shock, snake-bite, burns, poisoning, heart disease, fractures & resuscitation methods. Elements of minor surgery & dressings.
5. Environment & health-Sources of water supply, water pollution, purification of water, health & air, noise, light-solid waste disposal & control medical entomology, arthropod borne disease & their control, rodents, animals & diseases.
6. Fundamental principles of microbiology – Classification of microbes, isolation, techniques of organisms of common diseases.
7. Communicable diseases-Causative agents, mode of transmission & prevention.
  - a. Respiratory infections- Chicken pox, measles, influenza, diphtheria, whooping cough & tuberculosis.
  - b. Intestinal infections: Poliomyelitis, Malaria, Filariasis.
  - c. Arthropod borne infections-Plague, Malaria, Filariasis.
  - d. Surface infections-Rabies, Thachoma, Tetanus, Laprosy.
  - e. Sexually transmit ion diseases-Syphilis, Conorrhoea, AIDS.
8. Non-communicable diseases-Causative agents, prevention, care & control.
9. Epidemiology-Its scope, methods, uses, dynamics of disease transmission. Immunity & immunizations Immunological products & their does schedule.  
Principles of disease control & prevention, hospital acquired infection, prevention & control. Disinfection, types of disinfection procedures, for faeces, urine, cu room, liron, dead-bodies, instruments.

Course of study and scheme of Examination

Diploma in Pharmacy (Part-II) Examination

**SECOND YEAR**

S. No	Subject Code	Department	Subject	Periods per week			Scheme of Examination				Total Marks
				L	T	P	Theory		Practical		
							EYE	Sessio nal	EYE	Sessi onal	
1	PHS2101	Pharmacy	Pharmaceutics-II	3	-	-	80	20	-	-	100
2	PHS2102	Pharmacy	Pharm. Chem-II	4	-	-	80	20	-	-	100
3	PHS2103	Pharmacy	Pharmacology & Toxicology	3	-	-	80	20	-	-	100
4	PHS2104	Pharmacy	Pharmaceutical Jurisprudence	3	-	-	80	20	-	-	100
5	PHS2105	Pharmacy	Drug Store & Business Management	2	-	-	80	20	-	-	100
6	PHS2106	Pharmacy	Hospital and Clinical Pharmacy	3	-	-	80	20	-	-	100
7	PHS2107	Pharmacy	Pharmaceutics-II Lab	-	-	4	-	-	80	20	100
8	PHS2108	Pharmacy	Pharm. Chem-II Lab	-	-	3	-	-	80	20	100
9	PHS2109	Pharmacy	Pharmacology & Toxicology Lab	-	-	2	-	-	80	20	100
10	PHS2110	Pharmacy	Hospital and Clinical Pharmacy Lab	-	-	2	-	-	80	20	100
	Total			18	-	11	480	120	320	80	1000

**L- Lecture, T- Tutorial, P- Practical, EYE- End Year Exam**

**Hints for Course code:** PHS denotes Pharmaceutical Sciences, **First Digit** denotes Semester/Year No., **Second Digit** denotes Course Level 1 for Diploma 2 for UG, 3 for PG, **Third Digit(s)** denotes paper No.

**SUBJECT - PHARMACEUTICS-II**

**Branch/Discipline – Pharmacy**

**Course Contents –**

Theory (75 hours)

8. Dispensing Pharmacy:

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.

Incompatibilities in Prescriptions – Study of various types of incompatibilities – physical, chemical and therapeutic.

Posology - Dose and Dosage of drugs, Factors influencing dose, Calculations of doses on the basis of age, sex and surface area, Veterinary doses.

9. 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 high –lighted).

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 amounts and weighing of material below the minimum weighable amount, geometric dilution and proper usage and care of dispensing balance.

Liquid Oral Dosage Forms:

Monophasic – Theoretical aspects including commonly used vehicles, essential adjuvant 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 mucus membranes.
Mixtures and concentrates Syrups Elixirs	Gargles Mouth washes Throat –paints Douches Ear Drops Nasal drops & Sprays Liniments Lotions.

Biphasic Liquid Dosage Forms:

Suspension (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.

Semi –Solid Dosage Forms:

Ointments – Types of ointments, classification and selection of dermatological vehicles. Preparation and stability of ointments by the following processes: (i)

Pastes - Difference between ointments and pastes, bases of pastes. Preparation of pastes and their preservation.

Jellies – An introduction to the different types of jellies and their preparation.

An elementary study of poultice.

Suppositories and pessaries –Their relative merits and demerits, types of suppositories, suppository bases, classification, properties, Preparation and packing of suppositories. Use of suppositories for drug absorption.

Dental and Cosmetic Preparations:

Introduction to Dentrifices, Facial cosmetics, Deodorants, Antiperspirants, Shampoos, Hair dressing and Hair removers.

Sterile Dosage Forms:

Parenteral dosage forms—Definitions, 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.

Sterility testing, Particulate matter monitoring –Faulty seal packaging.

Ophthalmic Products –Study of essential characteristics of different ophthalmic preparations. Formulation additives, special precautions in handling and storage of ophthalmic products.

### **Practical Code –PHS2107**

#### **PRACTICAL (100 hours)**

Dispensing of at least 100 products covering a wide range of preparations such as mixtures, emulsions, lotions, liniments, E.N.T. preparations, ointments, suppositories, powders, incompatible prescriptions etc. Books recommended: (Latest editions )

9. Indian – Pharmacopoeia.
10. British Pharmacopoeia.
11. National Formularies (N.F.I. B.N.F.)
12. Remington's Pharmaceutical Sciences.
13. Martindale Extra Pharmacopoeia.

Year– 2<sup>nd</sup> Year (Diploma)

Theory Code PHS2102

**SUBJECT – PHARMACEUTICAL CHEMISTRY II**

**Branch/Discipline – Pharmacy**

**Course Contents –**

Theory (100 hours)

10. Introduction to the nomenclature of organic chemical systems with particular reference to heterocyclic system containing up to 3 rings.

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 type of Pharmaceutical formulations of these drugs and their popular brand names.

**Antiseptics and Disinfectants** –Proflavine,\* Benzalkoniumchloride, Cetrimide, Chlorocresol\*, Chloroxylene, Formaldehyde solution, Hexachlorophene, Liquefied phenol, Nitrofurantoin.

Sulfonamides-Sulfadiazine, Sulfaguanidine\*, Phthalysulfathiazole, Succinylsulfathiazole, Sulfadimethoxine, Sulfamethoxypridazine, Sulfamethoxazole, co-trimoxazole, Sulfacetamide\*. **Antileprotic Drugs** –Clofazimine, Thiambutosine, Dapsone\*, Solapsone.

**Anti-tubercular Drugs** –Isoniazid\*, PAS\*, Streptomycin, Rifampicin, Ethambutol\*, Thiacetazone, Ethionamide, Cycloserine, Pyrazinamide\*.

**Antiamoebic and Anthelmintic Drugs**- Emetine, Metronidazole\*, Halogenated hydroxyquinolines, diloxanidefuroate, Paramomycin Piperazine\*, Mebendazole, D.E.C\*.,

**Antibiotics** –Benzyl Penicillin\*, Phenoxy methyl Penicillin\*, Benzathine Penicillin Ampicillin\*, Cloxacillin, Carbenicillin, Gentamicin, Neomycin, Erythromycin, Tetracycline, Cephalexin, Cephaloridine, Cephalothin, Griseofulvin, Chloramphenicol.

**Antifungal agents** –Undecylenic acid, Tolnaftate, Nystatin, Amphotericin, Hamycin.

**Antimalarial Drugs** –Chloroquine\*, Amodiaquine, Primaquine, Proguanil, Pyrimethamine\*, Quinine, Trimethoprim.

**Tranquilizers** –Chlorpromazine\*, Prochlorperazine, Trifluoperazine, Thiothixene, Haloperidol\*,

Triperidol, Oxypertine, Chlordiazepoxide, Diazepam\*, Lorazepam, Meprobamate.

**Hypnotics**—Phenobarbitone\*, Butobarbitone, Cyclobarbitone, Nitrazepam, Glutethimide\*, Methypylone, Paraldehyde, Triclofos sodium.

**General Anaesthetics** –Halothane\*, Cyclopropane\*, Diethyl ether\*, Methohexital sodium, Thiopental sodium, Trichloroethylene.

**Antidepressant Drugs**—Amitriptyline, Nortriptyline, Imipramine\*, Phenelzine, Tranylcypromine.

**Analeptics** –Theophylline, Caffeine\*, Coramine\*, Dextroamphetamine.

**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\*, Hysocine, Homatropine, Propantheline\*, Benztrophine, Tropicamide, Biperiden.\*

**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 Anti –Coagulants** –Heparin, Thrombin, Menadione\*, Bishydroxycoumarin, Warfarin Sodium.

**Local Anaesthetics** –Lignocaine\*, Procaine\*, Benzocaine.

**Histamine and Anti-histaminic Agents**–Histamine, Diphenhydramine\*, Promethazine, Cyproheptadine, Mepyramine, Pheniramine, Chlorpheniramine\*.

**Analgesics and Anti-pyretics**–Morphin, Pethidine\*, Codeine, Methadone, Aspirin\*, Paracetamol\*, Analgin, Dextropropoxyphene, Pentazocine.

**Non-steroidal anti-inflammatory Agents** –Indomethacin\*, phenylbutazone\*, Oxyphenbutazone, Ibuprofen, Thyroxine and Antithyroids –Thyroxine\*, Methimazole, Methylthiouracil, Propylthiouracil.

**Diagnostic Agents**–Iopanoic Acid, Propyliodone, Sulfobromophthalein. Sodium indigotindisulfonate, Indigo Carmine, Evans blue, Congo Red, Fluorescein Sodium .  
\*Anticonvulsants, cardiac glycosides, Antiarrhythmic antihypertensives & vitamins.

**Steroidal Drugs** –Betamethazone, Cortisone, Hydrocortisone, prednisolone, Progesterone, Testosterone, Oestradiol, Nandrolone.

**Anti- Neoplastic Drugs** –Actinomycins, Azathioprine, Busulphan, Chlorambucil, Cisplatin cyclophosphamide, Daunorubicin hydrochloride, Fluorouracil, Mercaptopurine, Methotrexate, Mytomycin.

### **Books Recommended: (Latest editions)**

1. Pharmacopoeia of India.
2. British Pharmaceutical Codex.
3. Martindale The Extra Pharmacopoeia.

### **Practical Code –PHS2108**

#### **PRACTICAL (75 hours)**

#### **PRACTICAL (75 hours)**

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

**SUBJECT – PHARMACOLOGY & TOXICOLOGY**

**Branch/Discipline – Pharmacy**

**Course Contents –**

Theory (75 hours)

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 drug action.
5. Pharmacological classification of drugs. The discussion of drugs should emphasise the following aspect:
  - (i) Drugs acting on the Central Nervous System:
    - (a) General anaesthetics, adjunction to anaesthesia, intravenous anaesthetics.
    - (b) Analgesic antipyretics and non-steroidal anti-inflammatory drugs, Narcotic analgesics, Antirheumatic and antigout remedies, Sedatives and Hypnotics, Psychopharmacological agents, anti convulsants, analeptics.
    - (c) Centrally acting muscle relaxants and anti parkinsonism agents
  - (ii) Local anaesthetics.
  - (iii) Drug acting on autonomic nervous system.
    - (a) Cholinergic drug, Anticholinergic drugs, anti cholinesterase drugs.
    - (b) Adrenergic drugs and adrenergic receptor blockers.
    - (c) Neurones blockers and ganglion blockers.
    - (d) Neuromuscular blockers, drugs used in myasthenia gravis.
  - (iv) Drugs acting on eye, mydriatics, drugs used in glaucoma.
  - (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) Cardio Vascular 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 anti Coagulants, 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, Antidiarrhoeals, Emetics, Antiemetics, Anti-spasmodics.
6. Chemotherapy of microbial disease: Urinary antiseptics, Sulphonamides, Penicillins, Streptomycin, Tetracyclines and other antibiotics, Antitubercular agents, Antifungal agents, antiviral drugs, antileprotic drugs.
7. Chemotherapy of protozoal diseases Anthelmintic drugs.
8. Chemotherapy of cancer.
9. Disinfectants and antiseptics.

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

**PRACTICAL (50 hours)**

**PRACTICAL (50 hours)**

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  $K^+$ ,  $Ca^{++}$ , acetylcholine and adrenaline on frog's heart.
2. Effect of acetylcholine on rectus abdominis muscle of Frog and guinea pig ileum.
3. Effect on spasmogens and relaxants on rabbits intestine.
4. Effect of local anaesthetics on rabbit cornea.
5. Effect of mydriatics and miotics on rabbits eye.
6. To study the action of strychnine on frog.
7. Effect of digitalis on frog's heart.
8. Effect of hypnotics in mice.
9. Effect of convulsants and anticonvulsant in mice or rats.
10. Test for pyrogen.
11. Taming and hypnosis potentiating effect of chlorpromazine in mice/rats.
12. Effect of diphenhydramine in experimentally produced asthma in guinea pigs.

Year– 2<sup>nd</sup> Year (Diploma)

Theory Code PHS2104

**SUBJECT – PHARMACEUTICAL JURISPRUDENCE**

**Branch/Discipline – Pharmacy**

**Course Contents –**

Theory (50 hours)

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. Principles and significance of Professional Ethics. Critical study of the code of Pharmaceutical Ethics drafted by Pharmacy Council of India.
3. 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.
4. The Drugs and Cosmetics Act, 1940—General study of the Drugs and Cosmetics Act and the Rules thereunder. Definitions and salient features related to retail and wholesale distribution of drugs. The powers of Inspectors, the sampling procedures and the procedure and formalities in obtaining licences under the rule. Facilities to be provided for running a Pharmacy effectively. General study of the Schedules with special reference of schedules C, C1, F, G, J, H, P and X and salient features of labelling and storage condition of drugs.
5. The Drug and Magic Remedies (Objectionable Advertisement) Act, 1945-General study of the Act Objectives, special reference to be laid on Advertisements. Magic remedies and objectionable and permitted advertisements – disease 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.
7. Brief introduction to the study of the following acts.
  1. Latest Drugs (Price Control) Order in force.
  2. Poisons Act 1919 (as amended to date)
  3. Medicinal and Toilet Preparations (Excise Duties) Act, 1995 (as amended to date)
  4. Medical Termination of Pregnancy Act, 1971 (as amended to date)

**BOOKS RECOMMENDED (Latest edition)** Bare Acts of the said laws published by Government.

**Year– 2<sup>nd</sup> Year (Diploma)**

**Theory Code PHS2105**

**SUBJECT – DRUG STORE AND BUSINESS MANAGMENT**

**Branch/Discipline – Pharmacy**

**Course Contents –**

**Theory (75 hours)**

**Part – I Commerce (50 hours)**

1. Introduction-Trade, Industry and Commerce, Functions and subdivision of Commerce, Introduction of Elements of Economics and Management.
2. Forms of Business Organizations.
3. Channels of Distribution.
4. 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.
5. 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.
6. Sales Promotion, Market Research, Salesmanship, qualities of a salesman, Advertising and Window Display.
7. Recruitment, training, evaluation and compensation of the pharmacist.
8. Banking and Finance Service and functions of the bank, Finance Planning and sources of finance.

**Part – II Accountancy (25 hours)**

1. Introduction to the accounting concepts and conventions, Double entry Book keeping, Different kinds of accounts.
2. Cash Book.
3. General Leger and Trial Balance.
4. Profit and Loss Account and Balance Sheet.
5. Simple technique of analysing financial statements.
6. Introduction to Budgetting.

**Books Recommended (Latest edition)**

Remington’s Pharmaceutical Sciences.

Year– 2<sup>nd</sup> Year (Diploma)

Theory Code PHS2106

**SUBJECT – HOSPITAL AND CLINICAL PHARMACY**

**Branch/Discipline – Pharmacy**

**Course Contents –**

Theory (75 hours)

**Part – I: Hospital Pharmacy:**

1. Hospitals Definition, Function, Classifications 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 material 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.
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 e.g. I.V sets B.G sets, Ryals tubes, Catheters, Syringes etc.
9. Application of computer in maintenance of records, inventory control, medication monitoring, drug information and data storage and retrieval in hospital and retail pharmacy establishments.

**Part –II: Clinical Pharmacy.**

1. Introduction to Clinical Pharmacy Practice –Definition, scope.
2. Modern dispensing aspects – Pharmacists and Patient counseling and advice for the use of common drugs, medication history.
3. Common daily terminology used in the Practice of Medicine.
4. Disease, manifestation and pathophysiology including salient symptoms to understand the disease like Tuberculosis, Hepatitis, Rheumatoid Arthritis, Cardiovascular diseases, Epilepsy, Diabetes, Peptic Ulcer, Hypertension.
5. Physiological parameters with their significance.
6. 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.
7. Adverse Drug Reactions:
    - (a) Definition and Significance.
    - (b) Drug – induced diseases and Teratogenicity.
  8. Drugs in Clinical Toxicity – Introduction, general treatment of poisoning, systematic antidotes. Treatment of insecticide poisoning, heavy metal poison, Narcotic drugs, Barbiturate, Organophosphours poisons.
  9. Drug dependences, Drug abuse, addictive drugs and their treatment, complications.
  10. Bio–availability of drugs, including factors affecting it.

**Books recommended (Latest editions)**

1. Remington’s Pharmaceutical Sciences.
2. Martindale The Extra Pharmacopoeia

**Practical Code –PHS2110**

**PRACTICAL (50 hours)**

**PRACTICAL (50 hours)**

1. Preparation of transfusion fluids.
2. Testing of raw materials used in (1).
3. Evaluation of surgical dressings.
4. Sterilization of surgical instruments, glass ware and other hospital supplies.
5. Handling and use of data processing equipments.