

SINGHANIA UNIVERSITY
SCHOOL OF PHARMACY AND MEDICAL SCIENCES

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SYLLABUS

For

Diploma in Pharmacy

ORDINANCE, SCHEME & SYLLABUS FOR DIPLOMA IN PHARMACY

Course Title	Diploma in Pharmacy
Abbreviation	D. Pharm
Type of Course	A Two years Diploma course
Pattern	Yearly
Award of the Degree	Diploma will be awarded for those passing in both the years as per rules and regulations.

O-D. Ph. 1. DURATION OF THE COURSE: The duration of the course shall be for two academic years, with each academic year spread over a period of not less than one hundred and eighty working days in addition to 500 hours practical training spread over a period of not less than 3 months.

O-D. Ph.2. ELIGIBILITY FOR ADMISSION: No. Candidate shall be admitted to Diploma in Pharmacy Pt. I unless he/she had passed any of the following examinations in all the optional subjects and compulsory subjects (Physics, Chemistry, Biology and /or Mathematics including English as one of the Compulsory subjects):

- Intermediate examination in Science; The First Year of the three year degree course in Science; 10+2 Examination(Academic stream) in Science;
- Pre-degree examination; any other qualification approved by the Pharmacy Council of India as equivalent to any of the above exam.

Admission of candidates to the Diploma in Pharmacy Part - I shall be made in order of merit on the basis of 'Pre-Pharmacy Test' conducted in accordance with the scheme of Examinations and syllabus laid-down by the University.

O- D. Ph.3. ELIGIBILITY FOR APPEARING IN EXAMINATION

- Eligibility for appearing at the Diploma in Pharmacy Part-I Examination: Only such candidates who produce-certificate from the Head of the Academic Institution in which he/she has undergone the Diploma in Pharmacy

Part-I course, in proof of his/her having regularly and satisfactorily undergone the course of study by attending not less than 75% of the classes held both in theory and in practical separately in each, shall be eligible for appearing at the Diploma in Pharmacy (Part-I) examination.

- (b) Eligibility for appearing at the Diploma in Pharmacy Part-II Examination: Only such candidates who produce certificate from the Head of the academic institution in which he/she has undergone the Diploma in Pharmacy Part-II course, in proof of his/her having regularly and satisfactorily attending not less than 75% of the classes held both in theory and practicals separately in each subject, shall be eligible for appearing at the Diploma in Pharmacy (Part-II) examination.
- (c) A candidate can have a relaxation of 10% attendance on medical ground by producing a certificate from medical officer of government hospital and a 5% relaxation by the vice chancellor on the recommendation of Dean, faculty.

O-D. Ph. 4. GENERAL

- (A) **Course of Study:** The course of study for Diploma in Pharmacy part-I and Diploma in pharmacy part-II shall include the subjects as given in the Tables I & II below. The number of hours devoted to each subject for its teaching is given against columns 2 and 3 of the Tables below.

TABLE-I Diploma in Pharmacy (Part-I)

Subject	Theory		Practical	
	hours /year	Hrs. / week	hours /year	Hrs. / week
Pharmaceutics-I	75	3	100	4
Pharmaceutical Chemistry-I	75	3	75	3
Pharmacognosy	75	3	75	3
Biochemistry & Clinical Pathology	50	2	75	3
Human Anatomy & Physiology	75	3	50	2
Health Education & community pharmacy	50	2		
	400	16	375	15

TABLE-II Diploma in Pharmacy (Part-II)

Subject	Theory		Practical	
	hours /year	Hrs. / week	hours /year	Hrs. / week
Pharmaceutics-II	75	3	100	4
Pharmaceutical Chemistry-II	100	4	75	3

Pharmacology & Toxicology	75	3	50	2
Pharmaceutical Jurisprudence	50	2	-	
Drug store and Business Management	75	3	-	
Hospital & Clinical Pharmacy	75	3	50	2
	450	18	275	11

- (b) Examinations: There shall be an examination for Diploma in Pharmacy (part-I) to examine students of the first year course and an examination for Diploma in Pharmacy (part-II) to examine students of the second year course. Each examination may be held twice every year. The first examination in every year shall be the annual examination and the second examination shall be supplementary examination of the Diploma in Pharmacy (part-I) or Diploma in pharmacy (Part-II) as the case may be. The examinations shall be of written and practical (including oral) nature. Carrying maximum marks for each part of subject, as indicated in Table III and IV:R-29(A) (Plan and scheme of examination for Diploma in Pharmacy).

O-D. Ph.5. PRACTICAL TRAINING

Diploma in Pharmacy (Part-III)

- (a) Period and other conditions of practical training:

After having appeared in Part-II examination of Diploma in Pharmacy conducted by Board/University or other approved examination Body or any other course accepted as being equivalent by the Pharmacy Council of India, a candidate shall be eligible to undergo practical training in one or more of the following institutions namely:

Hospitals/Dispensaries run by Central/State Government/Municipal corporations/ central Government Health scheme and Employees state Insurance scheme. A pharmacy, chemist and Druggist licensed under the Drugs and cosmetics Rules, 1945 made under the Drugs and Cosmetics Act, 1940 (23 of 1940). The institutions referred in sub-regulation(1) shall be eligible to impart training subject to the condition that the number of student pharmacists that may be taken in any Hospital, pharmacy, Chemist and Druggist licensed under the Drugs and cosmetics Rules, 1945 made under the Drugs and cosmetics Act, 1940 shall not exceed two where there is one registered pharmacist engaged in the work in which the student pharmacist is under going practical training, where there is more than one registered pharmacist similarly engaged, the number shall not exceed one for each additional such registered pharmacist. Hospital and Dispensary other than those specified in sub-regulation(1) for the purpose of giving practical training shall have to be recognized by pharmacy council of India on fulfilling the conditions specified in Appendix-D to these regulations.

In the course of practical training, the trainees shall have exposure to: Working knowledge of keeping of records required by various acts concerning the profession of pharmacy and Practical experience in the manipulation of pharmaceutical apparatus in common use, the reading, translation and copying of prescription including checking of dose, the dispensing of prescriptions illustrating the commoner methods of administering medicaments; the storage of drugs and medical preparations. The practical training shall be not

less than five hundred hours spread over a period of not less than three months provided that not less than two hundred and fifty hours and devoted to actual dispensing of prescriptions.

(b) Procedure to be followed prior to commencing of the training:

The head of the academic training institution, shall supply application in triplicate in ' Practical Training Contract Form for Qualification as pharmacist' to candidate eligible to under-take the said practical training, the contract form shall be as specified in Appendix-E to these regulations.

The head of an academic training institution shall fill section I of the contract Form. The trainee shall fill section II of the said contract Form and the Head of the institution agreeing to impart the training (hereinafter referred to as the Apprentice Master) shall fill section III of the said contract Form.

It shall be the responsibility of the trainee to ensure that one copy (hereinafter referred to as the first copy of the contract Form)so filled is submitted to Head of the academic training institution and the other two copies(hereinafter referred to as the second copy and the third copy)shall be filled with Apprentice Master(if he so desires)or with the trainee pending completion of the training.

- (c) Certificate of Passing Diploma in Pharmacy(part-III) on satisfactory completion of the apprentice period, the Apprentice Master shall fill Section IV of the second copy and third copy of contract form and cause it to be sent to the head to the academic training institution who shall suitably enter in the first copy of the entries from the second copy and third copy and shall fill section V of the three copies of contract form and thereafter handover both the second copy and the third copy to the trainee. Thus, if completed in all respect, shall be regarded as a certificate of having successfully completed the course of Diploma in Pharmacy (part-III).

O-D. Ph.6. Working out of Result

(a) Mode of examinations:

Each theory and practical examination in the subject mentioned in Table-III and IV shall be of three hours duration. A candidate who fails in theory or practical examination shall reappear in such theory or practical paper(s) as the case may be. Practical examination shall also consist of viva voce (oral) examination.

(b) Award of sessional marks and maintenance of records:

A regular record of both theory and practical class work and examinations conducted in an institution imparting training for Diploma in Pharmacy Part-I and Diploma in pharmacy Part-II courses, shall be maintained for each student in the institution and 20 marks for each theory and 20 marks for each practical subject shall be allotted as sessional.

There shall be at least three periodic sessional examinations during each academic year. The highest aggregate of any two performances shall form the basis of calculating sessional marks.

The sessional marks in practicals shall be allotted on the following basis:

Actual performance in the sessional examination.	10
Day to day assessment in the practical class work.	10

- (c) Minimum marks for passing the examination: A student shall not be declared to have passed Diploma in Pharmacy examination unless he/she secures atleast 40% marks in each of the subject separately in theory examination, including sessional marks and atleast 40% marks in each of the practical examination including sessional marks. The candidates securing 60% marks or above in aggregate in all subjects in a single attempt at

the Diploma in Pharmacy (part-I) or Diploma in Pharmacy (part-II) examinations shall be declared to have passed in first class the Diploma in Pharmacy (part-I) or Diploma in Pharmacy (part-II) examinations, as the case may be. Candidates securing 75% marks or above in any subject or subjects provided he/she passes in all the subjects in single attempt, will be given distinction in that subject(s).

- (d) Eligibility for Promotion to Diploma in Pharmacy (Pt. II): All candidates who have appeared for all the subjects and passed the Diploma in pharmacy part-I class. However failure in more than two subjects (each Theory paper or practical examination shall be considered as a subject) shall debar him/her from promotion to the Diploma in Pharmacy Part-II class. Such candidates shall be examined in the failing subjects only at subsequent. A candidate who fails to pass D Pharm Part - I exam. in four attempts shall not allowed to continue the course.
- (e) Improvement of sessional marks: Candidates who wish to improve sessional marks can do so by appearing in two additional sessional examinations during the next academic year. The average score of the two examinations shall be the basis for improved sessional marks in theory. The sessional of practicals shall be improved by appearing in additional practical examinations. Marks awarded to a candidate for day to day assessment in the practical class, can not be improved unless he/she attends regular course of study again.
- (f) Certificate of passing examination for Diploma in Pharmacy (part-II): Certificate of having passed the examination for the Diploma in pharmacy Part-II shall be granted by the Examining Authority to a successful student.
- (g) Certificate of Diploma in Pharmacy: A certificate of Diploma in pharmacy shall be granted by the Examining Authority to successful candidate on producing certificate of having passed the Diploma in Pharmacy part-I and Part-II and satisfactory completion of practical training for Diploma in pharmacy (part-III).
- (h) The chairman and at least one expert member of examining committee of the Examining Authority Concerned with appointment of examiners and conduct of pharmacy examination should be persons possessing pharmacy Qualifications.

PLAN AND SCHEME OF EXAMINATION FOR THE DIPLOMA IN PHARMACY

(Based on effective teaching for 180 working days in one academic session)

Table-III Diploma in pharmacy (part-I) Examination

Subject	Max. Marks in Theory			Max. Marks in Practical		
	Examination	Sessional	Total	Examination	Sessional	Total
Pharmaceutics-I	80	20	100	80	20	100
Pharmaceutical Chemistry-I	80	20	100	80	20	100
Pharmacognosy	80	20	100	80	20	100
Biochem. & Clinical Pathology	80	20	100	80	20	100
Human Anatomy & Physiology	80	20	100	80	20	100
Health Education & community	80	20	100			

pharmacy						
			600			500

TABLE-IV Diploma in Pharmacy (Part-II)

Subject	Max. Marks in Theory			Max. Marks in Practical		
	Examination	Sessional	Total	Examination	Sessional	Total
Pharmaceutics-II	80	20	100	80	20	100
Pharmaceutical Chemistry-II	80	20	100	80	20	100
Pharmacology & Toxicology	80	20	100	80	20	100
Pharmaceutical Jurisprudence	80	20	100			
Drug store and Business Management	80	20	100			
Hospital & Clinical Pharmacy	80	20	100	80	20	100
			600			400

Note: Each paper shall consist of six questions out of which five shall be attempted. Half of the total number of papers in each year will be set and assessed by external examiners and the remaining half will be set and assessed by the internal examiners. There shall be one external and one internal examiner for each practical Examination.

SYLLABUS

DIPLOMA IN PHARMACY (YEAR-I)

1.1 PHARMACEUTICS I

Theory (75 Hours)

Introduction of different dosage forms. Their classification with examples-their relative applications. Familiarization with new drug delivery systems. Introduction to Pharmacopoeias with special reference to the Indian Pharmacopoeia.

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.

Packaging of pharmaceuticals-Desirable features of a container and types of containers. Study of glass & plastics as materials for containers and rubber as a material for closure-their merits and demerits. Introduction to aerosol packaging.

Size reduction, objectives, and factors affecting size reduction, methods of size reduction- study of Hammer mill, ball mill, Fluid energy mill and Disintegrator.

Size separation-size separation by sifting. Official standards for powders. Sedimentation methods of size separation. Construction and working of Cyclone separator.

Mixing and Homogenization-Liquid mixing and powder mixing, Mixing of semisolids. Study of silverson Mixer-Homogenizer, planetary Mixer; Agitated powder mixer; Triple Roller Mill; Propeller Mixer, colloid Mill and Hand Homogeniser. Double cone mixer.

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.

Extraction and Galenicals-

(a) Study of percolation and maceration and their modification, continuous hot extraction-Application in the preparation of tinctures and extracts.

(b) Introduction to Ayurvedic dosage forms.

Heat process-Evaporation-Definition-Factors affecting evaporation-study of evaporating still and Evaporating pan.

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.

Introduction to drying process-Study of Tray Dryers; Fluidized Bed Dryer, Vacuum Dryer and Freeze Dryer.

Sterilization-Concept of sterilization and its differences from disinfection-Thermal resistance of microorganisms. Detailed study of the following sterilization process.

Sterilization with moist heat, Dry heat sterilization, Sterilization by radiation, Sterilization by filtration and Gaseous sterilization.

Aseptic techniques-Applications of sterilization process in hospitals particularly with reference to surgical dressings and intravenous fluids. Precautions for safe and effective handling of sterilization equipment.

Processing of Tablets-Definition; different type of compressed tables 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; films coating, enteric coating and micro-encapsulation (Tablet coating may be de.. in an elementary manner).

Processing of Capsules-Hard and soft gelatin capsules; different sizes of capsules; filling of capsules; handling and storage of capsules. Special applications of capsules.

Study of immunological products like sera, vaccines, toxoids & their preparations.

PRACTICAL (100 hours)

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

1. Aromatic waters³
2. Solutions⁴
3. Spirits²
4. Tinctures⁴
5. Extracts²
6. Creams²
7. Cosmetic preparations³
8. Capsules²
9. Tablets²
10. Preparations involving²
11. Ophthalmic preparations²
12. Preparations involving aseptic techniques²

Books recommended:(Latest editions)

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

1.2 PHARMACEUTICAL CHEMISTRY-I

THEORY (75 Hours)

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

Acids, bases and buffers- Boric acid, Hydrochloric acid, Strong Ammonium hydroxide, Sodium hydroxide and official buffers.

Antioxidants- Hypophosphorous acid, Sulphur dioxide, Sodium bisulphite, Sodium meta-bisulphite, Sodium thiosulphate, Nitrogen and Sodium nitrite.

Gastrointestinal agents-

Acidifying agents- Dilute Hydrochloric acid.

Antacids- Sodium bicarbonate, Aluminum hydroxide gel, Aluminum phosphate, Calcium carbonate, Magnesium carbonate, Magnesium trisilicate, Magnesium oxide, Combinations of antacid preparations.

Protective and Adsorbents- Bismuth sub carbonate and Kaolin.

Saline cathartics- Sodium potassium tartrate and Magnesium sulphate.

Topical Agents-

Protective- Talc, Zinc Oxide, Calamine, Zinc stearate, Titanium dioxide, silicone polymers.

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.

Sulphur and its compounds- Sublimed sulphur, Percipitated sulphur, Selenium sulphide.

Astringents- Alum and Zinc Sulphate.

Dental Products- Sodium fluoride, Stannous fluoride, Calcium carbonate, Sodium meta phosphate, Di-calcium phosphate, Strontium chloride, Zinc chloride.

Inhalants- Oxygen, Carbon dioxide, Nitrous oxide.

Respiratory stimulants- Ammonium carbonate.

Expectorants and Emetics- Ammonium chloride*, Potassium iodide, Antimony potassium tartrate.

Antidotes- Sodium nitrite.

Major Intra and Extra cellular electrolytes-

Electrolytes used for replacement therapy- Sodium chloride and its preparations, Potassium chloride and its preparations.

Physiological acid-base balance and electrolytes used- Sodium acetate, Potassium Acetate, Sodium bicarbonate Inj., Sodium citrate, Potassium citrate, Sodium lactate injection, Ammonium chloride and its injection.

Combination of oral electrolyte powders and solutions.

Inorganic official compounds of Iron, Iodine and Calcium, Ferrous Sulphate and Calcium Gluconate.

Radio pharmaceuticals and contrast media- Radio activity-Alpha; Beta and Gamma Radiations, Biological effects of radiations, Measurement of radio activity, G.M. Counter, Radio isotopes-their uses, Storage and precautions with special reference to the official preparations. Radio opaque contrast media-Barium sulfate.

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, Chloride, Sulfate, Iron and Heavy metals.

Identification tests for cations and anions as per Indian Pharmacopoeia.

PRACTICAL (75 hours)

- 1.** Identification tests for inorganic compounds particularly drugs and pharmaceuticals.
- 2.** Limit test for chloride, Sulfate, Arsenic, Iron and Heavy metals.
- 3.** Assay of inorganic pharmaceuticals involving each of the following methods of compounds marked with (*) under theory.
 - i. Acid-Base titrations(at least 3)
 - ii. Redox titrations (one each of permanganometry and iodimetry).
 - iii. Precipitation titrations (at least 2)
 - iv. Complexometric titration (Calcium and Magnesium).

Books recommended (Latest editions)

1. Indian pharmacopoeia.

1.3 PHARMACOGNOSY

THEORY (75 Hours)

1. Definition, history and scope of Pharmacognosy including indigenous system of medicine.
2. Various systems of classification of drugs and natural origin.
3. Adulteration and drug evaluation; significance of pharmacopoeial standards.
4. Brief outline of occurrence, distribution, outline of isolation, identification tests, therapeutic effects and pharmaceutical application 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.

(d) **Astringents**- Catechu.

(e) **Drugs acting on nervous system**- Hyoscyamus, Belladonna, Aconite, Ashwagandha, Ephedra, Opium, Cannabis, Nux-vomica.

(f) **Antihypertensive**- Rauwolfia.

(g) **Antitussives**- Vasaka, Tolu balsam, Tulsi.

(h) **Antirheumatics**- Guggal, Colchicum.

(i) **Antitumour**- Vinca.

(j) **Antileptics**- Chaulmoogra oil.

(k) **Antidiabetics**- Pterocarpus, Gymnema sylvestre.

(l) **Diuretics**- Gokhru, Punarnava.

(m) **Antidysenterics**- Ipecacuanha.

(n) **Antiseptics and disinfectants**- Benzoin, Myrrh, Neem, Curcuma.

(o) **Antimalarials**- Cinchona.

(p) **Oxytocics**- Ergot.

(q) **Vitamins**- Shark liver oil and Amla.

(r) **Enzymes**- Papaya, Diastase, Yeast.

(s) **Perfumes and flavoring agents**- peppermint oil, Lemon oil, Orange oil, lemon grass oil, sandal wood.

Pharmaceutical aids-Honey, Arachis oil, starch, kaolin, pectin, olive oil. Lanolin, Beeswax, Acacia, Tragacanth, sodium Alginate, Agar, Guar

gum, Gelatin.

Miscellaneous- Liquorice, Garlic, picrorhiza, Dirscorea, Linseed, shatavari, shankpushpi, pyrethrum, Tobacco.

Collection and preparation of crude drugs for the market as exemplified by Ergot, opium, Rauwalfia, Digitalis, senna.

Study of source, preparation and identification of fibers used in sutures and surgical dressings-cotton ,silk, wool and regenerated fibers.

Gross anatomical studies of-senna , Datura, cinnamon, cinchona, fennel, clove, Ginger, Nuxvomica & ipecacuanha.

PRACTICAL (75 hours)

1. Identification of drugs by morphological characters. Physical and chemical tests for evaluation of drugs wherever applicable.
2. Gross anatomical studies(t.s.)of the following drugs :Senna, Datura, cinnamon, cinchona, coriander, fennel , clove, Ginger, Nux-vomica, Ipecacuanha.
3. Identification of fibers and surgical dressing.
- 4.

1.4 BIOCHEMISTRY AND CLINICAL PATHOLOGY

THEORY (50 Hours)

Introduction to biochemistry. Brief chemistry and role of proteins, polypeptides and amino acids, classification, Qualitative tests, Biological value, Deficiency diseases.

Carbohydrates: Brief chemistry and role of carbohydrates, classification, qualitative tests, Diseases related to carbohydrate metabolism.

Lipids: Brief chemistry and role of lipids, classification and qualitative tests. Diseases related to lipids metabolism.

Vitamins: Brief chemistry and role of vitamins and coenzymes. Role of minerals and water in life processes.

Enzymes: Brief concept of enzymatic action. factors affecting it.

Therapeutics: Introduction to pathology of blood and urine. Lymphocytes and platelets, their role in health and disease. Erythrocytes-Abnormal cells and their significance. Abnormal constituents of urine and their significance in diseases.

PRACTICAL (75 Hours)

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, cretinine, 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.

1.5 HUMAN ANATOMY AND PHYSIOLOGY

THEORY(75 Hours)

Scope of Anatomy and physiology. Definition of various terms used in Anatomy. Structure of cell, function of its components with special reference to mitochondria and microsomes.

Elementary tissues: Elementary tissues of the body, i.e. epithelial tissue, muscular tissue, connective tissue and nervous tissue.

Skeletal System: Structure and function of Skelton .Classification of joints and their function. Joint disorders.

Cardiovascular System: Composition of blood, functions of blood elements. Blood group and coagulation of blood. Brief information regarding disorders of blood. Name and functions of lymph glands. 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.

Respiratory system: Various parts of respiratory system and their functions, physiology of respiration.

Urinary System: Various parts of urinary system and their functions, structure and functions of kidney. Physiology of urine formation. Patho-physiology of renal diseases and edema.

Muscular System: Structure of skeletal muscle, physiology of muscle contraction. Names, positions, attachments and functions of various skeletal muscles. physiology of neuromuscular junction.

Central Nervous System: Various parts of central nervous system, brain and its parts, functions and reflex action. Anatomy and physiology of automatic nervous system.

Sensory Organs: Elementary knowledge of structure and functions of the organs of taste, smell, ear, eye and skin. Physiology of pain.

Digestive System: names of various parts of digestive system and their functions. structure and functions of liver, physiology of digestion and absorption.

Endocrine System: Endocrine glands and Hormones. Location of glands, their hormones and functions. pituitary, thyroid. Adrenal and pancreas

Reproductive system: Physiology and Anatomy of Reproductive system.

PRACTICALS (50 hours)

- 1.** Study of the human Skelton.
- 2.** Study with the help of charts and models of the following system and organs:

Digestive system	Respiratory system	Ear
Cardiovascular system	Urinary system	
Reproductive system	Eye	
- 3.** Microscopic examination of epithelial 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 RBCs, clotting time of blood, erythrocyte sedimentation rate and Hemoglobin value.
- 6.** Recording of body temperature, pulse, heart-rate, blood pressure and ECG.

1.6 HEALTH EDUCATION AND COMMUNITY PHARMACY

THEORY (50 hours)

Concept of health: Definition of physical health, mental health, social health, spiritual health determinants of health, indicatory of health, concept of disease, natural history of diseases, the disease agents, concept of prevention of diseases.

Nutrition and health: Classification of foods, requirements, diseases induced due to deficiency of proteins, vitamins and minerals-treatment and prevention.

Demography and family planning: Demography cycle, fertility, family planning, contraceptive methods, behavioral methods, natural family planning methods, chemical methods, mechanical methods, hormonal contraceptives, population problem of India.

First aid: Emergency treatment in shock, snake-bite, burns, poisoning, heart disease, fractures and resuscitation methods, Elements of minor surgery and dressings.

Environment and health: Source 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.

Fundamental principles of microbiology: Classification of microbes, isolation, staining techniques of organisms of common diseases.

Communicable diseases: Causative agents, mode of transmission and prevention. Respiratory infections-chicken pox, measles, influenza, diphtheria, whooping cough and tuberculosis.

Intestinal infection-poliomyelitis, Hepatitis, cholera, Typhoid, food poisoning, Hookworm infection.

Arthropod borne infections-plague, Malaria, filariases.

Surface infection-Rabies, Trachoma, Tetanus, Leprosy.

Sexually transmitted diseases-Syphilis, Gonorrhoea, AIDS.

Non-communicable diseases: causative agents, prevention, care and control.

Epidemiology: Its scope, methods, uses, dynamics of disease transmission. Immunity and immunization: Immunological products and their dose schedule. Principles of disease control and prevention, hospital acquired infection, prevention and control. Disinfection, types of disinfection procedures, for-faces, urine, sputum, room linen, dead-bodies, instruments.

2.1 PHARMACEUTICS II

(Dispensing Pharmacy)

THEORY (75 Hours)

Prescriptions-Reading and understanding of prescriptions; 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, surface area and veterinary doses.

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-Type 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 a 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, colorants and flavors, 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

Syrups Mouth washes

Throat-paints

Elixirs

Douches

Ear Drops

Nasal drops

Sprays

Liniments

Lotions.

Biphasic Liquid Dosage Forms:

Suspensions (elementary study)-Suspensions containing diffusible solids and liquids and their preparations. Study of the adjuvant 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 agent. 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:

Trituration	fusion
chemical reaction	Emulsification.

Pastes: Differences 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 of drug absorption.

Dental and cosmetic preparations: Introduction to Dentifrices, facial cosmetics, Deodorants. Anti-perspirants, shampoo, Hair dressings and Hair removers.

Sterile Dosage forms:

Parenteral dosage forms-Definition, General requirements for parenteral dosage forms. Types of parenteral formulations, vehicles, adjuvant, processing and personnel, Facilities and quality control. Preparation of Intravenous fluids and admixtures-Total parenteral nutrition, Dialysis fluids.

Sterility testing: particulate matter monitoring- Faculty seal packaging.

Ophthalmic products: study of essential characteristics of different ophthalmic preparations. Formulation: additives, special precautions in handling and storage of ophthalmic products.

PRACTICAL (100 hours)

Dispensing of at least 100 products covering a wide range of preparations such as mixtures, emulsion, solutions, liniments, E.N.T. preparations. Ointments, suppositories, powders, incompatible prescriptions etc.

Books recommended: (Latest editions)

- 1.** Indian Pharmacopoeia.
- 2.** British pharmacopoeia.
- 3.** National formularies(N.F.I.,B.N.P)
- 4.** Remington's pharmaceutical sciences.
- 5.** Martindale's Extra pharmacopoeia.

2.2 PHARMACEUTICAL CHEMISTRY II

THEORY (100 hours)

1. Introduction to the nomenclature of organic chemical systems with particular reference to hetero-cyclic system containing up to 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 type of pharmaceutical formulations of these drugs and their popular brand names.

Antiseptics and Disinfectants-Proflavine*, Benzalkonium chloride, Cetrimide, Phenol, chloroxylenol, Formaldehyde solution, Hexachlophene, Nitrofurantoin.

Sulphonamides- Sulphadiazine, Sulphaguanidine, Phthalylsulphathiazole, Succinylsulphathiazole, Sulphadimethoxine, Sulphamethoxy pyridazine, Co-trimoxazole, sulfacetamide*

Antileprotic Drugs- Clofazimine, Thiambutosine, Dapsone*, solapsone,

Anti-tubercular Drugs- Isoniazid*, PAS*, Streptomycin, Rifampicin, Ethambutol*, Thiacetazone, Ethionamide, cycloserine, pyrazinamide*.

Antimoebic and Anthelmintic Drugs- Emetine, Metronidazole, Halogenated hydroxyquinolines, Diloxanide furoate, Paromomycin, Piperazine*, Mebendazole

,D.E.C.*

Antibiotics- Benzyl penicillin*, Phenoxy methyl penicillin*, Benzathine penicillin, Ampicillin*, Cloxacillin, Carbencillin, Gentamicin, Neomycin, Erythromycin, Tetracycline, Cephalexin, Cephaloridine, Cephalothin, Griseofulvin, Chloramphenicol.

Antifungal agents- Udecylenic acid, Tolnaftate, Nystatin, Amphotericin, Hamycin.

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

Tranquilizers-Chlorpromazine*, Prochlorperazine, Trifluoperazine, Thiothixene, Haloperidol*, Triperidol, Oxypertine, Chlordizepoxide, Diazepam*, Lorazepam, Meprobamate.

Hypnotics- Phenobarbitone*, Butobarbitone, Cylobarbitone, Nitrazepam, Glutethimide*, Methyprylon, Paraldehyde, Triclofosodium.

General Anaesthetics-Halothane*, Cyclopropane*, Diethyl ether*, Methohexital sodium, Thiopecal sodium, Trichloroethylene .

Antidepressant Drugs- Amitriptyline, Nortriptyline, Imperamine*, Phepelzine, Tranylcpromine.

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*.

Diuretic Drugs- Furosemide*, Chlorothiazide, Hydrochlorothiazide*, Benzthiazide, Urea*, Mannitol*, Ethacrynic Acid.

Cardiovascular Drugs- Ethylnitrite*, Glyceryl trinitrate, Alpha methyl dopa, Guanethidine, Clofibrate, Quinidine.

Hypoglycemic Agents- Insulin, Chlorpropamide*, Tolbutamide, Glibenclamide, Phenformin*, Metformin.

Coagulants and Anti coagulants- Heparin, Thrombin, Menadione*, Bisphydroxy-coumarin, Warfarin sodium.

Local Anaesthetics- Lignocaine*, Procaine*, Benzocaine,

Histamine and anti Histaminic Agents- Histamine, Diphenhydramine*, Promethazine, Cyproheptadine, Mepyramine*, Pheniramine, Chlorpheniramine*,

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

Non-steroidal anti-inflammatory agents- Indomethacin*, Phenylbutazone*, Oxyphenbutazone, Ibuprofen.

Thyroxine and Antithyroids- Thyroxine*, Methimazole, Methyl thiouracil, Propylthiouracil.

Diagnostic Agents- Iopanoic Acid, Propyl iodone, Sulfobromophthalein-sodium, Indigotindisulfonate, Indigo Carmine, Evans blue, Congo Red, Fluorescein sodium.

Anticonvulsants, cardiac glycosides, Antiarrhythmic, Antihypertensives & Vitamins.

Steroidal Drugs- Betamethasone, Cortisone, Hydrocortisone, Prednisolone, Progesterone, Testosterone, Oestradiol, Nandrolone.

Anti-Neoplastic Drugs- Actinomycin, 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's Extra pharmacopoeia.

PRACTICAL (75 hours)

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.

2.3 PHARMACOLOGY & TOXICOLOGY

THEORY (75 hours)

Introduction to pharmacology, scope of pharmacology.

Routes of administration of drugs, their advantages and disadvantages. Various processes of absorption of drugs and the factors affecting them. Metabolism, distribution and excretion of drugs.

General mechanism of drugs action and their factors which modify drugs action. Pharmacological classification of drugs. The discussion of drugs should emphasize the following aspects:

Drugs acting on the central Nervous system:

General anaesthetics- adjunction to anaesthesia, intravenous anaesthetics.

Analgesic antipyretics and non-steroidal

Anti-inflammatory drugs- Narcotic analgesics.

Antirheumatic and anti-gout remedies.

Sedatives and Hypnotics, psychopharmacological agents, anticonvulsants, analeptics.

Centrally acting muscle relaxants and anti parkinsonism agents.

Local anesthetics.

Drugs acting on autonomic nervous system.

Cholinergic drugs, Anticholinergic drugs, anticholinesterase drugs.

Adrenergic drugs and adrenergic receptor blockers.

Neurone blockers and ganglion blockers.

Neuromuscular blockers, used in myasthenia gravis.

Drugs acting on eye: Mydriatics, drugs used in glaucoma.

Drugs acting on respiratory system

Respiratory stimulants, Bronchodilators, Nasal decongestants, Expectorants and Antitussive agents.

Autocoids: physiological role of histamine and serotonin, Histamine and Antihistamines, prostaglandins.

Cardio vascular drugs

Cardiotonics, Antiarrhythmic agents, Anti-anginal agents, Antihypertensive agents, peripheral Vasodilators and drugs used in atherosclerosis.

Drugs acting on the blood and blood forming organs. Haematinics, coagulants and anticoagulants, Haemostatic , Blood substitutes and plasma expanders.

Drugs affecting renal function- Diuretics and anti-diuretics.

Hormones and hormone antagonists- Hypoglycemic agents, Anti--thyroid drugs, sex hormones and oral contraceptives , corticosteroids.

Drugs acting on digestive system-carminatives, digest ants, Bitters, Antacids and drugs used in peptic ulcer, purgatives ,and laxatives, Antidiarrhoeals, Emetics, Anti-emetics, Antispasmodics.

Chemotherapy of microbial diseases:

Urinary antiseptics, sulphonamides, penicillin, streptomycin, Tetracyclines and other antibiotics. Anti-tubercular agents, Antifungal agents, antiviral drugs, anti-leprotic drugs.

Chemotherapy of protozoal diseases, Anthelmintic drugs.

Chemotherapy of cancer.

Disinfectants and antiseptics.

PHARMACOLOGY

PRACTICAL (50 hours)

- 1.** The first six of the following experiments will be done by the students while
- 2.** the remaining will be demonstrated by the teacher.
- 3.** Effect of potassium and calcium ions, acetylcholine and adrenaline on frog's heart.
- 4.** Effect of acetyl choline on rectus abdomens muscle of frog and guinea pig ileum.
- 5.** Effect of spasmogens and relaxants on rabbits intestine.
- 6.** Effect of local anaesthetics on rabbit cornea.
- 7.** Effect of mydriatics and miotics on rabbit's eye.
- 8.** To study the action of strychnine on frog.

9. Effect of digitalis on frog's heart.
10. Effect of hypnotics in mice.
11. Effect of convulsants and anticonvulsant in mice or rats.
12. Test for pyrogens.
13. Taming and hypnosis potentiating effect of chlorpromazine in mice/rats.
14. Effect of diphenhydramine in experimentally produced asthma in guinea pigs.

2.4 PHARMACEUTICAL JURISPRUDENCE

THEORY (50 hours)

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.

Principles and significance of professional Ethics. Critical study of the code of pharmaceutical Ethics drafted by pharmacy council of India.

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.

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 whole sale distribution of drugs. The powers of Inspectors, the sampling procedures and the procedure and formalities in obtaining licenses under the rule. 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.

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 objections¹ and permitted advertisements - diseases which cannot be claimed to be cured.

Narcotic Drugs and psychotropic substances Act,1985-A brief study of the act with special reference to its objectives, offences and punishment.

Brief introduction to the study of the following acts:

Latest Drugs (price control) order in force.

Poisons Act 1919(as amended to date)

Medicinal and Toilet preparations (excise Duties) Act, 1955 (as amended to date).

Medical Termination of Pregnancy Act, 1971(as amended to date).

Books recommended:(Latest editions)

Bare Acts of the said laws published by Government.

2.5 DRUG STORE AND BUSINESS MANAGEMENT

THEORY (75 hours)

Part I Commerce (50 hours)

Introduction-Trade, Industry and commerce, Functions and subdivision of commerce, Introduction to Elements for Economics and Management. Forms of Business Organizations. Channels of Distribution.

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. 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.

Sales promotion, Market Research, Salesmanship, qualities of a salesman, Advertising and Window Display.

Recruitment, training, evaluation and compensation of the pharmacist.

Banking and Finance-Service and functions of bank, Finance planning and sources of finance.

Part II Accountancy (25 hours)

Introduction to the accounting concepts and conventions. Double entry Book Keeping, Different kinds of accounts. Cash Book. General Ledger and Trial Balance. Profit and Loss Account and Balance Sheet.

Simple techniques of analyzing financial statements. Introduction to Budgeting.

Books Recommended: (Latest editions)

2.6 HOSPITAL AND CLINICAL PHARMACY

THEORY (75 hours)

Part-I: Hospital Pharmacy:

Hospital-Definition, Function, classifications based on various criteria, organization, Management and health delivery system in India.

Hospital Pharmacy: Definition Functions and objectives of Hospital pharmaceutical services. Location, Layout, Flow chart of materials and men.

Personnel and facilities requirements including equipments based on individual and basic needs. Requirements and abilities required for Hospital pharmacists.

Drug Distribution system in Hospitals. Out-patient service,

In-patient services- types of services detailed discussion of unit Dose system, Floor ward stock system, satellite pharmacy services, central sterile services, Bed side pharmacy.

Manufacturing: Economical considerations, estimation of demand.

Sterile manufacture-Large and small volume parenterals, facilities, requirements, layout production planning , man-power requirements.

Non-sterile manufacture-Liquid orals, externals, Bulk concentrates. Procurement of stores and testing of raw materials.

Nomenclature and uses of surgical instruments and Hospital Equipments and health accessories.

P.T.C.(pharmacy Therapeutic Committee)

Hospital Formulary system and their organization, functioning, composition.

Drug Information service and Drug Information Bulletin.

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

Application of computers in maintenance of records, inventory control, medication monitoring, drug information and data storage and retrieval in hospital retail pharmacy establishment.

Part II: Clinical Pharmacy:

Introduction to Clinical pharmacy practice- Definition, scope.

Modern dispensing aspects- Pharmacists and patient counseling and advice for the use of common drugs, medication history.

Common daily terminology used in the practice of Medicine.

Disease, manifestation and patho-physiology including salient symptoms to understand the disease like Tuberculosis, Hepatitis, Rheumatoid Arthritis, Cardio-vascular diseases, Epilepsy, Diabetes, Peptic Ulcer, Hypertension.

Physiological parameters with their significance.

Drug Interactions: Definition and introduction. Mechanism of Drug Interaction. Drug-drug interaction with reference to analgesics, diuretics, cardiovascular drugs, Gastro-intestinal agents. Vitamins and Hypoglycemic agents. Drug-food interaction.

Adverse Drug Reaction: Definition and significance. Drug-Induced diseases and Teratogenicity.

Drugs in Clinical Toxicity- Introduction, general treatment of poisoning, systemic antidotes, Treatment of insecticide poisoning, heavy metal poison, Narcotic drugs, Barbiturate, Organo-phosphorus poisons.

Drug dependences, drug abuse, addictive drugs and their treatment, complications.

Bio-availability of drugs, including factors affecting it.

Books Recommended:(Latest editions)

- 1.** Remington's pharmaceutical sciences.
- 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.

SINGHANIA UNIVERSITY
BACHELOR OF PHARMACY (B. PHARM.)
DETAILED SYLLABUS
YEAR-I

PHARMACEUTICS-1: INTRODUCTION TO PHARMACY (THEORY)

. Pharmacy Profession:

Pharmacy as a career, Evaluation of Pharmacy profession, earlier period, Middle to Modern Ages.

Introduction to Pharmacopoeias with special reference to Indian Pharmacopoeia, B.P.; U.S.P.; and International Pharmacopoeia.

2. Metrology

Imperial, Metric and S.I., Weights and measures, Interco version

3. Classification of dosage forms:

Solids, Semisolids & Liquid dosage form.

Principles involved in the preparation of the following pharmaceutical products official in I.P., and their uses.

Purified water, Deionized water, Distilled water and water for injection

Aromatic water

Solutions

Spirits

Glycerines

Syrups

Elixirs

Lotions

Mucilages

Liniments

4. Pharmaceutical Additives :

Diluents, Vehicles, bases, solvents, Organoleptic additives, surfactants and their applications.

5. Size reduction and Size Separation

Definitions, factors affecting size reduction; principles, laws and factors affecting energy requirements, different methods of size reduction, study of Hammer mill, Fluid energy mill and disintegrator. Various methods & equipments employed for

size separation eg. sieving,, sedimentation, centrifugal elutriation microscopic methods etc.

6. Mixing and Homogenisation

Liquid mixing and powder mixing, mixing of semisolids, study of different types of mixers used in pharmaceuticals.

Number of lectures: 4

7. Clarification and Filtration:

Definitions, theory and Factors affecting Filtration, Types of filter media, Filter Aids, and Selection of filters.

Equipments like gravity filter, pressure filter, vacuum filters, filter press, leaf filters, continuous rotary drum Filter, edge filter, sand filter, Membrane filters. Centrifugal types filters; batch, semicontinuous & continuous type.

8. Heat Processes:

a. Evaporation Factors affecting evaporation, study of evaporating stills and evaporating pans. Heat transferring evaporators, Vapor compression evaporators, evaporation under reduced pressure.

b. Distillation: Importance of distillation in Pharmacy, methods of distillation. Brief introduction to freeze drying, sublimation, Desiccation and Exsiccation, Efflorescence and its importance.

Number of lectures: 10

9. Extraction and Galenicals :

Extraction processes, study of percolation and maceration and their modifications, Applications in the preparation of tinctures & Extracts.

Number of lectures : 4

PRACTICAL

1. Preparation of following classes of products, involving the use of calculations in metrology (at least 2 products from each category where applicable)

Aromatic waters

Injections

Solutions

Spirits

Glycerine

Syrups

Elixirs

Lotions

Mucilages

Liniments

Suppositories

Tables
Powders
Capsules

2. Study of one monograph from the latest edition of Indian Pharmacopoeia
Demonstration of equipments (working procedure) for

a. Size Reduction and Size Separation

Mixing and Homogenization
Clarification and filtration
Evaporation
Distillation
Percolation

PHARMACEUTICS-II: UNIT OPERATIONS

1. Introduction

Introduction to Pharmaceutical Engineering, Unit Operations concept and requirement; Materials and energy balances.

2. Conveying of Solids:

Belt Conveyors; Chain conveyors; Screw conveyors and Pneumatic conveyors.

3. Materials of Pharmaceutical Plant Construction, Factors affecting the material selection for Pharmaceutical plants:

Physical, chemical, Mechanical and economical. Suitability of different materials for different plants i.e. ferrous metals-Cast iron, steel, stainless steel; Non-ferrous metals - copper and alloys, aluminum and alloys, lead, tin, silver, nickel and alloys, chromium, zinc; Non-metals glass, stoneware, slate brick, concrete asbestos, plastics, rubber, timber, ceramics and enamel.

Corrosions : Types, causes, theories and methods of prevention of corrosion.

4. Environmental Pollution and safety hazards :

Mechanical, chemical, electrical fire and dust hazards; safety requirements; fire Extinguishers; accident records. Environment control and Effluent treatment.

5 . Flow of fluids :

Fluid statics and dynamics, Basic equations, law of conservation in fluid flow;

Measurement of pressure manometers; Types of flow, Reynold's number and its significance; distribution of velocities in a pipe; friction losses; pipe fittings and joints.

Measurement of fluid flow - Principles, and construction of venturimeter, orifice meter, pitot tube, weirs, rotameter, and positive displacement meter - current meter and disc meter. Flow controls - Plug cock, Globe valves, Gate valves, and water hammer, unidirectional valves, Automatic regulating valve.

Pumps - Reciprocating pumps, positive displacement pumps, rotary pumps -

volute and centrifugal pumps.

Blowers-Compressors, evacuators

6. Heat transfer :

Modes of heat transfer; heat transfer coefficient; OHTC; Convection - concept of film overall coefficient, Evaluation of Individual film coefficient; radiation - Stefan Boltzmann law; heating media, equipments, lagging. Fuels - solid, liquid, gases. Steam as heating medium - properties and uses of steam, steam traps, pressure reducing valve, steam heated heat exchanger, lagging, condensation etc. heating by electricity.

7. Distillation :

Theory of distillation - vapor liquid equilibrium relationship, volatility and relative volatility, Azeotropic -and Zeotropic mixture, phase diagrams etc; Rectification and construction of columns; molecular distillation; steam distillation; Enthalpy composition diagram and determination of number of theoretical plates; HETP.

8. Refrigeration :

Theory of refrigeration, refrigeration current cycle, equipments employed for large-scale refrigeration.

Air conditioning - humidification and dehumidification, cooling towers - Principles and applications; different types.

Humidity - Determination methods, methods of increasing and decreasing humidity. Application of humidity control in Pharmaceutical Industries.

9. Drying

Theory of drying - principles, equilibrium moisture content, rate of drying; Drying of dilute solutions and suspensions - drum dryer, spray dryer; Drying of solids - convection type tray dryer, tunnel dryer, rotary dryer, fluidized bed dryer, vacuum oven, freeze dryer, radiant heat dryers, Automation in drying process.

10. Leaching and Extraction :

Solid-liquid extraction, percolation, agitation; Liquid-liquid extraction; small and large scale equipment; problems of crude drug extraction; Theories of extraction of drugs, properties of solvents; Extraction methods - small and large scale, factors affecting, the choice of extraction, recovery of solvents from mare

11. Purpose of Engineering Drawing:

Use of precision drawing instruments and drawing materials, lines of Engineering and their conventions. Lettering : Printing letters and Figures, construction of ellipse, parabola, Hyperbola, cycloid and involute.

12. Element of Projection:

Free hand sketching, study of isometric objects into orthographic views, sections in orthographic projections. Orthographic and isometric projections of simple

geometrical solids like cylinder, cone, cube, prism and pyramids.

EXPERIMENTS:

Experiments based upon theoretical portion preferably on the following:

- 1 Effect of thickness of filter media, hydrostatic pressure size of filter media etc. on filtration rate.
2. Rate of drying, Equilibrium moisture content determination of factors affecting rate of drying.
3. Effect of number of balls and speed of ball mill on the grinding rate in ball mill.

Comparison of single stage and multiple stage extraction in solid-liquid extraction
Study of Reynold's number and flow of fluids.

- 6 . Estimation of overall heat transfer coefficient in distillation unit
7. Determination of flow rate by Orifice and Venturimeters.
8. Calibration of pressure gauge with manometers.

Efficiency of a simple distillation unit and effect of insulating materials on the efficiency.

Determination of efficiency of a steam distillation unit.

11. Determination of humidity by Psychometric method and physical - method.
12. Determination of hardness of water.

Effect of driving fluids, on efficiency of ejector pumps.

14. Calibration of rotameters.
15. Factors affecting liquid displacement in air lift pumps.

Freeze drying of a solution of antibiotic. Suspension of lacto - bacilli and evaluation.

PHARMACEUTICS-III: DISPENSING PHARMACY

1. Prescriptions

Reading and understanding of prescriptions

Modern methods of prescribing; common Latin abbreviations

2. Metrology

Reducing and Enlarging recipes; percentage calculations %

W/V, V/V, & w/w

Alcohol dilutions, use of Alligation methods; proof spirit

Isotonic solutions, mEq units

Displacement Value of suppositories

3 Posology

Dose and dosage of drugs Factors influencing dose.

Calculations of doses on the basis of age, sex and surface area

4. Powders :

Types of powders; their merits and demerits; compounding, storage and packaging of

- Effervescent powders
- Granules, cachets and tablet triturates
- Dusting powders

5. Liquid Dosage forms :

Preparation, merits, demerits storage and packaging of solutions and mixtures to pharmaceuticals-

6. Emulsions and Suspensions :

Emulsions - Definition; types and identification; merits and demerits; use of emulsifying agents and stability of Emulsions

Suspensions - Definition; Types; merits & demerits; use of suspending agents; Flocculated & Deflocculated suspensions; stability of suspensions

7. Semi-Solid Dosage forms :

Ointment bases; Dispensing; demerits and packaging

Aspects of Ointments

Pastes, Jellies, Poultices

Suppositories and Passeries

8. Tablets :

Types of tablets; merits and demerits storage and packaging

9 Capsules :

Hard and soft Gelatin Capsules -their merits and demerits; storage and packaging

10. Sterile Dosage forms :

Definition; Types and their merits and demerits -Elementary study of the formulation characteristics of the following types :

- Injectable preparations
- Ophthalmic and ENT Products
- Total Parenteral nutrition
- Dialysis fluids

General requirements of sterile

dosage forms. Handling, packaging, storage and dispensing of sterile dosage forms

11. Introduction to Ayurvedic/Unani Tibb dosage forms

12. Incompatibility in Prescriptions :

Physical, chemical, biological and therapeutic incompatibility

Labeling instructions and precautions while dispensing various dosage forms

14. Current Patent and Proprietary Products

Study of the following classes of patent and Proprietary products; Generic and selected brand names; Indications; contra indications; ADR; available dosage forms; dose and packing

-Antihypertensive drugs

-Antiamoebic drugs

-Antihistaminic, Antiemetics,

-Antacids and Ulcer healing drugs

-Anti-diarrhoeals and laxatives

-Respiratory drugs

-Antibiotics

-Analgesics - Antipyretics

PRACTICAL

1. Student's Orientation.,

Introduction to the laboratory equipment, weighing methodology, general instructions and handling of prescriptions, labeling instructions

2. Compounding and Dispensing of Prescriptions:

At least 50 prescriptions, representing the following classes of products, should be compounded and dispensed:

Powders; capsules; tablets; mixtures; Emulsions; Lotions & Liniments; Ointments; creams; pastes; suppositories; ENT preparations; Incompatibilities; Miscellaneous products

3. Current Patent and Proprietary Products:

A study of current patent and proprietary products. Students should be trained in patient counseling by discussing specific problems in major classes of patent and proprietary products

4. Prescription Reading and Pricing:

Minimum of 20 prescriptions from the clinical practice

Legal and Ethical aspects of Dispensing and compounding of prescriptions:
The students should be trained about these aspects evaluated by questionnaires.
Demonstration of Immunological products and pharmaceutical products involved in family planning programs.

PHARMACEUTICAL CHEMISTRY 1 (ORGANIC CHEMISTRY)

1. Basic Principles and concepts of Organic Chemistry:

Atomic and molecular orbitals, dipole moment, resonance, inductive and electromeric effects, intramolecular and intermolecular hydrogen bonding, acids and bases.

2. Stereochemistry:

Introduction, optical activity, stereoisomerism, specification of configuration, reactions involving stereoisomers, Baeyers Strain Theory and conformational analysis.

Structure, nomenclature, preparation and reactions/properties of the following groups of compounds (including mechanism of reactions wherever necessary).

3. Aliphatic & Alicyclic Hydrocarbons:

Alkanes, alkenes, alkynes, cycloalkanes.

4. Aliphatic Halohydrocarbons:

SN' and SN' reactions, chloroform, carbon tetrachloride, trichloroethylene and halothane.

5. Aliphatic Alcohols:

Primary, secondary and tertiary alcohols, methanol, ethanol, proof spirit, denatured

alcohol, methylated spirit, determination of alcohol in pharmaceutical preparations, di & trihydric alcohols: glycols, glycerol, ethylene glycol, propylene glycol, glyceryl trinitrate, allyl alcohol, acraldehyde, dimercaprol, ethobexadol, polyethylene glycols, polyoxyl 40 stearate, polysorbate.

6. Ethers:

Thioethers, divinyl ether, solvent ether, anaesthetic ether.

7. Aldehydes and Ketones:

Formaldehyde, trioxymethylene, paraformaldehyde, acetaldehyde and its polymers, chloralhydrate, dichloro phenaxone, methenamine manderate.

8. Saturated Monocarboxylic Acids and Esters..

Preparation and properties of formic acid, acetic acid and derivatives, propionic acid, butyric acid, valeric acid, palmitic acid and stearic acid ethylacetate, ethyl acetoacetate ethyl nitrate, pentaerythritol tetranitrate, dioctyl sodium sulphosuccinate, ethyl oleate, sodium lauryl sulphate, acylhalides, lactic acid,

lactides, lactones, glucuronic acid and gluconic acid.

9. Di & Tricarboxylic Acids:

Oxalic acid, malonic acid, succinic acid and their amide and imide derivatives, maleic acid and fumaric acid, malic acid, glutaric acid, tartaric acid, citric acid and adipic acid.

10 Aliphatic Amines and Related Compounds:

Alkylamines 8-hydroxy and 3-alkylamines, diamines, urea and ureides, dextropropoxyphene hydrochloride, cramiphen hydrochloride, dicyclamine hydrochloride, mustine hydrochloride, ethylenediamine hydrate, sodium calcium edetate, cyclamic acid calcium cyclamate, sodium cyclamate, thiambutosine.

11. Carbanions:

Reactions involving carbanions: malonic ester, synthesis of carboxylic acids, acetoacetic ester, synthesis of ketones, Decarboxylation of α -ketoacids and malonic acids, direct and indirect alkylation of esters and ketones, alkylation of carbonyl compounds via enamines, et, α -unsaturated carbonyl compounds (conjugate addition) including Michael and Diels- Alder reaction.

PRACTICAL

1. Lassaigne's test for N,S and halogens.

2. Identification of organic compounds based on solubility and functional group test.

Performance of qualitative test for alkaloids, steroids carbohydrates, glycosides, proteins and

amino acids.

4. Test for identity of selected drugs: atropine, caffeine, quinine, glucose, sucrose, barbiturates, ascorbic acid & sulphanilamide.

PHARMACEUTICAL CHEMISTRY II

(INORGANIC MEDICINAL PHARMACEUTICAL CHEMISTRY)

Sources of impurities in pharmaceutical substances and their control

The following topics will be treated covering an outline of methods of preparation, tests for identity, assay procedure and pharmaceutical uses of compounds covered under following headings:

Pharmaceutical aids and necessities: Acids, bases, buffers, antioxidants, water and pharmaceutically acceptable glass.

Major intra and extra cellular electrolytes: Major physiological ions, electrolytes used in replacement therapy, physiological acids-base balance, electrolytes used in acid-base therapy, electrolyte combination therapy.

Essential and trace ions: Copper, zinc, chromium, manganese, molybdenum, selenium, sulfur and iodine.

Gastrointestinal agents: Acidifying agents, antacids, protective and absorbents, saline cathartics.

Radiopharmaceutical used in medicine: Therapeutic application of isotopes, diagnostic application of isotopes, radio assay methods in medicine (preliminary knowledge).

Topical agents: Antimicrobials and astringents.

Dental products: Anticaries agents and dentifrices.

Miscellaneous Inorganic Pharmaceutical agents: Inhalants; respiratory stimulants, expectorants and emetics, antidote, tableting aids and suspending agents.

PRACTICAL

Limit tests for impurities in pharmacopial compounds.

Quantitative analysis-assay of the following compounds will be done: solution of ammonia, boric acid, sodium bicarbonate, sodium carbonate, ferrous sulphate, strong and weak iodine solutions, copper sulphate, chlorinated lime, sodium chloride, ammonium chloride, sodium sulphate, calcium gluconate, magnesium sulphate, arsenic trioxide, bismuth oxychloride, bismuth subnitrate.

PHARMACOGNOSY-1

1. Introduction, development, present status, future and scope, of Pharmacognosy. Scope and significance of biology in Pharmaceutical Sciences. Modern concept of Biology viz. molecular, Physiological and biochemical concept.

Introduction to different group of plant constituents and their tests, Definitions of selected botanical and Pharmacological terms.

4. Principles of classification of plants with special reference to:

i) Algae: Rhodophyta (Agar, Alginic acid)

Fungi: Eumycetes (Ergot, Yeast, Mushrooms)

iii) Gymnosperm: Pinaceae, Gnetaceae.

Angiosperm: Apocynaceae, Compositae, Convolvulaceae, Labiateae, Rubiaceae, Rutaceae,

Solanaceae, Scrophulariaceae, Umbelliferae, Leguminosae.

Study of plant tissue and ergastic cell inclusion with a view to identify & authenticate powder crude drugs with emphasis on anatomical structures of bark, stem (Monocot, Dicot).

6. Different systems of classification of crude drugs.

Different system of medicine practiced in India with specific reference to Unani, Ayurvedic and Homoeopathic medicines.

Factors involved in the production of drugs from wild and cultivated sources including cultivation, collection, drying storage, commerce and quality control.

Biological source, chemical tests for identity and salient microscopic features of commercial fibres used as surgical dressings and filtering aids. Cotton, silk, wool and rayon.

10. Natural Pesticides and insecticides.

PRACTICAL

1. Taxonomic study of families included in theory. Microscopic studies. Basic tissues, anatomy of bark, stem (Dicot, Monocot), root (Dicot, Monocot), seed, leaf and fruit. Trichomes, stomata, Calcium oxalate crystals.

3. Study of surgical fibers and dressings.

General chemical test for plant constituents such as alkaloids, glycosides, tannins, saponins, resins and proteins.

HUMAN ANATOMY & PHYSIOLOGY (THEORY)

I. INTRODUCTION

Definition and scope of anatomy, physiology and related sciences. Anatomical terms in relation to parts of the body, system and organs.

Study of human skeleton.

II. CELL

1. Structures and their functions
2. Genetic control of cell function

III. TISSUES OF THE BODY

Types of tissues and their functions

Physiology of muscle contraction

3. Neuromuscular transmission

IV. MEMBRANE

General principles of membrane permeability, transport

2. Mechanisms and electrophysiology of membrane

V. NERVOUS SYSTEM

1. General anatomy and physiology of neurons, synapses, neurohumoral transmission
2. Central nervous system, its various parts and their functions
RAS, Limbic system, Physiology of sleep, CSF, Sensory and motor pathway
4. Autonomic nervous system
5. Reflex arc, conditioned and unconditioned reflexes

VI. CARDIOVASCULAR SYSTEM AND BLOOD

- 1 . Structures and functions of heart and blood vessels
Heart sounds, ECG, Cardiac cycle, Blood pressure and its regulations
3. Circulation
4. Lymphatic system
5. Blood composition and functions
Blood groups, Rh factor, blood transfusion.

VII RESPIRATORY SYSTEM

- Gross anatomy of respiratory passages
Regulation and mechanism of breathing and pulmonary function test.
Transportation of gases.
Hypoxia, Anoxia, Dyspnoea, artificial respiration

VIII DIGESTIVE SYSTEM

- Gross anatomy of the alimentary canal
Physiology of digestion
Liver and pancreas

IX ENDOCRINE SYSTEM

- Physiological consideration of thyroid, parathyroid, pancreas, pituitry, suprarenal and gonads.

X REPRODUCTIVE SYSTEM

- Structure and function of male female reproductive organs.
Spermatogenesis
Puberty, ovulation, menstrual cycle, reproductive cycles
Pregnancy, lactation and menopause.

XI URINARY SYSTEM

- General disposition of organs of excretory system
Physiological consideration of urine formation and factors controlling it .
Micturition Regulation of body fluid constituents and their volumes,.

XII SPECIAL SENSES

- Physiology of hearing, taste, smell and vision.
Structure and functions of skin
Regulation of body temperature

PRACTICAL

I

Study of human skeleton and bones.

Study of models of organs of various body systems.

Study of surgical instruments

II HISTOLOGY

Handling of microscope

Identification of various tissues

III HAEMATOLOGY

Estimation of hemoglobin

Total RBC count

Total WBC count

Differential leukocyte count (DLC)

Platelets count

Determination of blood group and Rh factor.

Determination of ESR.(demonstration)

Determination of blood clotting and bleeding time

Identification of plasmodium species in the human blood

IV MUSCLE PHYSIOLOGY

Study of equipments used in experimental physiology.

Study of simple muscle curve

Muscle fatigue, effect of load and after load.

Effect of temperature on muscle contraction

V RESPIRATION

Pulmonary function test using spirometer.

VI NERVOUS SYSTEM

Study of reflex action

Recording of body temperature by various techniques

Recording and interpretation of EEG.

VII. CARDIOVASCULAR SYSTEM

Determination of blood pressure by palpatory and auscultating methods

2. Recording ECG and its interpretation

YEAR- II

PHARMACEUTICAL MATHS AND BIO STATISTICS

A. Statistics and Calculus

Condensation of the data collected; various forms of distribution tables.
Pictorial representation of frequency distribution in histograms and frequency polygons.
Measures of central tendency.
Measures of dispersion-range, mean deviation and standard deviation, coefficient of variation.
Significance tests-test of significance and chi-square test of significance.
Correlation between two variables
Interpolation.
Probability.
Use of log-log graph.
Limits of algebraic functions.
Lim Sin θ ; axioms on limits; of trig. Functions.
Differential coefficient of a function; derivatives of x^n , NoR.
Derivative formula of sum and difference of two functions generalizing it for more than two; derivative of product of two functions-generalizing it for the product of 3 functions; derivatives of quotient of two functions.
Derivative of trigonometrical functions and inverse functions.
Derivative by method of substitution.
Derivative of function of a function.
Derivative by method of substitution.
Derivative of function of a function.
Parametric functions; implicit function; log. Differentiation.
Higher order derivatives.
Partial derivatives.
Total differentials and total derivatives, higher order , partial derivative
Tangent and normal, velocity and acceleration
Approximate values, maxima and minima,
Derivation of formulae of integration from derivative formula
Integration of sum and difference of two functions
Integration by substitution, integration by parts,
The relationship of integration to summation
Definite integration, interpretation of definite integration, as an area , area of circle.
R and B (beta) functions
Double integrals, S.S (x,y) dydx over a particular region and its interpretation
Ordinary differential equations of the first order

Linear differential equations with constant coefficient
Simultaneous differential equations.

PHARMACEUTICAL MICROBIOLOGY INCLUDING BIOLOGICAL PHARMACY

1. Introduction:

History of Microbiology its branches and its importance; general microbiological techniques, identification, staining, enumeration etc. General classification of micro - organisms & study of bacteria, moulds, yeasts, viruses & actinomycetes - Nutrition, cultivation, Isolation and identification; Effect of moisture, temperature, ion, light and pH on the growth of micro - organisms; bacteriological media; Bacterial metabolism - EMP and TCA pathways; Salient features of common communicable disease producing microbes; study of different types of microscopy; bacterial resistance.

2. Immunology :

Introduction, Types of Immunity, Immunological products like sera, vaccines, toxoids: Phagocytosis, antigens, antibodies, components; Immune systems- humoral immunity, cellular immunity, privileged graft, sites, graft host reaction; tolerance, immunogenetics; Types of reactions and their application.

Preparation and standardization of Immunological products e.g. BCG vaccines, diphtheria toxoids, small pox vaccine, poliomyelitis vaccine; tetanus anti-toxin, diagnostic biologicals; General method of the preparation of bacterial vaccines, toxoids; viral vaccine; rickettsial vaccines; anti-toxins; serum-immune blood derivatives and other products relative to immunity; Interferon.

3. Disinfection

Factors influencing disinfection; dynamics of Disinfection; disinfectants, antiseptics and their evaluation.

4. Sterilization methods and Principles :

Methods of sterilization; Physical, Chemical, Heat, radiation, gaseous, filtration. Evaluation of the efficiency of sterilization methods; Equipments employed in large scale sterilization. Examples of the materials sterilized by different methods. Sterility indicators.

5. Sterility testing of pharmaceutical products:

Sterility testing of products according to IP, BP and USP. Sterility testing of parenteral products - solids, liquids; Ophthalmic and other sterile products according to the I.P., B.P. and U.S.P. Sterility testing of sterile surgical devices; dressings, implants, absorbable, haemostats, surgical ligatures and sutures, surgical catgut etc.

6. Aseptic Technique :

Designing of aseptic area ,laminar flow equipments; study of different sources of contamination aseptic area and methods of prevention.

7. Fermentation Technology:

Fermentation methods and general requirements; study of media, equipments, sterilization methods, aeration process, stirring, etc. Large scale production fermenter design and its various controls. Study of the production of - penicillins, citric acid, fungal diastase and Dextran.

8. Microbiological Standardization

Microbiological methods for standardization of antibiotics, vitamins and amino acids;

Immunoassay; Assessment of a new antibiotic and testing of antimicrobial activity of a new substance.

9. Microbial spoilage and preservation of Pharmaceutical products:

Types of spoilage; factors affecting the microbial spoilage of pharmaceutical products.,

sources and types of microbial contaminants; assessment of microbial contamination and spoilage; preservation of pharmaceutical products using antimicrobial agents; Evaluation of microbial stability of formulations.

10. Control of microbial contamination during manufacture :

General aspects-environmental cleanliness and hygiene, quality of starting materials, process design, quality control and documentation.

11. Glandular products

Preparation of extracts and isolation of pure substances for the preparation of dosage

forms, e.g. Pituitary, Adrenal, pancreas, Thyroid, Parathyroid, Ovary, liver, stomach etc.

PRACTICAL

Exercise illustrating the course contents of theory including :

Preparation of various types of culture media

Studying of different laboratory equipments and processing e.g. B.O.D. incubator, laminar flow, aseptic hood, autoclave, hot air sterilizer, deep freezer, refrigerator, microscopes etc.

Subculturing of aerobic and anaerobic bacteria, fungus and yeast, Nutrient stabs and slants preparations.

Various staining methods-simple, Grams staining and acid fast staining, structural staining etc.

Isolation of pure culture of micro-organisms and identification of micro-organisms.

Evaluation of sterilizing techniques.

Evaluation of antiseptic and disinfectants e.g. RWC, FDA method and chick martin.

Sterility testing-different methods as per IP/BPIUSP
Hanging drop slide preparation
Biochemical reactions-starch hydrolysis, nitrate reduction, litmus milk test, gelatin liquification and haemolysis of blood.
Microbial viable count in a pharmaceutical product, total count of bacteria
Thermal death time
Microbiological assay of antibiotics & vitamin B12
Test for limit of alkalinity of glass
Pyrogen testing
Standardization of surgical dressings and sutures and ligatures
Studying the effect of Temperature, pH on the medium etc. on growth.
Isolation of an antibiotic producer.
Bacteriophage isolation and characteristics
Standard analysis of water & Biochemical oxygen demand
Normal throat flora
Studying of the environment microflora and testing of aseptic area e.g. dextrose injection, calcium gluconate injection, oily injections, injections of vitamins etc.

PHARMACEUTICS-V: PHYSICAL PHARMACY

1. Complexation and Drug action:

Metal complexes, Organic molecular complexes, Inclusion compounds, methods of analysis, crystalline structure of complexes, thermodynamic treatment of stability constants, protein binding.

2. Kinetic and Drug Stability:

Rates and orders of reactions, influence of temperature and other factors on reaction rates, Decomposition and stabilization of Medical agents, Accelerated stability analysis.

3. Surface and interfacial phenomenon:

Surface and interfacial tension, surface free energy, measurement of surface and interfacial tension, spreading coefficient, complex films, adsorption phenomenon, adsorption at solid/liquid interface.

Surface activity, general classification of surfactants, hydrophilic-lipophilic system, solubilization, factors affecting solubilization, mechanism of solubilization, pharmaceutical applications of solubilization, co-solubilization. Micelle formation, factors affecting micelle formation, determination of critical micelle concentration. Detergency, Emulsification, Wetting agent, foaming agent, Antifoaming agent. Medicinal and Pharmaceutical application of surfactants.

4. Colloids and Macromolecular system :

Introduction, Types of colloidal systems, optical properties of colloids, kinetic properties

of colloids, Electrical properties of colloids, stabilization. Interaction of colloids.

5. Rheology:

Fundamentals of Rheology, Introduction, Types of flow, quantitative measurement of flow, mechanical models to illustrate viscoelasticity, Thixotropy, Measurement of thixotropy, Thixotropy in formulations, Rheology of disperse systems, Application of Rheology to Pharmacy, Methods of measuring viscosity.

6. Micromeritics:

Introduction, importance in Pharmacy, fundamental properties of collection of particles

like particle size, particle size distribution, particle shape, particle volume, particle number, surface area, methods for determining particle size, surface area and particle volume, derived properties of loose powder, flow properties of powders, Angle of repose, factors affecting flow of powders.

7. Coarse Dispersions:

Suspensions - Interfacial properties of suspended particles, settling in suspensions,

formulation of suspension, Emulsions; theories of emulsification, physical stability of emulsions, preservation of emulsions, rheologic properties of emulsions, phase equilibria and emulsion formulation.

8. Diffusion and Dissolution:

Steady state diffusion, procedures and apparatus, Dissolution, drug release, diffusion principles in biologic systems, vapor sorption and transmission and thermodynamics of diffusion.

PRACTICALS

Preparation and properties of simple complexes

Design, Conduction and reporting of accelerated testing in studying chemical stabilization against hydrolytic decomposition of drugs.

Determination of surface and interfacial tension ,

Preparation and properties of colloids.

Viscosity determination of Newtonian and Non-Newtonian liquids by one point and multipoint viscometers.

Determination of HLB value of surfactant by saponification method.

Determination of HLB value by modified Griffin acacia emulsion method.

Determination of spreading coefficient of organic liquid by stalagamometer.

Determination of particle size by optical method.

Determination of particle size by sieving method and efficiency of screening operation.

Determination of particle size by sedimentation method using and Anderson pipette.

Determination of flow properties of powder through the tube as a function of length of

tube, diameter of orifice of tube and pressure head.

Experiments demonstrating the measurement of angle of repose of powders and

the factors
affecting.

Determination of CMC (Critical Micelle Concentration) of surfactants by surface tension methods.

Experiments demonstrating the usefulness of solubilizing agent in forming a clear liquid

phase of two immiscible liquids (Ternary phase diagram) .

Qualitative and quantitative study of adsorption phenomenon.

Determination of bulk density of pharmaceutical solid

Any other new experiment that can be included from time to time in support of the theoretical aspects of the course.

PHARMACEUTICAL CHEMISTRY III: PHARMACEUTICAL ANALYSIS-1 (INORGANIC CHEMISTRY)

1. Introduction: Significance of quantitative analysis in quality control, different techniques of analysis.

2. Acid-base titrations

Theories of acidimetry and alkalimetry, classification, direct titration of strong acids, weak acids, strong bases & weak bases.

Preparation and standardization of acids and bases. Some exercises related to the determination of acids & bases. Some official assay procedures e.g. boric acid, hydrochloric acid, phosphoric acid, sodium hydroxide, calcium carbonate, ammonium hydroxide, nitric acid, sulfuric acid.

3. Oxidation & reduction titrations:

Concepts of oxidation and reduction, redox reactions, strengths & equivalent weights of oxidizing and reducing agents, redox indicators, potassium permanganate titrations, iodometry & iodimetry, ammonium sulphate titrations, potassium iodate titrations. Pharmaceutical applications, preparation and standardization of redox titrants e.g. sodium thiosulphate etc. Some exercises related to determination of oxidizing and reducing agents in a given sample shall be covered.

4. Precipitation titrations

Preparation & standardization of titrants like silver nitrate, ammonium thiocyanate; titrations according to Mohr's and Volhard's methods; ammonium and potassium thiocyanate titrations; indicators; applications in pharmaceutical analysis.

5. Diazotisation titrations

Different conditions involved in diazotisation of different amines, end point determination, pharmaceutical analytical applications such as in the assay of sulfonamides.

6 Gravimetric analysis

Introduction, precipitation techniques, supersaturation, coprecipitation, digestion, washing of the precipitates, filtration paper and crucibles, ignition, specific examples of Gravimetric estimations like barium as barium sulphate, aluminum as aluminum oxide, calcium as calcium oxalate, magnesium as magnesium pyrophosphate. Other organic precipitants.

7. Non-aqueous titrations

Theoretical considerations, scope and limitations, acid base equilibria in non-aqueous media, titration of weak bases, titration of weak acids. Pharmaceutical products should be selected for illustration e.g. ephedrine, methyldopa, adrenaline acid tartarate etc.

8. Complexometric titrations

Types of Complexometric titrations, metal ion, indicators, factors influencing the stability of complexes and applications e.g. calcium gluconate, bismuth carbonate, bismuth subnitrate.

PRACTICAL

Acid base titrations: Preparation and standardization of acids and bases, some exercises related to the determination of acids and bases separately and in mixture form. Some official assay procedures e.g. of boric acid, ascorbic acid shall also be covered.

Oxidation-reduction titrations: Preparation and standardization of some redox titrants e.g. potassium permanganate, potassium dichromate, iodine, sodium thiosulphate etc. Some exercises related to the determination of oxidizing and reducing agents in the sample shall be covered. Exercises involving use of potassium iodate, potassium bromate, 2,6-dichlorophenol indophenol, ceric ammonium sulphate shall be performed.

Precipitation titrations: Preparation and standardization of titrants like silver nitrate and ammonium thiocyanate, titrations according to Mohr's and Volhard's methods.

Gravimetric analysis: Determination of water of hydration, some exercises related to Gravimetric estimation of metal ions such as barium, magnesium & calcium shall be covered.

PHARMACEUTICAL CHEMISTRY IV: ORGANIC CHEMISTRY INCLUDING HETEROCYCLIC AND MEDICINAL CHEMISTRY)

1. Aromatic Compounds: Structure and resonance of benzene, aromatic character, mechanism of electrophilic aromatic substitution, orientation effects in electrophilic substitution, nucleophilic aromatic substitution.
2. Preparation, properties and actions of. Phenols sulphonic acids and derivatives, carboxylic acids, carboxamides, nitro compounds, amines, diazonium salts, aryl halides and ketones.
3. Poly nuclear aromatic hydrocarbons: Naphthalene, phenanthrene and

anthracene.

4. Heterocyclic compounds: Study of fundamentals of heterocyclics, nomenclature, methods of synthesis and important chemical reactions of the following:

Five-membered heterocycles: furan, thiophene, pyrrole, thiazole, oxazole, imidazole, pyrazole, triazole and tetrazole.

Six-membered heterocycles: Pyridine, pyridazine, pyrimidine, pyrazine and pyrones. Benz-fused heterocycles: Quinoline, isoquinoline, indole, acridines and xanthone.

5. The following topic shall be treated covering outlines of synthetic procedures (of selected drugs), uses, structure activity relationship including physicochemical and steric aspects and mode of action.

Sedatives and hypnotic, thyroid hormones and antithyroid drugs, coagulants and anticoagulants, local anesthetics, general anesthetics, opioid analgesics, CNS stimulants, antiseptics and disinfectants, sulfonamides and surfactants.

PRACTICAL

1. Identification of organic compounds and preparation of simple derivatives. Synthesis based on O- and N-acetylation, nitration and bromination.

PHARMACOGNOSY-II

1. Modern concept of Pharmacognosy, sources of drugs from biological, marine and plant tissue culture.

2. Classification and chemistry of carbohydrates. Study of drugs dealing with biological sources, geographical distribution, collection, commercial production, chemical constituents, chemical tests for identity, substitutes, adulterants and uses of the following drugs.

Starches, Acacia, Tragacanth, Sterculia, Guar gum, Plantago and Honey.

3. Study of lipids, their chemistry, classification & biogenesis, lipid containing drugs dealing with general methods of extraction & purification of fixed oils, biological source, chemical constituents, tests for identity and uses of the following:

Arachis oil, Castor oil, Sesame oil, Cotton seed oil, Olive oil, Chaulmoogra oil, bees wax.

4. Drugs of animal origin: Shellac, Cochineal, cantharides, spermaceti, wool fat.

5. Tannin containing drugs. Catechu (Black & Pale), Tannic acid, Myrobalan, Katha industry in India.

6. Protein containing drugs: General chemistry and study of amino acids, Gelatin.

7. Plant allergens and allergenic substances.

8. Hallucinogens, narcotics and common poisonous plants of India.

9. General study of formation of secondary metabolites". Biogenesis of primary metabolites and importance of photosynthesis in formation of primary metabolites and their relationship to the formation of secondary metabolites (Calvine Cycle, TCA cycle, shikimic acid pathway, Embden Merrhoffs pathway, acetate hypothesis, isoprenol compound biosynthesis).

10. Evaluation of crude drugs.

PRACTICAL

1. Microscopic and chemical study of the following powdered drugs.

Leaf - Senna, Datura

Stem - Ephedra

Root - Rauwolfia

Seed - Nux-vomica. plantago

Bark - Cinchona Fruit- Fennel

2. Identification of the drugs on the basis of their organoleptic and chemical tests included in 2,3,4 & 5.

PATHOPHYSIOLOGY, TOXICOLOGY AND HEALTH EDUCATION

I General aspect of pathophysiology - Atrophy, necrosis, pain, irritation, inflammation. shock, allergy

II. Pathophysiology and clinical assessment of -

1. Disorders of cells and tissues - hypoplasia, hyperplasia, hypertrophy, metaplasia, neoplasia and general considerations

2. Disorders of blood cells - leukopenia, leukemia, erythrocyte disorders (anemia polycythemia etc.), hemorrhagic diseases (thrombocytopenia, fibrinogen deficiency, purpura etc.)

3. Disorders of blood vessels and heart - atheroma, arteriosclerosis, aneurysms, thrombophlebitis, embolism, varicose veins, congestive cardiac failure, ischaemic heart disease, rheumatic heart diseases, arrhythmia, hypertension, Burger's disease

4. Disorders of the respiratory tract - tonsillitis, bronchitis, bronchial asthma, emphysema, cough.

5. Disorders of the digestive tract -.gastritis, peptic ulcers, pancreatitis, cirrhosis of the liver, jaundice

6. Disorders of the urinary system - glomerulonephritis, renal calculi

7. Disorders of the nervous system and special senses- Multiple sclerosis, hypoxia, dementia,

Parkinsons' disease, chorea, Alzheimer's disease, migrain, depression, .schizophrenia

8. Disorders of the reproductive system - Impotency, infertility, cryptorchism

9. Disorders of bone, joints and cartilages - Osteoporosis, gout, arthritis, ricketts
10. Disorders of eye - glaucoma and cataract

III. Toxicology

Definition, scope and its branches
Teratogenicity and Carcinogenicity
Toxicity of heavy metals and their antidote
Management of poisoned patients

IV. Health Education

Spread and prevention of communicable disease- AIDS, Sexually Transmitted Disease, Small pox, measles, influenza, diphtheria, whooping cough, meningitis, tuberculosis, polio-militias, viral hepatitis, cholera, typhoid, diarrhea, amoebiasis, malaria, filariasis, rabies, tetanus, leprosy.

Control of population explosion, national family program means of contraception (mechanical, chemicals, surgical, Immunological, physical and physiological).

Immunisation – various vaccines, toxoids and their uses.

PHARMACOLOGY-I (THEORY)

I. General Pharmacology

Definition, scope and branches of pharmacology. Historical development with special reference to India

Sources of drugs

Routes of drugs administration and drug delivery systems

Dynamics of absorption, distribution and excretion of drugs

Basic pharmacokinetic parameters employed in the use of drugs, their bioavailability and biotransformations, metabolizing

enzymes as targets of drugs action (induction and inhibition)

Mechanisms of drugs action, drug receptors and cellular signaling systems

Drug antagonism and synergism

Drug dependence and related conditions

Adverse drug effects and their monitoring, Iatrogenic diseases

Pharmacogenetics

II. Pharmacology Of Autonomic Nervous System

Cholinergic receptors, cholinergic drugs (parasym-pathomimetics, cholinomimetics, anticholinesterases), anticholinergic drugs

Adrenoceptors, sympathomimetics, adrenoceptors blockers and adrenergic neurone antagonists

Drugs action on autonomic ganglia (ganglionic stimulants, ganglion blocking agents)

Neuromuscular blocking agents and centrally acting muscle relaxants

III. Autocoids

Histamine, Antihistaminic

Serotonin, agonists and antagonists
Arachidonic acid metabolites
Angiotensin, Plasminins, VIP, neurotensin, substance P, PAF

IV Drugs In Ocular Pharmacology

Mydriatic and miotic agents and drugs used in glaucoma

PRACTICAL

1. Study of instruments used in experimental Pharmacology, smoking and fixing a kymograph
2. Handling of laboratory animals
3. Techniques of drug administrations in animals
4. Influence of route of administration of drugs on drug response
5. Experiments on isolated tissue preparations
 - i. To record the CRC of acetylcholine using frog rectus
 - ii. To record CRC of acetylcholine using guinea pig ileum
 - iii. Determination of dose ratio
 - iv. Study of competitive antagonism using acetylcholine and histamine as agonist
 - v. Potentiation of acetylcholine responses with anticholinesterases
 - vi. Identification of an agonist using isolated tissue (frog rectus abdominus muscle, guinea pig ileum)
 - vii. Determination of pD₂ value
6. Study of drug absorption in vitro
7. Determination of intraocular pressure in rabbits

COMPUTER APPLICATIONS

1. History of Computer development and respective generations:

Abaceer, Napier, Bonar, Slide rule, PASCAL'S calculator. Need to use computers, applications in pharmacy and in general

2. Computer Classification:

Mainframe, Mini, and Micro computers, comparison of Analogue and Digital computers, Hardware and software, calculator and computer.

3. Operating Systems:

Introduction to types of operating systems, UNIX, MS-DOS etc. RAM, Virtual Memory etc.

4. Type of Languages:

conventional languages, Their advantages, limitations; C, PASCAL, FORTRAN, Programming of these languages

5. Introduction to Computer Networks:

Architecture of seven layers of communications

6. Introduction to Data Structure:

Like Queues, list, trees, Binary trees algorithms, Flow chart, Structured Systems Analysis and development, Ingress-SQL, Gateways etc. Statistics, methodologies, computer Graphics; Introduction

7. Basic language:

Constraints and Variables: Character set, constraints, variables, Naming the variables getting data into memory, LET, INPUT, READ, DATA, Print Statement.

Expressions:

Arithmetic expression, Hierarchy of operations, Rules of Arithmetic, Evaluation of expressions, Relational expressions Logical operations, Library functions.

Printer control:

Comma and semicolon control, the TAB funedon. PRINT, LPRINT.

Jumping, Branching and Looping:

GOTO, IF THEN, ON GOTO, FOR NEXT Statements.

Functions and Subroutines:

User defined functions, subroutines, subscripted variables.

8. Programming (Tutorial)

'C', PASCAL, FORTRAN

YEAR-III

PHARMACEUTICS-VI : HOSPITAL AND CLINICAL PHARMACY INCLUDING DRUG INTERACTIONS

Part 1-Hospital Pharmacy

1. Status of health delivery systems in India. Definition and role of hospitals in the health delivery systems. Types of hospitals.
2. Hospital Pharmacy, Definition, functions and objectives of hospital pharmacy, Location, Layout & flow chart of material and men, personnel and facilities required, including equipments.
3. Drug distribution system in Hospitals:
 - a. Out patients
 - b. In patients: Detailed discussion of
 - i. Unit dose dispensing
 - ii. Floor ward stock system & satellite pharmacy services
 - iii. Central sterile services; bed side pharmacy
 - iv. Prepackaging
4. Establishment of an OTC counter & dispensing; personnel., space; equipment; apparatus and other facilities required for; Methods to achieve safe and efficient and speedy dispensing of drugs.
5. Maintenance of records of issue and use of Narcotics and Dangerous drugs, Ward stock medicines and emergency drugs.
6. Medical Stores:

Objectives, Layout facilities; Procedures for procurement of drugs and supplies from medical stores depot, manufacturer, distributor, local market; procedure and limits of emergency purchase.
7. Pharmacy Therapeutics Committee:

Constitution and functions of Pharmacy therapeutics committee, Hospital formulary system and their organization, Functions and composition.
8. Drug Information service and drug information bulletin
9. Manufacturing of pharmaceuticals in Hospitals
 - a. Sterile Manufacture
Large and small volume parenterals; facilities, requirements, layout, production

planning, manpower requirements

b. Non-sterile manufacture.

Liquid orals, external bulk concentrates

10. Nomenclature and uses of surgical instruments, hospital equipments and health accessories

Part II-Clinical Pharmacy and Drug Interactions

11. Introduction to clinical pharmacy practice

Definition and scope

Common daily terminology used in the practice of medicine

12. Functioning and working of clinical pharmacy unit; manpower requirements

13. Methodology and techniques of Analysis of drug contents and their metabolites in blood and other biological fluids and to correlate the therapeutic efficacy with drug concentrations in biological fluids

14. Biological half life; pKa values, pH-partition coefficient and stability with reference to clinical applications

15. Pharmacists and patient counseling including specific examples

16. Drug interactions

a. Definition and Introduction

Mechanism of drug interactions

b. Drug - Drug Interactions with reference to Analgesics, Diuretics, Cardiovascular drugs, Gastrointestinal agents, Vitamins and Hypoglycemic drugs

17. Adverse drug reactions

a. Definition and significance

b. Drug Induced disease and teratogenicity

18. Drugs in clinical toxicity:

Introduction, general treatment of poisoning, systemic antidotes, Treatment of poisoning due to insecticides, heavy metals, narcotics, barbiturates, organophosphorous compounds

19. Drug dependence, Drug abuse, addictive drugs and their treatment, complications

PRACTICAL

1. Laboratory testing for drugs and their metabolites in Urine/Blood

2. Preparation of parenterals products by the following methods

Asceptic technique, involving sterilization by filtration Involving terminal steam sterilization

3. Demonstration of some common surgical instruments, hospital equipments and health accessories
 4. Common daily terminology used in the practice of medicine
 5. Monograph on drug interactions (at least one monograph for each student)
 6. Sterilization of following classes of products
 - a. All glass syringes, with metallic needles
 - b. Surgical dressings
 - c. Surgical Equipments
 - d. Surgeon's Gloves (Rubber)
 - e. Ointment bases (Petroleum based)
 - f. Powders (Starch, talcum)
- Any other experiment illustrative of theory

PHARMACEUTICS-VII: FORENSIC PHARMACY AND ETHICS

1. Historical Background:

Drug legislation in India, Code of Ethics for Pharmacists

2. Drug Laws:

(A detailed study : Case study (actual/simulated) inclusive of recent amendments)

- a. Prevention of cruelty of animals act
- b. Pharmacy Act 1948
- c. Drugs and cosmetic Act 1940, Rules 1945
- d. Narcotic Drugs and Psychotropic substance Act, and Rules thereunder
- e. Drugs and Magic Remedies (Objectionable Advertisements) Act 1954
- f. Medicinal and Toilet Preparations (Excise Duties) Act 1955, Rules 1976
- g. Poison Act
- h. Factory Act
- i. Delhi shops and Establishment Act
- j. Medical termination of pregnancy Act
- k. The Drug (price control) order
1. The Insecticide Act

Drug Store Management:

Organization of Drug store, location and layout, Inventory and stock control and retail, (Purchasing, receiving, inspection and issue of materials).

Storage of materials (Non-parenterals, Parenterals), Stock control, Records,

Accounting, Computer utilization in Pharmacy Practice. Pricing policy : (basis for prices, Documentation, Methods - percentage mark up method, Dispensing Fee method, Per Diem charge method, Combination and Modifications of standard methods etc.)

PHARMACEUTICS-VIII: FORMULATIVE PHARMACY AND COSMETICOLOGY

1. Preformulation studies:

Physical Properties - Polymorphism, solubility, Rheology, Salt formation and partitioning

Effects.

Chemical Properties - Hydrolytic degradation, oxidation, Drug substance - Excipient interaction, other changes

Biologic and Pharmacologic - Properties of dosage forms

2. Monophasic and Biphasic dosage forms

Interfacial Phenomena, forces and energetic in disperse phases. Industrial formulation

of Emulsion and suspension preparations

3. Blood Products

Classification and preparation on large scale, preparation of plasma expanders, preservation and storage of blood products, official in I.P.

4. Radio Pharmaceuticals:

Radioactivity, production of Radionuclides, Radiation hazards, Radiological safety, Medical applications of Radiopharmaceutical

5. Raw materials used for Cosmetic preparations:

Surfactants, Humectants, Cream bases, Aerosol propellants, perfumes, colors

6. Hair care products

Introduction, hair structure, shampoos, conditioners, styling aids, setting lotion, hair creams, bleaches and hair dyes.

7. Skin care products :

Introduction, anatomy and physiology of skin, formulation of skin cleaners, moisturizers, sun screen products, acne products.

8. Color cosmetics:

Introduction, lip colors, nail polish, face make up, eye make up.

9. Dental products:

Dentrifrices, oral rinses, tooth powder, tooth paste.

10. Personal hygiene products:

Toilet soaps, shaving soaps, antiperspirants , deodorants.

PRACTICAL

1. Preparation and quality control of

- a) Cold cream
- b) Vanishing cream
- c) Cleansing lotion and cream
- d) Moisturizing cream
- e) Skin tonics
- f) Hair creams for hair conditioning
- g) Shampoos
- h) Hair colorants
- i) Depilatory
- j) Shaving creams and sticks
- k) Tooth powders
- l) Tooth pastes
- m) After shave lotions and other cosmetics

2. Experiments to illustrate comparative study of suspending agents, emulsifying agents, antioxidants and preservatives

PHARMACEUTICAL CHEMISTRY-V, PHARMACEUTICAL ANALYSIS II

(PHYSICAL CHEMISTRY & PRINCIPLES OF INSTRUMENTAL ANALYSIS)

SECTION- A

1. Ionisation and ionic equilibria: Arrhenius theory, degree of ionisation and Ostwald dilution law, common ion effect, buffer solutions and preparation of pharmaceutical buffer solution, approximate calculation of buffer capacity excluding the derivation of Vanslykes equation of buffer capacity, buffers in pharmaceutical and biological systems, solubility products.

2. Hydrogen ion concentration, determination of pH values (potentiometric and colorimetric), indicators, sulphonaphthalein indicators, screened indicators, natural colouring matters, theories of indicators.

3. Solutions: Lowering of vapour pressure and Raoult's Law, osmosis and osmotic pressure, measurement of osmotic pressure, isotonic solutions, pharmaceutical applications of osmosis, theories of semipermeable membranes, colligative properties, elevation of boiling point and its experimental determination, depression of freezing point and its determination, distribution law and solvent extraction method, electrolyte and non electrolytes, Debye-Huckel theory, ionic

equilibria in blood, characterization of acid base functional groups.

4. Catalysis. Homogeneous and heterogeneous catalysis, acid base catalysis, theories of catalysis, poisoning and applications of catalysis.

5. Chemical kinetics: Order and molecularity of a reaction, examples of 1st and 2nd order of reaction, method of determining order of a reaction.

6. Thermodynamics: First law of thermodynamics, work done in expansion of gases, internal energy, enthalpy, heat capacity.

SECTION B

7. Potentiometric analysis: Potentials of galvanic cells, potentiometric acid-base titrations potentiometric pH determination, precipitation and complex formation, oxidation-reduction titrations, applications in pharmacy.

8. Conductometric analysis.. Definitions of units in conductometric titrations. determination of water analysis of salt solutions, measurement of conductance, high frequency (oscillometric) method, applications.

9. Aquametry: Brief account of aquametry, physical methods for water determination in brief, thermal methods, azeotropic distillation, refractive index, spectrophotometric method, gas chromatography, electrochemical methods, chemical methods of water determination, Kari Fischer's method of moisture determination, other chemical methods involving the use of organic and inorganic reagents.

10. Spectrofluorimetry: Fluorescence, spectrofluorimetry and analytical factors.

11. Principles of turbidimetry.

12. Polarimetry: Its principles and applications; polarization types of molecule analysed; optical rotation; effects of concentration, wavelength, solvent, temperature on optical rotation; polarimeter, light source, sample cells.

PRACTICAL

Experiments based on surface tension, viscosity, partition coefficient, kinetics, solubility product, critical solution temperature. Exercises involving polarimetry, refractometry and pH-determination.

PHARMACEUTICAL CHEMISTRY VI (MEDICINAL CHEMISTRY-1)

1. Principles of medicinal chemistry including drug absorption, distribution and elimination, physico chemical and steric aspects and drug receptor interaction and rational drug design, drug metabolism.

2. The following topics shall be treated covering outline of synthetic procedures (of selected drugs), uses, structure activity relationship including physicochemical and steric aspects and mode of action.

Adrenergic hormones and drugs, cholinergic and anticholinesterases, antispasmodic agents, anticonvulsant, psychopharmacological agents; antipsychotic agents, antidepressants, and anti-anxiety agents; uricosurics (antigout), muscle relaxants, histamine and antihistamines, antiparkinsonism drugs, diuretics, non-steroidal anti-inflammatory agents, hypoglycemic agents, hallucinogens, diagnostic agents, expectorant and antitussives.

PRACTICAL

Synthesis of compounds of medicinal interest including synthesis involving two steps and synthesis of heterocyclic compounds.

PHARMACEUTICAL CHEMISTRY VII (NATURAL PRODUCTS)

1. General methods of isolation of natural products, belonging to different groups.
2. An account of the chemistry of mono, di- and polysaccharides: arabinose, mannose, glucose, fructose, sucrose, maltose, lactose, cellulose, starch, glycogen and dextran. Study of the naturally occurring glycosides (excluding cardiac glycosides Indican, ruberythric acid, amygdalin, salicin, sinigrin, arbutin and methyl arbutin).
3. Proteins and amino acids.. Classification, general methods of preparation and properties of amino acids, general nature of proteins, classification of proteins, C-terminal and N-terminal amino acid determination. Structural features of DNA and RNA (excluding three dimensional structure).
4. Terpenoids.. Classification, isolation and structure determination of some important terpenoids: Limonene, pinene, cineole, menthol, menthone, camphor, thymol & citral.
5. Alkaloids: Isolation, general methods of determination of structure, estimation of functional groups, structure elucidation and syntheses of some selected simple members, ephedrine, nicotine, atropine, cocaine, quinine, cinchonine, papaverine, morphine, reserpine, ergotamine.
6. Xanthine bases: Isolation, structure determination and synthesis of Caffeine, theophylline and theobromine.
7. Study of the chemistry of lipids (fats, oils and waxes); phospholipids.
8. Chemistry of flavones and isoflavones (Preliminary studies).

PRACTICAL

1. Analysis of fixed oils:, determination of acid value, saponification value and iodine value.
2. Isolation of a few naturally occurring compounds such as caffeine, from tea leaves.
3. Estimation of following organic groups: hydroxyl (alcoholic and phenolic), aldehyde, amino & carboxylic groups.

PHARMACOGNOSY-III

Study of volatile oil containing following drugs with regard to the nature occurrence, chemistry and biogenesis. Pharmacognostic study of drugs underlined.

1. Hydrocarbons: Pepper., , turpentine. 2. Alcohol: Mentha, Coriander , Cardamom. 3. Aldehyde: Cinnamon, Cassia, Lemon Peel, Lemon grass, Citronella, Cumin. 4. Ketone: Caraway, Dill, Spearmint. 5. Phenol: e1Qy-c 6. Phenolic ethers: Anise, Star Anise, Fennel, Nutmeg. 7. Oxides: Eucalyptus, Chenopodium.
2. Commercial production, export potential and world trade in oil of mentha, Eucalyptus oil and oleoresins from pinus species and lemon grass oil.
3. Nature, occurrence, chemistry, collection and preparation of drugs containing.
 1. Balsams : (Tolu balsam; Peru balsam, Benzoin). 2. Acid resins: (Colophony). 3. Gum resin: Myrrh, Asafoetida . 4. Resins; Colocynth, Ginger, Turmeric, Capsicum, Cannabis, podophyllum (Pharmacognostic study of drugs underlined).
4. Biological source, preparation and uses of the following enzymes: Diastase, papain, Maltase, Bromalein, ficin.
5. Quantitative microscopy.
6. Factors affecting drug constituents.
7. Drug adulteration.

PRACTICAL

1. Identification through morphological, sensory and chemical characteristics of drugs included in 1 and 3.
2. Chemical evaluation of oil of Mentha, lemon grass oil, Clove oil.
3. Quantitative microscopy of leafy drugs.
4. Field collection of medicinal and aromatic plants and preparation of herbarium sheets

Monograph on one of the plants collected during Pharmacognosy tour.

PHARMACOLOGY-II (THEORY).

I. DRUGS ACTING ON CENTRAL NERVOUS SYSTEM

1. Synaptic transmission in the CNS
2. General anaesthetics, Dissociative and neurolept- anaesthesia
3. Hypnotics and sedatives
4. Alcohol
5. Antiepileptics
6. Psychopharmacological agents
7. Antiparkinsonian drugs

8. Non-steroidal analgesics, anti-inflammatory and anti-pyretic agents, drugs used in gout

9. Narcotic analgesics, opioid poisoning and treatment

10. Drug abuse and drug addiction 11. CNS stimulants

11. Local anesthetics

II. DRUGS ACTING ON CARDIOVASCULAR SYSTEM

1. Cardiac glycosides and positive inotropic agents

2. Antiarrhythmic drugs

3. Antihypertensive drugs

4. Coronary vasodilators and Drugs used in Angina

5. Hypolipidemic drugs

6. Fibrinolytic agents

III. DRUGS ACTING ON THE BLOOD AND BLOOD FORMING AGENTS

1. Coagulants

2. Anticoagulants

3. Haematinics (iron, vitamin B₁₂ and Folic acid)

4. Plasma expanders

IV. DIURETICS

V. DRUGS ACTING ON GASTROINTESTINAL SYSTEM

Purgatives

Antidiarrhoeal drugs

Antacids and treatment of peptic ulcers

Emetics and anti emetics

Digestants and drugs used for dissolution of gallstones.

VI. DRUGS ACTING ON RESPIRATORY SYSTEM

Expectorant

Antitussive bronchodilators

Drugs used in common cold

PRACTICAL

Stages of chloroform and ether anesthesia with and without premedication

Study of phenobarbitone induced hypnosis (Demonstration)

Determination of analgesic activity (codeine/aspirin)

Study of anticonvulsant
Study of local anesthetic activity
Surface anesthesia on activity rabbits
Infiltration anesthesia using guinea pigs
Nerve block anesthesia
Study of drugs on perfused frog heart
Study of drugs on isolated frog heart
Identification of unknown drugs using frog heart
Study of effect of purgative in frog/mice/rat.
Study of drugs on blood vessels(frog)
Effect of drug on ciliary movements

BIO CHEMISTRY (THEORY)

I. ENZYMES

1. Classification of enzymes
General mechanisms of enzyme action
Factors affecting the velocity of enzyme catalysed reaction
Activators and inactivators of enzymatic reactions
Application of metabolic antagonism

II. BIOLOGICAL OXIDATIONS

1. Oxidation-reduction chains in nature
2. Oxidative Phosphorylation

III. METABOLISM OF CARBOHYDRATE

Anaerobic metabolism of Glucose
Aerobic metabolism (Kreb's cycle)
HMP pathway
Regulation of blood glucose concentration
Glycogenesis
Glycogenolysis
Gluconeogenesis

IV. METABOLISM OF LIPIDS

1. Fatty acid metabolism
2. Oxidation of fatty acids

3. Biosynthesis of fatty acids
4. Synthesis and degradation of Triglycerides
5. Hormonal influence on the mobilisation of fat in adipose tissue
6. Ketosis

V. METABOLISM OF PROTEINS

Amino acid degradation and U" cycle

Metabolism of tyrosine and Tryptophan

VI PROTEIN SYNTHESIS

1. Transmission and expression of genetic information
2. DNA genetic role
- 3 DNA Structure and replication
4. RNA and transcription
5. Gene-protein relationship
6. Control of Protein Synthesis

VII. METABOLISM OF NUCLEIC ACIDS

Metabolism of purines and Pyrimdines

VIII. METABOLISM OF INORGANIC ELEMENTS

Calcium, Phosphorous, magnesium, Trace elements

IX. BASIC PRINCIPLES OF MOLECULAR BIOLOGY

PRACTICAL

- 1 Estimation of glucose in blood
2. Estimation of Liver glycogen
3. Estimation of protein in Serum
4. Determination of Creatinine and Creatine in blood and Urine
5. Estimation of Chloride in Serum and Urine
6. Estimation of free fatty acids in Serum
7. Estimation of Uric acid in Serum and Urine
8. Determination of acid and alkaline phosphate
9. Determination of SGOT and SGPT
10. Determination of blood Cholesterol
11. Estimation of RNA and DNA
12. Determination of Serum bilirubin

13. Electrophoretic separation of serum proteins
14. Fat determination in milk

YEAR-IV

PHARMACEUTICAL BIOTECHNOLOGY (THEORY)

Brief introduction to biotechnology with reference to Pharmaceutical sciences

Genetic Engineering : Structure, function and properties of genetic material. Basic principles of genetic engineering, DNA recombination, Application in medicine.

Enzyme and cell immobilization method for immobilization, Applications.

Plant biotechnology : Natural plant products, their uses, plant cell. Cultures for the production of useful chemicals, plant tissue culture, protoplast fusion, totipotency, direct gene transfer.

Medical technology : Blood products, Immunoglobulins by hybridoma technology, synthesis of monoclonal antibody, biopolymers, derivative of biopolymers and their application in medicine.

PHARMACEUTICS-IX: PHARMACEUTICAL MANAGEMENT

1. Personnel Management and Industrial Relations:

Objectives and functions of personnel department, Employment and development of personnel. Industrial Relations: Problems of labour management relations, courses of Industrial disputes, Remedies, Industrial Dispute Act, Trade Union, Grievance and Grievance Handling procedure, Causes of grievances, Need for grievance procedure, Grievance redressal machinery

2. Motivation:

Objectives, Rules of Motivation, Motivation steps, Types of motivation, Non-financial motivators, Theories of motivation: McGregor's Theory X and Y, Herzberg's Time factor theory, McClelland's Need for Achievement theory Vroom's Expectancy theory, Behavioural theory, Employee- Centred approach

3. Communication:

Importance, Nature of communication, oral vs. written Media of Communication, Barriers to communication, Communication failure, Achieving effective communication

4. Purchasing and Store Keeping.

Objectives, Organisation and responsibilities of purchasing department, methods of purchasing, Centralised and Decentralised purchasing

Types of stores Depot, Location and Layout of a store, problems and Development

5. Materials management.

Materials handling, Equipment, Inventory management, Economic ordering quantity, ABC analysis, Value analysis, classification and codification of stores, obsolete, surplus and scrap management, lead time, inventory carrying costs, safety stock, solutions to problems relating to EOQ.

6. Drug Supply:

Planning and management, supply process and its pitfalls, planning for drug supply, planning models, steps to develop a formulary, predicting drug requirements, procurement cycle and its methods, designing training programs to improve pharmaceutical logistics

7. Pharmaceutical Marketing..

Goals, theories of selling process, company market, systems, market and sale forecasting, market test method, statistical Demand analysis, Types of sales organizations, Salesmanship, Qualification of a salesman, Channels of Distribution Advertising, Presentation and analysis of statistical data. (Charts, frequency distribution)

8. Establishment of a pharmaceutical factory:

Choice of site, trends in location of a plant, plant facilities, layout of stores in an industry, layout of Injectable unit or sterile area, tableting department and area requirement for each department

PHARMACEUTICS-X: BIOPHARMACEUTICS AND PHARMACOKINETICS

A. Biopharmaceutics:

1. Introduction to biopharmaceutics, definition, historical development of the subject, Fundamental principles and concepts. Definitions and explanation of the various terms connected with the study of biopharmaceutics like Bioavailability, Bioequivalence and chemical equivalence, therapeutic equivalence etc.

2. Drug Absorption:

Various mechanisms, physico-chemical factors affecting drug absorption, biological factors in drug absorption, dosage form considerations in gastro-intestinal absorption

Number of lectures 5

3. Drug disposition:

Distribution in blood, plasma-protein binding, cellular distribution, drug penetration to cell, drug excretion renal, biliary, salivary and biotransformation

4. Bioavailability:

Concept of bioavailability and comparative bioavailability Methods of estimation of bioavailability using blood level and urinary excretion data.

B. Pharmacokinetics:

- 1 Introduction to pharmacokinetics, importance in bioavailability and clinical practice and concepts. Definition and explanation of terminologies used.
- 2 Absorption, distribution, metabolism and excretion of drugs. Biological half-life, apparent volume of distribution. Fluid compartments and circulatory system
- 3 Compartments models- concepts and their importance in the study of pharmacokinetics. One compartment open model. Determination of drug /metabolite levels on administration of single and multiple dose in plasma and urine after i.v. injection. Oral administration and first order absorption. Percent absorbed time plot and absorption rates based on one compartment model.
- 4 Two compartments open model, pharmacokinetics of single and multiple dose administration as applied to intravenous (rapid) and oral administration, intravenous transformation.
- 5 Pharmacokinetic basis of sustained release formulations.

PRACTICAL

1. Establishment of standard curve of a drug substance.
2. Disintegration and Dissolution of peroral tablets.
3. Influence of vehicle on drug availability from topical dosage forms in-vitro.
4. Release of drug from suppository base.
5. Evaluation of antacid products, by acid neutralizing capacity and Rosset-Rice test methods.
6. Comparative in-vitro release rate studies of marketed formulations.
7. Determination of bioavailability of marketed formulations by plasma concentration method.
8. Determination of bioavailability of marketed formulations by urinary excretion method.
9. Drug release from capsules, effect of diluents etc.
10. Effect of protein binding by egg albumin; dialysis method.
11. Determination of pharmacokinetic parameters and determination and evaluation of bioavailability of drug administered by IV, IM and P.O.
12. Practice numericals based on the portions covered under theory syllabus.

PHARMACEUTICS-XI: PHARMACEUTICAL TECHNOLOGY

1. Mixing :

Fluid mixing, mechanism and types of flow, equipments.

Solids mixing, mixing mechanism, equipment.

2. Capsules :

Hard gelatin capsules; formulation of shell and contents, capsule production,

filling operation and equipment employed.

Soft gelatin capsules : Manufacture, processing and quality control.

3. Microencapsulation :

Importance and application, techniques, equipment employed.

4. Tablets :

Production of tablets, additives and components, preparation of components for compression, forms of compressed tablets, evaluation.

Tablet coating.

Sugar coating, film coating, Air suspension coating, film defects

5. Measurement of tablet punch forces:

Transmission of forces through a powder. Distribution of forces within the powder mass, Effect of pressure on the relative volume, Adhesion and cohesion of particles strength of granules and tablets. Factors affecting the strength of tablets.

6. .Pharmaceutical aerosols:

Components, formulation, types of systems, manufacturing, operation of an aerosol package, quality control and testing, oral, Inhalation, Nasal and topical Aerosols, Future developments.

7. Controlled drug delivery system :

Introduction, Terminology, Drug Targeting, Design and Fabrication of oral controlled release drug delivery system. Introduction to implantable and transdermal Therapeutic system

8. Sustained action dosage form:

Drug replacement rate, unit drug dose, mechanisms, formulation and manufacture of sustained action dosage form.

9. Packaging technology:

Types of containers; materials used, closures,. unit dose packaging, strip packaging materials, packaging of solid, parenterals, and ophthalmic dosage forms

10. Good manufacturing practices for pharmaceuticals:

Status and applicability of regulation, current good manufacturing practices in manufacturing, processing, packaging & holding of drugs, production and process controls, ISO 9000 certification.

PRACTICAL

1 Preparation of tablets by the following techniques

a. Wet granulation (Aqueous)

b. Wet granulation (non-aqueous)

- c. Dry granulation (Slugging)
2. Coating of tablets - sugar coating and film coating
- 3 Strip packing of tablets
4. Quality control of tablets
5. Filling and sealing of hard capsules
6. Quality control of capsules
7. Preparation of sustained release dosage forms employing various techniques
8. Preparation of an aerosol dosage form and its evaluation
9. Preparation of microcapsules by employing various tech.
10. Any other experiments illustrative of the theory of syllabus

PHARMACEUTICAL CHEMISTRY-VIII (PHARMACEUTICAL ANALYSIS III)

1. Chromatography: Fundamental principles of chromatography, adsorption, partition, column, paper, thin-layer chromatography, gas chromatography, electrophoresis high performance liquid chromatography. Instrumentation with particular reference to quantitative estimation of drugs and biopharmaceutical agents. Theory of ion exchange, type of exchangers, ion-exchange equilibria, ion-exchange separation, applications in pharmaceutical analysis.
2. Visible and ultraviolet absorption spectrophotometry: Principles of visual and UV absorption spectrophotometry, qualitative and quantitative analysis, Instrumentation.
3. Nuclear Magnetic Resonance Resonance: An introduction to the theory of NMR, chemical shifts, spin spin coupling, NMR instrumentation, structure elucidation and qualitative analysis of drugs.
4. Infrared spectrophotometry: Origin of infrared spectra and regions, qualitative and quantitative analysis, instruments and applications.
5. Mass spectrometry: Basic principles, instrumentation, the mass spectra, determination of molecular formula, molecular ion peak, fragmentation, mass spectra of some simple molecules.
6. Flame photometry: Origin of spectra, atomization and ionization, instrumentation, background emission, qualitative and quantitative applications in pharmaceutical analysis.
7. Atomic absorption spectroscopy: Theory of absorption of radiant energy by atoms, equipment, analytical applications.
8. Emission spectroscopy: Theory of emission spectra, equipment, qualitative and quantitative applications.
9. Polarography: Introduction, theoretical consideration, organic polarography, dropping mercury electrode, basic principles of polarographic instruments, methods of analysis, experiments including amperometric titrations.

10. Analysis of drugs with particular reference to instrumental methods as included in Indian Pharmacopoeia.

Antibiotics: Benzylpenicillin, tetracyclin, chloramphenicol.

Vitamins: Ascorbic acid, thiamine, vitamin A,

Barbiturates:, Phenobarbitone.

Sulphonamides: Sulphanilamide, Sulphadiazine.

PRACTICAL

1. Experiments based on thin-layer and paper chromatography.
2. Analysis of drugs by instrumental methods as included in Indian Pharmacopoeia.

PHARMACEUTICAL CHEMISTRY IX (MEDICINAL CHEMISTRY II)

1. Steroids: Nomenclature, stereochemistry, classification, isolation methods, chemistry (excluding synthesis) of cholesterol, diosgenin, stigmasterol, ergosterol, beta-sitosterol and steroidal alkaloids.
2. Steroids and related drugs: Androgens & anabolic agents, esterogens and progestational agents (oral contraceptives) and adrenocorticoids.
3. Cardiac glycosides, coronary dilators, hypotensive, anti-arrhythmic, antifibrilatory and antilipidemic agents.
4. The following topics shall be treated covering outline of synthetic procedures (of selected drugs), uses, structure activity relationship including physicochemical and steric aspects and mode of action: antibiotics, antimalarials, antiamoebic, drugs used for trypanosomiasis and other protozoan diseases, anthelmintics, antifungal agents, antineoplastic agents, antiviral agents (including treatment of AIDS) antitubercular drugs, medicinal dyes.
5. Chemistry of vitamins (excluding the detailed study of constitution).
6. Prostaglandins

PRACTICAL

Two or three step synthesis of some compounds of medicinal interest.

PHARMACOGNOSY-IV

1. Study of drugs containing glycosides: Nature, Occurrence, Chemistry and Biogenesis.

Anthraquinone glycosides: Cascara, aloe, Rhubarb, Senna Cardiac glycosides: Digitalis, Strophanthus, Squill, Theyetia.

Bitter glycosides: Quassia.

Saponin glycosides: Dioscorea, Quillia Flavonoid glycosides: Ruta graveolens

2. Study of drugs containing alkaloids: Nature, Occurrence, Chemistry and Biosynthesis. Pyridine-piperidine alkaloids: Nicotine, areca nut. Tropane alkaloids:

Belladonna, Hyoscymus, Stramonium, Duboisia.

Quinoline alkaloids: Cinchona

Isoquinoline alkaloids: Opium, Ipecac

Indole alkaloids: Nux-vomica, Ergot, Rauwvffla, Catharanthus.

Steroidal alkaloids: Kurchi, Solanum

Alkaloidal Amines: Ephedra, Colchicum.

3. Botanical source, history, clinical uses, chemical, constituents, authentication and standardization of traditional drugs such as Tylophora indica, Tribulus terrestris, Allium sativum, Achyranthus aspera, Centelia asiatica, Boerhaavia diffusa, Phyllanthus embelica, Azadirachta indica, Ocimum sanctum, Commiphora mukul, Swertia chirata, Withania somnifera.

4. Study of general aspects of plant tissue culture techniques and their contribution to phytopharmaceuticals. Plant growth regulators.

5. Processes of plant extraction and chromatographic techniques as applicable to phytopharmaceuticals.

6. World wide trade, commercial potential and demand of crude drugs with reference to phytochemical industry in India.

PRACTICAL

1. Identification of drugs in 1,2 and 3 based on morphological and sensory characters.

2. Microscopy of drugs underlined in 1 and 2 and chemical tests wherever applicable.

3. Extraction and preparation of T.L.C. profile of some volatile oil containing drugs.

4. Preparation of T.L.C. profile of alkaloidal extracts of Datura, Nux-vomica, Rauwolfia. and Cinchona.

5. Extraction of piperine from Piper nigrum, total alkaloids of Cinchona (Gravimetric method) and Sennosides from Senna.

6. Project work.

PHARMACOLOGY-III (THEORY)

I. CHEMOTHERAPY

General principles of chemotherapy

Sulfonamides, Quinolones and other chemotherapeutic agents

Antiprotozoal drugs

Antimalarials

Antiamoebics

Antifungal and antiviral drugs

Anti-helminthics

Chemotherapy of Tuberculosis and leprosy

Chemotherapy of cancer

immunomodulators

II. PHARMACOLOGY OF ENDOCRINE SYSTEM

1. Pituitary hormones

2. Thyroid - antithyroid drugs

3. Insulin, oral hypoglycemics and glucagon

4. Adrenocortical steroids and their antagonists

5. Sex hormones, contraceptives and drugs used in infertility

6. Drugs regulating calcium homoeostasis

III. BIOASSAYS

1. General principles and methods of Bioassays

2. Official methods of bioassay :

Insulin, Heparin, Oxytocin, d-tubocurarin, Vasopressin, Digitalis, ACTH Glucagon, Gonadotrophin

IV. EVALUATION OF NEW DRUGS

1. Acute, subacute and chronic toxicity tests

2. Teratogenicity & Carcinogenicity

3 Clinical trials

V. VITAMINS

PRACTICAL

Bio-assay of following by using appropriate isolated tissue preparation

Acetylcholine, histamine, adrenaline, Oxytocin.

Singhania University

Syllabus for M. Pharm in Pharmaceutics

SEMESTER-I

Consist of four papers (Paper-I, II, III & IV)

Paper - I	Duration of Exam - 3 Hrs
Teaching Hours - 4 Hrs/week	Maximum Marks - 100
Paper - II	Duration of Exam - 3 Hrs
Teaching Hours - 3 Hrs/week	Maximum Marks - 100
Paper - III	Duration of Exam - 3 Hrs
Teaching Hours - 3 Hrs/week	Maximum Marks - 100
Paper – IV (Practical)	Duration of Exam - 3 Hrs
Teaching Hours - 6 Hrs/week	Maximum Marks - 100

Paper - I

MODERN PHARMACEUTICAL ANALYTICAL TECHNIQUES (THEORY & PRACTICAL)

1. Principles of separation and applications of TLC. Column chromatography. Paper chromatography, Ion exchange chromatography, Counter current chromatography, G.C., DCCC, HPTLC & HPLC and electrophoresis.

2. Infrared spectroscopy

Introduction: The IR absorption process; the modes of vibration bond properties and absorption trends. The Hook's Law & calculations of frequencies for different types of bonds; coupled interactions; hydrogen bonding; radiation source, sample handling, qualitative and quantitative applications and introduction about FT-IR

3. Ultraviolet spectroscopy :

Introduction: The nature of electronic excitation, the origin of UV band structure; principle of absorption spectroscopy; Beer and Lambert's Law, Chromophore $\sigma \rightarrow \sigma^*$, $\eta \rightarrow \sigma^*$, $\pi \rightarrow \pi^*$, $\eta \rightarrow \pi^*$, transitions; shifts reagents effects of substituents; effect of conjugation' confirmations and geometry; calculation of Lamda maxima, effect of solvents, qualitative and quantitative applications

4. Nuclear Magnetic Resonance spectroscopy :

- A. ^1H NMR Spectroscopy: Principle, Instrumentation techniques. Chemical equivalence, spin-spin coupling, The origin of spin-spin splitting, Pascal triangle, the coupling constant chemical shift reagents Pharm. application including interpretation of Proton-NMR spectra.
- B. ^{13}C NMR Spectroscopy: Peak assignments, off resonance decoupling, selective proton decoupling, chemical shift equivalence, chemical shifts and spin coupling.

5. Mass Spectrometry:

Basic principle and theory involved, Instrumentation, types of ions, fragmentation, rearrangements; mass spectra of representative compounds, recognition of molecular ion peak, chemical ionization mass spectrometry, field desorption mass spectrometry, mass spectrometry, fast atom bombardment mass spectrometry.

6. Thermal analysis:

Introduction to various thermal methods of analysis, basic principle and theory; differential thermal analysis and differential scanning calorimetry and micro calorimetry. Different types of calorimeters and micro calorimeters.

7. Pharmacological evaluation of drugs in biological fluids: Bioassay.

8. Microbiological assays.

9. Radioimmunoassays.

10. Quantitative microscopy of herbal drugs. Lycopodium spore method, stomatal number, stomatal index, palisade ratio, vein-islet number, and vein-termination number.

II. BIOSTATISTICS AND COMPUTER APPLICATION

- 1. Methods of collection of data, classification of data, graphical representation of data, frequency, polygon, histogram, measure of central tendency, mean mode and median dispersion and standard deviation.
- 2. Confidence level, Null hypothesis, calculation of statistical significance between two means, analysis of variance.
- 3. Association of attributes centigency, classification of attributes, coefficient of association, chi square test.
- 4. Theory of probability, simple probability, law of probability, Permutation and combinations, ratios percentages and proportions and statistical difference between proportions. Analysis of variance two way ANOVA and multiple comparison procedures.
- 5. Correlation and regression, least square method and its application, significance of coefficient of correlation, non linear regression.

6. Calculation of ED₅₀, LD₅₀, probit analysis.

II COMPUTER APPLICATIONS

BOOK RECOMMENDED

1. R.M.Silverstein, F.X.Webster, Spectrometric Identification of organic compounds, 6th ed. John Wiley & sons, New-York, 1998.
2. Remington, The science and practice of pharmacy, Mack publishing company. Easton Pennsylvania.
3. Organic spectroscopy by Willam Kemp
4. E. Heftmann, A laboratory handbook of chromatography, New - York.
5. H.H.Willard, L.L.Merritt and J.A.Dean, Instrumental methods of analysis, Van Nostrend Reinhold, New York.
6. WWM. Wenland, Thermal analysis, John Willy and sons, New-York.
7. Principle of instrumental analysis,V ed. By Skoog, Holler-Niemen.
8. Modern analytical chemistry by David Harvey. (MC Graw-Hill international edition).

Paper - II

PHARMACEUTICS I PRODUCT DEVELOPMENT

1. Preformulation Studies :

Timings and goals of Preformulation, Pre-formulation methodology, solid state properties, partition coefficient, solubility, dissolution, crystal form and stability, compatibility tests, dissolution of drug substances and dosage.

2. Kinetic principles and stability testing :

Order of reaction, influence of pH, temperature, Acid - base catalysis. Effect of Ionic strength on degradation, Complex reactions, amide hydrolysis, Ring alteration, Oxidation - reduction, Chemical &Physical stability of dosage forms, Influence of packaging components on dosage form stability.

3. Optimization Techniques in Pharmaceutics, Formulation and Processing

Optimization parameters, statistical design, and other application.

BOOKS RECOMMENDED :

1. **Lachman, Leon and H. A. Lieberman, The theory and Practice of Industrial pharmacy, 3rd edition, Varghese Publishing Co.**
2. Gilbert S. Banker and C.T Rhodes, Modern Pharmaceutics, Marcel Decker.
3. Bernard T. L. and Robert A. Narth, Pharmaceutical process validation, volumes 23, Marcel Decker.

4. Norman A., Hodges and Stephen P. Denyer, haul book of Microbiological Quality control, Tayler and Francis, London.
5. Horth Tonneson, Photostability of Drugs and Drug Formulations, Taylor and Francis, London.

Paper – III

QUALITY ASSURANCE

1. Documentation

Relevance and importance of documentation, statutory requirements and procedure for documentation, critical examination of documents.

2. Pharmaceutical Process Validation :

Regulatory basis, Validation of sterile products, Solid dosage forms, Process Validation and non-sterile Analytical method Validation.

3. Quality Control : Process of dosage forms :

Process control ; Control of quality Validation, Control of manufacturing Process, Statistical quality control, control charts, sampling plans, Automated & process control, Dosage form control, Testing programme & method, Product identification systems, Adulteration, Misbranding, maintenance of records, Bioavailability, Bioequivalence, manufacturer's reliability, Manufacturer/drug information profile.

BOOKS RECOMMENDED :

1. Lachman, Leon and H. A. Lieberman, The theory and Practice of Industrial pharmacy, 3rd edition, Varghese Publishing Co.
2. Gilbert S. Banker and C.T Rhodes, Modern Pharmaceutics, Marcel Decker.
3. Bernard T. L. and Robert A. Narth, Pharmaceutical process validation, volumes 23, Marcel Decker.
4. Norman A., Hodges and Stephen P. Denyer, haul book of Microbiological Quality control, Tayler and Francis, London.
5. Horth Tonneson, Photostability of Drugs and Drug Formulations, Taylor and Francis, London.

Paper – IV

Pharmaceutics I Practicals

- To illustrate the topics included under theory.
- Practicals based on instrumental methods of analysis. A sufficient training will be given through exercises using different kinds of spectral analysis.

SEMESTER-II

Consist of two papers (Paper-I, II, III &IV)

Paper - I	Duration of Exam - 3 Hrs
Teaching Hours - 3 Hrs/week	Maximum Marks - 100
Paper - II	Duration of Exam - 3 Hrs
Teaching Hours - 3 Hrs/week	Maximum Marks - 100
Paper - III	Duration of Exam - 3 Hrs
Teaching Hours - 4 Hrs/week	Maximum Marks - 100
Paper – IV (Practical)	Duration of Exam - 3 Hrs
Teaching Hours - 6 Hrs/week	Maximum Marks - 100

Paper - I

Pharmaceutics II - Industrial Pharmacy and Packaging Technology

1. General Consideration, Preparation of Master Manufacturing Procedure

Material Handling, Blending, Granulation, Drying, Slugging Compression, Coating liquid Dosage Forms Contract Manufacturing

2. Production and Planning Management

Space Allocation, environmental factors, Manufacturing, Materials Management, Sales forecasting, Cost Control.

3. Drug Regulatory Methods

Definitions ; Federal food, Drug and Cosmetic Act ; Kafaarver Harre's Amendments, New Drug Application, Drug efficacy study, Implementation Review, OTC Drug review, Drug Listing. Drug amendments, Patents, Copy right, Trade Marks, Drug recalls, product liability, Clinical Trials.

BOOKS RECOMMENDED :

1. Lachman Leon & H. A. Liberman, The theory and practice of Industrial Pharmacy, Varghese Publishing Co.
2. Gilber S. Banker and C. T. Rhodes, Modern Pharmaceutics Marcel Dekker Inc.
3. Kenneth Harburn, Quality Control of Packaging materials in the pharmaceutical Industry.

4. Sidney H. Willing, Good Manufacturing Practice for pharmaceuticals, Merck Decker Inc.
5. Kinam Park, Shalaby. S. W, and Haesun park, Biodegradable Hydrogel for Drug Delivery, Technomic Basel.
6. Armstrong, N. A. and James K. C. , Pharmaceutical Experimental Design and Interpretation, Taylor and Francis, London.
7. Brody, A. L. and Marsh , K.S. , Encyclopedia of Packaging Technology, John Wiley and Sons, New York.

Paper - II

1 . Good Manufacturing Practices

GMP in manufacturing, Processing, Packaging and holding of Drugs ; Control of Components, Containers and closures, Production and process controls : Packaging & labeling controls ; Inspection for compliance with GMP Potable water standards ; Premises : Design, Construction, maintenance, equipment ; maintenance, warehousing, . ISO 9000 certification.

2 . Polymers and their application

Nomenclature, Polymer classification, Physicochemical properties, Chemistry, blends of polymer and properties of blends, Evaluation of polymers, Medical and surgical applications of polymers, polymerization mechanisms, Polymerization methods, Properties of Polymers & their characterization, Mechanism of Drug release from polymers, Applications of Polymers in controlled release of active agents and in other formulations.

3 . Packaging materials science

Packaging design and specifications, packaging validation trials, material of construction, component product validation, Regulatory requirements, Quality control Testing and Standards, GMP requirements & its deficiencies ; In process control during component manufacture Documentation ; Sterilization of packaging components ; Packaging and filling equipment ; Pharmaceutical Packaging including sterile filling area ; customer complaints.

BOOKS RECOMMENDED :

1. Lachman Leon & H. A. Liberman, The theory and practice of Industrial Pharmacy, Varghese Publishing Co.
2. Gilber S. Banker and C. T. Rhodes, Modern Pharmaceutics Marcel Dekker Inc.
3. Kenneth Harburn, Quality Control of Packaging materials in the pharmaceutical Industry.
4. Sidney H. Willing, Good Manufacturing Practice for pharmaceuticals, Merck Decker Inc.
5. Kinam Park, Shalaby. S. W, and Haesun park, Biodegradable Hydrogel for Drug Delivery, Technomic Basel.

6. Armstrong, N. A. and James K. C. , Pharmaceutical Experimental Design and Interpretation, Taylor and Francis, London.
7. Brody, A. L. and Marsh , K.S. , Encyclopedia of Packaging Technology, John wiley and sons, New York.

Paper – III

Pharmaceutics III - Advances in Drug Delivery Systems :

1. Fundamentals of Controlled release drug delivery systems :

Fundamentals and Rationale of Sustained / controlled drug delivery, factors influencing the design & performance of sustained/ Controlled release products, Drug Targeting, Use of polymers in controlled release of active agents, Pharmacokinetic / Pharmacodynamic basis of controlled drug delivery systems, regulatory requirements.

2. Design & Fabrication of Controlled Drug Delivery Systems :

Novel chemical approaches for sustained drug delivery, Design & fabrication of oral controlled release drug delivery systems. Parenteral products, Implantable systems. Transdermal systems, ocular , Intra - Vaginal, intra - uterine systems.

3. Biochemical and Molecular Biology approaches Controlled Drug Delivery :

Microparticulate drug Carriers ; Liposomes, Microspheres and cells, selective endocytosis of macromolecular drug carriers, Antibodies for drug delivery, Resealed erythrocytes, Niosomes.

4. Advances in the monitoring of pharmacotherapeutics and in drug delivery system design.

BOOKS RECOMMENDED :

1. **Robinson & Lee, Controlled Drug Delivery Fundamentals & Applications, Volume 29, 2nd edition, Marcel Dekker Inc.**
2. James Swarbrick, Novel Drug Delivery Systems.
3. Gilbert S. Banker and C. T. Rhodes, Modern Pharmaceutics 2nd Edition.
4. Robinson J. R. and Vincet H. L Lee, Controlled Drug Delivery, Fundamentals And Applications, Volume 29, 2nd edition, Mercel Dekker Inc.
5. Avis, K. E, Leon Lachman, And H. Lieberman, Pharmaceutical Dosage Forms : Parenteral Medications Volume - 2.
6. Lieberman H. A. and Leon Lachman , Pharmaceutical Dosage Forms : tablets Volume 3, Marcel Dekker.
7. Scher, H. B., Controlled release Delivery Systems of Pesticides, Marcel Dekker.
8. Kim. C., Controlled Release Dosage form Design, Technomic Publishing Co, Basel.

Paper – IV

Pharmaceutics I Practicals

- To illustrate the topics included under theory.
- Practicals based on instrumental methods of analysis. A sufficient training will be given through exercises using different kinds of spectral analysis.

SEMESTER-III

- Pharmaceutics Practical-II Marks : 100
- Synopsis of Research Project
- Seminar & Viva Voce on Research methodology & Research project

SEMESTER-IV

Thesis	-	300 Marks
Viva Voce	-	200 Marks

Singhania University

Syllabus For M. Pharm in Pharmacology

SEMESTER-I

Consist of four papers (Paper-I, II, III & IV)

Paper - I	Duration of Exam - 3 Hrs
Teaching Hours - 4 Hrs/week	Maximum Marks - 100
Paper - II	Duration of Exam - 3 Hrs
Teaching Hours - 3 Hrs/week	Maximum Marks - 100
Paper - III	Duration of Exam - 3 Hrs
Teaching Hours - 3 Hrs/week	Maximum Marks - 100
Paper – IV (Practical)	Duration of Exam - 12 Hrs
Teaching Hours - 6 Hrs/week	Maximum Marks - 100

Paper - I

MODERN PHARMACEUTICAL ANALYTICAL TECHNIQUES (THEORY & PRACTICAL)

1. Principles of separation and applications of TLC. Column chromatography. Paper chromatography, Ion exchange chromatography, Counter current chromatography, G.C., DCCC, HPTLC & HPLC and electrophoresis.

2. Infrared spectroscopy

Introduction: The IR absorption process; the modes of vibration bond properties and absorption trends. The Hook's Law & calculations of frequencies for different types of bonds; coupled interactions; hydrogen bonding; radiation source, sample handling, qualitative and quantitative applications and introduction about FT-IR

3. Ultraviolet spectroscopy :

Introduction: The nature of electronic excitation, the origin of UV band structure; principle of absorption spectroscopy; Beer and Lambert's Law, Chromophore $\sigma \rightarrow \sigma^*$, $\eta \rightarrow \sigma^*$, $\pi \rightarrow \pi^*$, $\eta \rightarrow \pi^*$, transitions; shifts reagents effects of substituents; effect of conjugation' confirmations and geometry; calculation of Lamda maxima, effect of solvents, qualitative and quantitative applications

4. Nuclear Magnetic Resonance spectroscopy :

- A. ^1H NMR Spectroscopy: Principle, Instrumentation techniques. Chemical equivalence, spin-spin coupling, The origin of spin-spin splitting, Pascal triangle, the coupling constant chemical shift reagents Pharm. application including interpretation of Proton-NMR spectra.
- B. ^{13}C NMR Spectroscopy: Peak assignments, off resonance decoupling, selective proton decoupling, chemical shift equivalence, chemical shifts and spin coupling.

5. Mass Spectrometry:

Basic principle and theory involved, Instrumentation, types of ions, fragmentation, rearrangements; mass spectra of representative compounds, recognition of molecular ion peak, chemical ionization mass spectrometry, field desorption mass spectrometry, mass spectrometry, fast atom bombardment mass spectrometry.

6. Thermal analysis:

Introduction to various thermal methods of analysis, basic principle and theory; differential thermal analysis and differential scanning calorimetry and micro calorimetry. Different types of calorimeters and micro calorimeters.

7. Pharmacological evaluation of drugs in biological fluids: Bioassay.

8. Microbiological assays.

9. Radioimmunoassays.

10. Quantitative microscopy of herbal drugs. Lycopodium spore method, stomatal number, stomatal index, palisade ratio, vein-islet number, and vein-termination number.

BIOSTATISTICS AND COMPUTER APPLICATION

- 1. Methods of collection of data, classification of data, graphical representation of data, frequency, polygon, histogram, measure of central tendency, mean mode and median dispersion and standard deviation.
- 2. Confidence level, Null hypothesis, calculation of statistical significance between two means, analysis of variance.
- 3. Association of attributes centigency, classification of attributes, coefficient of association, chi square test.
- 4. Theory of probability, simple probability, law of probability, Permutation and combinations, ratios percentages and proportions and statistical difference between proportions. Analysis of variance two way ANOVA and multiple comparison procedures.
- 5. Correlation and regression, least square method and its application, significance of coefficient of correlation, non linear regression.

6. Calculation of ED₅₀, LD₅₀, probit analysis.

II COMPUTER APPLICATIONS

BOOK RECOMMENDED

1. R.M.Silverstein, F.X.Webster, Spectrometric Identification of organic compounds, 6th ed. John Wiley & sons, New-York, 1998.
2. Remington, The science and practice of pharmacy, Mack publishing company. Easton Pennsylvania.
3. Organic spectroscopy by Willam Kemp
4. E. Heftmann, A laboratory handbook of chromatography, New - York.
5. H.H.Willard, L.L.Merritt and J.A.Dean, Instrumental methods of analysis, Van Nostrend Reinhold, New York.
6. WWM. Wenland, Thermal analysis, John Willy and sons, New-York.
7. Principle of instrumental analysis, V ed. By Skoog, Holler-Niemen.
8. Modern analytical chemistry by David Harvey. (MC Graw-Hill international edition).

Paper - II

Pharmacology – I (Basic Principles of Drug Therapy, and Clinical Pharmacology)

I. Definition, Scope, Organization and growth of Clinical Pharmacology, Cellular Transduction Mechanisms, Clinical Pharmacokinetics, Monitoring of Drug Therapy, Adverse Drug Reactions, Patient Compliance, Pharmacogenetics, Paediatric and Geriatric Pharmacology, Drug Interactions, Drug Therapy during pregnancy and lactation.

II. **Drugs acting on the autonomic nervous system :**

- i) Neurotransmission : The Autonomic and Somatic Motor Nervous System.
- ii) Muscarinic Receptor Agonists and Antagonists.
- iii) Anticholinestrases Agents
- iv) Agents acting at the neuromuscular junction and autonomic ganglia.
- v) Catecholamines, Sympathomimetic Drugs and adrenergic receptor antagonists, Ocular Pharmacology.
- vi) 5-Hydroxy tryptamine (Serotonin) receptor agonists and antagonists.

III. **Drugs acting on the Central Nervous System**

- i) Neurotransmission and the Central Nervous System
- ii) History and Principles of Anesthesiology

- iii) General Anesthetics
- iv) Local Anesthetics
- v) Hypnotics , Sedatives and Ethanol
- vi) Drugs and the treatment of Psychiatric Disorder : Psychosis, Anxiety : Depression and Mania
- vii) Drugs Effective in the therapy of Epilepsy
- viii) Drugs effective in the therapy of Migraine
- ix) Treatment of Central Nervous system degenerative disorders
- x) Opioid Analgesics and Antagonists
- xi) Drug Addiction and Drug Abuse

BOOKS RECOMMENDED

1. Modern Pharmacology by C.R. Craig and R.E. Stitzel
2. Goodman and Gilman's : The Pharmacological Basis of Therapeutics, edited by Alfred Goodman Gilman, Theodore W. Rall, Alan S Nies, and Palmar Taylor
3. Clinical Pharmacology by D.R. Laurence and P.N. Benett
4. Essentials of Pharmacotherapeutics by F.S.K. Barar
5. Pharmacology by H.P. Rang and M.M. Dale
6. Lewis's Pharmacology revised by James Crossland
7. Oxford Textbook of Clinical Pharmacology and Drug Therapy by D.G. Grahame-Smith and J.K. Aronson.

Paper – III

I. Autocoids : Drug Therapy of Inflammation

- i) Introduction
- ii) Histamine, Bradykinin and their Antagonists
- iii) Lipid- Derived Autocoids : Eicosanoids and platelet Activating factor
- iv) Analgesic-Antipyretic and Anti-Inflammatory agents and Drugs employed in the treatment of Gout.
- v) Drugs used in the treatment of Asthma.

II. Drugs effecting renal, blood and cardiovascular function :

- i) Diuretics
- ii) Drugs used in the treatment of Myocardial Ischemia
- iii) Antihypertensive agents and the drug therapy of hypertension.
- iv) Pharmacological treatment of Heart Failure
- v) Antiarrhythmic Drugs
- vi) Drugs used in the treatment of Hyperlipoproteinemias
- vii) Hematopoietic Agents : Growth factors, Minerals and Vitamins
- viii) Anti coagulant, thrombolytic and antiplatelet drugs.

BOOKS RECOMMENDED

1. Modern Pharmacology by C.R. Craig and R.E. Stitzel
2. Goodman and Gilman's : The Pharmacological Basis of Therapeutics, edited by Alfred Goodman Gilman, Theodore W. Rall, Alan S Nies, and Palmar Taylor
3. Clinical Pharmacology by D.R. Laurence and P.N. Benett
4. Essentials of Pharmacotherapeutics by F.S.K. Barar
5. Pharmacology by H.P. Rang and M.M. Dale
6. Lewis's Pharmacology revised by James Crossland
7. Oxford Textbook of Clinical Pharmacology and Drug Therapy by D.G. Grahame-Smith and J.K. Aronson.

Paper – IV

Pharmaceutics I Practicals

- Pharmacological techniques employed in the study of various drugs.
- Practicals based on instrumental methods of analysis. A sufficient training will be given through exercises using different kinds of spectral analysis.

SEMESTER-II

Consist of two papers (Paper-I, II, III &IV)

Paper – I

Duration of Exam - 3 Hrs

Teaching Hours - 3 Hrs/week

Maximum Marks - 100

Paper – II

Duration of Exam - 3 Hrs

Teaching Hours - 3 Hrs/week

Maximum Marks - 100

Paper - III

Duration of Exam - 3 Hrs

Teaching Hours - 4 Hrs/week

Maximum Marks - 100

Paper – IV (Practical)

Duration of Exam - 12 Hrs

Teaching Hours - 6 Hrs/week

Maximum Marks - 100

Paper - I

Pharmacology II Recent advances and emerging Trends in Pharmacological Sciences. (Theory)

I. Digestive System

- a) Pharmacotherapy of peptic ulcer, diarrhoea, constipation.
- b) Agents affecting gastrointestinal water, Flux and motility : Emesis and antiemetics; Bile acids and Pancreatic enzymes

II. Therapy of Infectious diseases

- a) General Principles, Antibacterial Drugs Sulphonamides, Quinolones, Penicillins, Cephalosporins, Tetracyclines, Chloramphenicol.
- b) Drugs used in the chemotherapy of Protozoal infections: Malaria
- c) Drugs used in the chemotherapy of Protozoal infections : Trypanosomiasis, Leishmaniasis, Amebiasis, Giardiasis, Trichomoniasis, and other Protozoal infections.
- d) Drugs used in the chemotherapy of Helminthiasis
- e) Drugs used in the chemotherapy of Leprosy, Tuberculosis, Fungal infections, Viral infections
- f) Drugs used in the Chemotherapy of Neoplastic diseases
- g) Immunomodulators : Immunosuppressive agents and Immunostimulants
- h) Newer Chemotherapeutic agents

RECOMMENDED REFERENCE JOURNALS

- 1. Annual Review Pharmacology and Toxicology

Paper - II

I. Hormones and Hormones Antagonists

- a) Adenohypophyseal hormones and their Hypothalamic releasing factors.
- b) Hormones of Posterior pituitary
- c) Thyroid and Antithyroid drugs
- d) Estrogens and Progestins, Antifertility agents
- e) Androgens
- f) Adrenocorticotrophic hormones; Adrenocortical steroids and their synthetic analogs; Inhibitors of the synthesis and actions of adrenocortical hormones.
- g) Insulin, oral hypoglycemic agents and the Pharmacology of pancreatic hormones.
- h) Agents affecting Calcification and bone turnover:
Calcium phosphate, parathyroid hormones, vitamin D, Calcitonin and other compounds.
- i) Vasopressin and other agents affecting the renal conservation of water.

II. Emerging Trends & Recent advances in:

- a) Receptor and G-Protein
- b) Cyclic nucleotides
- c) TNF, Apoptosis
- d) Ion channel modulators
- e) Neurosteroids and Cannabinoids
- f) Nitric oxide
- g) ANF, Anti oxidants : Melatonin
- h) Chiral Pharmacology
- i) Gene therapy
- j) Neuropeptide, Substance P, Angiotensin II modulators.

RECOMMENDED REFERENCE JOURNALS

- 1. Annual Review Pharmacology and Toxicology

Paper - III

Pharmacology III Pharmacological methods and Toxicology (Theory)

- 1. Principles of Pharmacological and Clinical Evaluation of drugs.**
- 2. Pharmacological Techniques to evaluate drugs belonging to following categories.**
 - a) Antipsychotics, antianxiety agents; nootropics; antidepressants, antiparkinsonian agents, antiepileptics, analgesics, anti-inflammatory agents, local anaesthetics.

- b) Antihypertensives, antiarrhythmics, antiatherosclerotics, drugs for myocardial infarction.
- c) Antiulcer drugs, antidiabetics, antitussives
- d) Evaluation of antioxidants
- e) Transgenic animals, genetically prone animal models
- f) Anti cancer drugs
- g) In-vitro techniques
- h) Antifertility agents

3. Drug Toxicity, Safety Evaluation of new drugs

4. Regulations for Laboratory animal care and ethical requirements

BOOKS RECOMMENDED

1. Modern Pharmacology by C.R. Craig and R.E. Stitzel
2. Goodman and Gilman's : The Pharmacological Basis of Therapeutics edited by Alfred Goodman Gilman, Theodore W. Rall, Alan S. Nies and Palmar Taylor

Paper – IV

PHARMACOLOGY PRACTICAL-I

Duration of Exam. 12 Hrs.

Max. Marks 100

- (I)** a) Study of agonist and antagonist
- b) pD₂ Value
 - c) pA₂ Value
 - d) 5HT bioassay (Comparative, graphical, 4 point)
 - e) Oxytocin bioassay (Graphical)
 - f) Antagonist bioassay
 - g) Ach bioassay (rat fundus)
 - h) Histamine assay guinea pig ileum (Graphical & 4 point assay)
 - i) Blind screening of drugs.
- (II)** Estimation of drugs in body fluids using modern analytical techniques.

BOOKS RECOMMENDED

1. Fundamentals of Experimental Pharmacology by M.N. Ghosh

2. Screening Methods in Pharmacology, Vol I & II, edited by Robert A. Turner and Peter Hebborn

3. Textbook of invitro Practical Pharmacology by Ian Kitchen

SEMESTER-III

PHARMACOLOGY PRACTICAL-II

(Marks 100)

I. Screening methods in Pharmacology:

Screening of antipsychotics, antianxiety, nootropics, antidepressants, antiparkinson, antiepileptics, analgesics, anti-inflammatory, antihypertensive, anti MI, anti ulcer, antidiabetic and antioxidants.

II. Literature survey, preparation of synopsis of the project work.

III. Seminar on the project work.

BOOKS RECOMMENDED

1. Fundamentals of Experimental Pharmacology by M.N. Ghosh, Scientific Book Agency, Calcutta (1984)
2. Pharmacological experiments in Intact preparations Edinburgh University Pharmacology Staff, Livingstone (1968).
3. Pharmacological Experiments on isolated preparations, Edinburgh University Pharmacology Staff, Livingstone (1968)
4. Handbook of Experimental Pharmacology by S.K. Kulkarni, Vallabh Parakashan Delhi, 3rd Edition (1999)
5. Screening Methods in Pharmacology by P. Turner, Vol. I & II, Academic Press, New York and London (1965)
6. Drug discovery and evaluation by H.G. Vogel and W.H. Vogel, Springer-Verlag, Berlin Heideleberg (1997)

SEMESTER-IV

Thesis	300 Marks
Viva Voce	200 Marks

**Syllabus for M. Pharm.
In
Quality Assurance**

SEMESTER-I

Paper - I **Modern Pharmaceutical Analytical Techniques (Theory & Practical)**
is common subject in the first semester of the first five branches
of M. Pharm. course.

Paper - II

QUALITY ASSURANCE – I

(Product Development and Packaging)

Teaching Hours = 4 Hrs/Week

Duration of Exam = 3 Hrs

Maximum Marks = 100

Section – A = 50 Marks

Section – B = 50 Marks

Section A : Product Development

1. **Tablets Technology**: Formulation, manufacturing and evaluation with special emphasis to unit process involved including mixing, drying, size reduction, granulation technology, compression & compression coating.
2. **Coating of Solid Dosage Form** : Aqueous and non-aqueous film coating, polymers, process controls, coating equipments, coating pans, Accela coata, Hi-coater, Driacoater, Fluid bed coating, equipment e.g. Glatt & Kugel coater application and metering equipment, particle coating methods, pelletization.
3. Drug stability: Solution stability, solid state stability, parameters for physical stability testing. Accelerated stability & shelf life assignment of drugs and pharmaceuticals.
4. Encapsulation Technology: Gelatin, physical and chemical properties, additives, substitutes, manufacture of hard gelatin capsules, capsule printing machinery and operation involved in dry filling powders, semisolid, and liquids in capsules.
5. **Preformulation Studies** : pKa and solubility kinetics, pH profile, partition coefficient, crystal morphology, polymorphism, powder flow, surface characteristic, dissolution, compatibility studies, protocol for Preformulation studies.

6. Liquid Dosage Forms: Formulation, stabilization and evaluation of liquid dosage forms including suspensions and emulsions, processing and equipment used in manufacture.
7. Parenteral Technology: Formulation, stabilization and manufacture of small and large volume Parenterals, stabilization evaluation and quality control, Environmental controls and design consideration for parenteral production facility, freeze drying.
8. Introduction to New Drug Delivery systems and their evaluation : Oral, Mucosal, Ocular, Transdermal , site specific and injectable controlled release systems
9. Dissolution Technology: Dissolution testing devices viz. forced convection non-sink devices, continuous flow through methods, effect of environmental factors during dissolution testing. Dissolution rate test apparatus for suspensions, topical and transdermal products, suppositories and controlled release products. In-Vitro-in-Vivo correlations.

Section B : Packaging

1. Glass and plastic containers for Pharmaceuticals: types, their manufacture, chemical performance, testing, quality control and biological toxicity. Flexible packaging, Type of films, Co-extracted films.
2. Metal Container: Aluminium and tin-plated drums, collapsible tubes and Aerosol containers. (lacquering, coating and lining).
3. Paper and paper board : Types of paper, folding cartons, Quality control testing of paper and paper board.; Corrugated and solid fiber boards and boxes.
4. Labels and Labeling: Types of labels, adhesives, inkjet and bar-coding.
5. Caps and Closures: Types of caps closure liners, child - resistant caps. Elastometric closure for parenterals, classification of elastomers, physical, chemical and biological properties and their quality control.
6. Packaging Machinery including strip packing, blister packaging, form, fill and seal machines, liquid and solid filling machines, capping machines.
7. Product-package compatibility, stability of product, packaging selection and critical development.
8. Tamper resistant packaging systems.

BOOKS RECOMMENDED

1. Handbook of Pharmaceutical granulation technology, Vol. 81, by Patrich, Marcel Dekker.
2. The Theory & Practice of Industrial Pharmacy, 3rd edition, Leon Lachman, Herbert A. Lieberman, Joseph. L. Karig, Varghese Publishing House, Bombay.

3. Controlled Drug Delivery : Concepts & Advances by Prof. S. P. Vyas & Prof. Roop K Khar, Vallabh Prakashan, Delhi.
4. Microparticulate Systems for the delivery of proteins & vaccines, Vol. 77, by Smadar Cohen & H. Bernstan, Marcel Dekker.
5. Pharmaceutical dosage Forms - Disperse Systems, Vol. 1, 2 & 3, Herbert A. Lieberman, Martin M. Reiger, Gilbert S. Banker, Marcel & Dekker Inc, New York.
6. Targeted & Controlled Drug Delivery ; Novel Carrier Systems, By Prof. S. P. Vyas && Prof. Roop K Khar, CBS Publishers, Delhi.
7. Introduction to Pharmaceutical Dosage Forms, Hourared C. Ansel, 4th edition, Varghese Publishing, Bombay.
8. Pharmaceutical Dosage forms - Parenteral Medications, Vol 1 -3, Kenneth E. Avis, Herbert A. Lieberman, Leon Lachman, Marcel Dekker Inc., New York.
9. Quality control of Packaging Materials in the Pharmaceutical Industry, Kenneth Herburn, Marcel Dekker, Inc., New York.
10. Pharmaceutical Dosage forms - Tablets, Vol. 1-3, Herbert A. Lieberman, Leo Lachman, Joseph B. Schurartz, Marcel Dekker, Inc., New York.
11. Controlled Drug Delivery, Fundamentals of Application, 2nd edition, Vol. 29, # Joseph R. Robinson, Vincent H. L. Lee, Marcel Dekker Inc., New York.
12. Pharmaceutical Peletilization Technology, Vol. 37, by Ghebre -Sellassie, Marcel Dekker. New York.
13. Ophthalmic Drug Delivery Systems, Vol. 58 by A. K. Mitra, Marcel Dekker., New York.
14. Controlled Drug Delivery Vol. I by N. K. Jain, CBS Publisher, New Delhi. 25 Controlled Drug Delivery Vol. II by N. K. Jain, CBS Publisher, New Delhi.
15. Pharmacokinetics, Vol. 15, 2nd edition, by Gibaldi & Perrier, Marcel Dekker.
16. Bioadhesive drug delivery systems, Vol. 98, by Mathiowitz., Marcel Dekker.
17. Controlled drug bioavailability, Vol. 3, by Smolen Ball, Witley Interscience.
18. Textbook of Biopharmaceutics and Pharmacokinetics by Javed Ali, Roop K Khar and Alka Ahuja, Birla Publications, New Delhi.

19. Clinical Pharmacokinetics, by Rowland, Malcolm and Tozer, Lea Febigar, Philadelphia, 1980.
20. Textbook of Hospital and clinical Pharmacy by Pratibha Nand and Roop K Khar Birla Publications, New Delhi.
21. P.P.Sharma, Cosmetics-Formulation Manufacturing and Quality Control, Vandana Publications, Delhi,1998.
22. Pharmaceutical Dispensing by Pratibha Nand and Roop K Khar CBS Publishers, New Delhi.
23. E.A.Rawlins, Bentley's Textbookn of Pharmaceutics, University Printing House,Oxford, 1998.
24. Inhalation Delivery of Therapeutic Peptides & Proteins, by Adjel, (Marcel Dekker).
25. Liposomes: Rational Design, by Janoff, (Marcel Dekker).
26. Peptide and Protein Drug Delivery, by Lee, (Marcel Dekker).

Semester - II

Paper - III

QUALITY ASSURANCE – II

(Biological Evaluation and Validation)

Teaching Hours = 4 Hrs/Week

Duration of Exam = 3 Hrs

Maximum Marks = 100

Section – A = 50 Marks

Section – B = 50 Marks

Section A : Biological Evaluation

1. Sterility Tests : Methodology & Interpretation.
2. Microbiological Limit Tests.
3. Tests for effectiveness of antimicrobial preservatives.
4. Refer section B (Validation) – repeated.
5. Biological standardization: General principles, scope and limitations of bioassays, Bioassays of some official drugs.
6. Preclinical Drug Evaluation, acute, subacute and chronic toxicity, Evaluation of a compound for its biological activity, and ED 50 determination. Special toxicity tests like teratogenicity and mutagenicity, Clinical Trials. Introduction to G.C.Ps.
7. Radio immunoassay: General principles, scope and limitations, radio immunoassay of some drugs like insulin, digitalis etc.
8. Pyrogen - chemistry and properties of bacterial pyrogens and endotoxins, Mechanisms of action of pyrogens. Pharmaceutical aspects, pyrogens test of IP compared to that of BP & USP. Interpretation of data, Comparison of LAL & other pyrogens tests.
9. Drug Approval., Schedule-Y; Introduction to U.S; F.D.A's, N.D.A/A.N.D.A.
10. Animal Studies.
11. Introduction to Bioequivalence studies U.S.P
- 12.

Section B : Validation

1. Validation of Analytical Methods, Calibration of Instruments and equipment.
2. Validation of process (Sterile and non sterile products). Validation of sterilization methods equipment, Autoclaves, dry heat sterilisers, aseptic membrane filtration.
3. Regulatory considerations in validation.
4. Introduction to validation of manufacturing facilities I.Q./O.Q./and certification, preparation of validation protocols.
5. Validation of purified water system, distilled water and water for injection.
6. Introduction to validation of computer assisted process.
7. Validation of air handling 'system, sterile' and non sterile areas.

BOOKS RECOMMENDED

1. Microbiological Risk Assessment in Pharm. Clean rooms by Bengt Ljungqvist and Berit Davis Harwood International Publishing.
2. Introduction to the environmental Monitoring of Pharmaceutical Areas by Michel Jahnke, Davis Harwood International Publishing.
3. Understanding Active Pharmaceutical ingredients by Siegfried Schmitt, Davis Harwood International Publishing.
4. Microbiology in Pharmaceutical Manufacturing by Richard Prince, Davis Harwood International Publishing.
5. Quality control of Packaging Materials in the Pharmaceutical Industry, Kenneth Herburn, Marcel Dekker, Inc., New York.
6. Pharmaceutical Process Validation, Volume 23, 2nd edition, Bernard T. Lofters, Robert A. Nash, Marcel Dekker, Inc. New York.
7. Parenteral Quality Control: Sterility, Pyrogen, and Package Integrity Testing, 2nd Edition by Akers, (Marcel Dekker).
8. Handbook of Polymer testing, by Brown, (Marcel Dekker).
9. Pharmaceutical Excipients, by Bugay, (Marcel Dekker).
10. Peptide and Protein Drug Analysis, by Reid,(Marcel Dekker).
11. Lipoproteins as Carriers of Pharmaceutical Agents, by Shaw, (Marcel Dekker).

12. Stability Indicating HPLC Methods for Drug Analysis, by XU, (Pharmaceutical Press Titles).

Semester - II

Paper - IV

QUALITY ASSURANCE – III

Teaching Hours = 4 Hrs/Week

(Quality Management)

Duration of Exam = 3 Hrs

Maximum Marks = 100

Section – A = 50 Marks

Section – B = 50 Marks

1. Concept of Total quality management philosophy and GMPs and GLPs, ISO 9000, Introduction to ICH process
2. Organization and personnel, responsibilities, training, hygiene, personnel, records.
3. Premises: Location, Design, plant layout. Construction maintenance and sanitation environmental control, utilities and services like gas, water maintenance of sterile areas control of contamination
4. Equipment, selection, purchase specifications, maintenance, clean in place and sterilize in place methods (TP and STP)
5. Raw materials, purchase, specifications, stores, selection of vendors Control of Raw materials.
6. Manufacture of and control on dosage forms. Manufacturing documents. Master formula. Batch formula records, standard operating procedure. Quality audits of manufacturing processes and facilities.
7. In process quality controls on various dosage forms sterile and non-sterile standard operating procedure for various operations like cleaning, filling, drying, compression, coating, disinfection, fumigation, sterilization, membrane filtration etc.
8. Packaging and labeling controls. Line clearance, reconciliation of labels, cartons and other packaging materials (refer section B-Validation).
9. Quality control laboratory, responsibilities, good laboratory practices, routine controls, instruments, reagents, sampling plans, standard test procedure, protocols, non-clinical testing, controls on animal house.
10. Data generation and storage. Quality control documentation. Retention samples, records, audits of quality control facilities

11. Finished products release, quality review, quality audits, batch release documents
12. Warehousing, good Warehousing practices, materials management.
13. Distribution and distribution records. Handling of returned goods. Recovered materials and processing.
14. Complaints and recalls, evaluation of complaints, recall procedures, related records and documents
15. Waste disposal, scrap disposal procedures and records
16. Regulatory aspects of pharmaceutical and bulk drug manufacturing.
17. Loan licenses (contract manufacture)
18. Recent amendments to drugs and cosmetics Acts and other relevant rules. Consumer protection. Environmental protection. Factory Act. Certificate and licensing procedures.
19. WHO Certification, Globalization of drug industry, Introduction to export and import policy of drugs
20. Intellectual property rights, patents, trade Marks, copy rights, Indian patent act.
21. Quality Audits: Raw Materials, Finished Products & Analytical Procedures.

BOOKS RECOMMENDED

1. The internal quality audit by Monica Girmaldi and Janet Gough Davis Harwood International Publishing.
2. Validation Master plan by Terveeks or Deeks, Davis Harwood International Publishing.
3. Validation of Aseptic Pharmaceutical Processes, 2nd Edition, by Carleton & Agalloco, (Marcel Dekker).
4. Statistical Design and Analysis in Pharmaceutical Science, by Chow, (Marcel Dekker).
5. Automation & Validation of Information in Pharmaceutical Processing, by deSPAUTZ, (Marcel Dekker).
6. Guidelines for Laboratory Quality Auditing, by Singer, (Marcel Dekker).
7. Pharmaceutical Experimental Design, by Lewis, (Marcel Dekker).

LIST OF EXPERIMENTS FOR M. PHARM. PRACTICALS - QUALITY ASSURANCE (Suggestive)

1. Preparation and evaluation of Riboflavin/Ibuprofen tablets I .P. to characterize and evaluate the effect of different concentrations of binders and disintegrant.
2. Optimization of tablet formulation of poorly water-soluble drugs.
3. Design and fabrication of theophylline sustained release formulation and comparison of its release profile with the conventional dosage form.
4. Formulation and evaluation of micronized disperse system for parenteral delivery of drugs including test for pyrogens and sterility testing etc.

5. Preparation of solid dispersions of poorly water soluble drugs using different carriers and to study the release profile and compare with conventional dosage forms.
6. Preparation and evaluation of a hydrodynamically balanced drug delivery system of a drug having absorption problem
7. Disintegration and dissolution of per oral tablets
8. Influence of vehicle on drug availability from topical dosage forms in-vitro
9. Determination of Pharmacokinetic parameters and determination and evaluation of bioavailability of a drug administered I.V., I.M. and P.O.
10. Design and preparation of a suspension and its evaluation.
11. Development of moisture resistant coating formulation for Amoxicillin tablets/ Ranitidine tablets
12. Quality control of paper, Plastic and glass container
13. Quality control of closure
14. Quality control of labels and label adhesives.
15. Microbial limit test in oral products
16. Sterility testing of parenteral products
17. Validation of sterilization equipments e.g. Hot air oven, Autoclave.
18. Validation of Analytical procedure
19. Preformulation studies of a model Drug.
20. Accelerated stability testing and shelf life determination.
21. Biological evaluation of equipments and materials used in sterile or non-sterile working area.
22. Biological evaluation of sterile and non sterile working area.

Semester III

Synopsis of Research Project

Seminar & Viva Voce on Research methodology & Research Project **(Marks 100)**

Semester IV

Thesis	300 Marks
Viva Voce	200 Marks

Syllabus For M. Pharm
in
Pharmaceutical Chemistry

(Including the Syllabus of Modern Analytical Techniques {Theory & Practical} common in the Ist Semester of all Branches of M. Pharm except M. Pharm in Pharmacy Practice)

Semester -I

No. of Teaching Hrs. 4 Hrs /

Week

Paper I

Duration of Exam 3 Hrs.

Max. Marks. 100

This Paper (Theory & Practical) is common in Ist semester of all Branches of M. Pharm except M. Pharm. in Pharmacy Practice.

MODERN PHARMACEUTICAL ANALYTICAL TECHNIQUES

1. Principles of separation and applications of TLC. Column chromatography. Paper chromatography, Ion exchange chromatography, Counter current chromatography, G.C., DCCC, HPTLC & HPLC and electrophoresis.

2. **Ultraviolet spectroscopy :**

Introduction: The nature of electronic excitation, the origin of UV band structure; principle of absorption spectroscopy; Beer and Lambert's Law, Chromophore $\sigma \rightarrow \sigma^*$, $\eta \rightarrow \sigma^*$, $\pi \rightarrow \pi^*$, $\eta \rightarrow \pi^*$, transitions; shifts reagents effects of substituents; effect of conjugation' confirmations and geometry; calculation of Lamda maxima, effect of solvents, qualitative and quantitative applications.

3. **Infrared spectroscopy**

Introduction: The IR absorption process; the modes of vibration bond properties and absorption trends. The Hook's Law & calculations of frequencies for different types of bonds; coupled interactions; hydrogen bonding; radiation source, sample handling, qualitative and quantitative applications and introduction about FT-IR

4. **Mass Spectrometry:**

Basic principle and theory involved, Instrumentation, types of ions, fragmentation, rearrangements; mass spectra of representative compounds, recognition of molecular ion peak, chemical ionization mass spectrometry, field desorption mass spectrometry, mass spectrometry, fast atom bombardment mass spectrometry.

5. **Nuclear Magnetic Resonance spectroscopy :**

A. ^1H NMR Spectroscopy: Principle, Instrumentation techniques. Chemical equivalence, spin-spin coupling, The origin of spin-spin splitting, Pascal triangle, the coupling constant chemical shift reagents Pharm. application including interpretation of Proton-NMR spectra.

B. ^{13}C NMR Spectroscopy: Peak assignments, off resonance decoupling, selective proton decoupling, chemical shift equivalence, chemical shifts and spin coupling.

6. **Thermal analysis:**

Introduction to various thermal methods of analysis, basic principle and theory; differential thermal analysis and differential scanning calorimetry and micro calorimetry. Different types of calorimeters and micro calorimeters.

7. **Microbiological assays.**

8. **Pharmacological evaluation of drugs in biological fluids: Bioassay.**

9. Quantitative microscopy of herbal drugs. Lycopodium spore method, stomatal number, stomatal index.

10. **Radioimmunoassays.**

Palisade ratio, vein-islet number, and vein-termination number.

BIOSTATISTICS AND COMPUTER APPLICATION

1. Methods of collection of data, classification of data, graphical representation of data, frequency, polygon, histogram, measure of central tendency, mean mode and median dispersion and standard deviation.
2. Confidence level, Null hypothesis, calculation of statistical significance between two means, analysis of variance.
3. Theory of probability, simple probability, law of probability, Permutation and combinations, ratios percentages and proportions and statistical difference between proportions. Analysis of variance two way ANOVA and multiple comparison procedures.
4. Association of attributes contingency, classification of attributes, coefficient of association, chi square test.
5. Calculation of ED₅₀, LD₅₀, probit analysis.
6. Correlation and regression, least square method and its application, significance of coefficient of correlation, non linear regression.

II COMPUTER APPLICATIONS

BOOK RECOMMENDED

1. Remington, The science and practice of pharmacy, Mack publishing company. Easton Pennsylvania.
2. R.M.Silverstein, F.X.Webster, Spectrometric Identification of organic compounds, 6th ed. John Wiley & sons, New-York, 1998.
3. E. Heftmann, A laboratory handbook of chromatography, New - York.
4. Organic spectroscopy by Willam Kemp.
5. WWM. Wenland, Thermal analysis, John Willy and sons, New-York.
6. H.H.Willard, L.L.Merritt and J.A.Dean, Instrumental methods of analysis, Van Nostrend Reinhold, New York.
7. Principle of instrumental analysis,V ed. By Skoog, Holler-Niemen.

8. Modern analytical chemistry by David Harvey. (MC Graw-Hill international edition).

PRACTICALS:-

Practicals based on instrumental methods of analysis. A sufficient training will be given through exercises using different kinds of spectral analysis. Modern Pharmaceutical Analytical Techniques (Theory & Practical) is a common subject in the first semester of the first five branches of Master of Pharmacy.

Semester No. I

No. of Teaching Hrs. 4 Hrs / Week

Paper II

Duration of Exam 3 Hrs.

Max. Marks. 100

PHARMACEUTICAL CHEMISTRY – I DRUG DESIGN INCLUDING ORGANIC NAME REACTIONS.

1. Stereochemical aspects of drug receptor interactions and mechanism of drug interaction. Isosterism and bioisosterism as guides to structural variations; Concepts of conformational analysis and its role in design and development of new drug molecules.
2. Physicochemical properties in relation to drug action; metabolic transformation of drugs and its role in development of new drug molecules; Metabolic antagonism.
3. QSAR and introduction to molecular modeling.
4. Principle of drug design: Analogue synthesis versus rational design; discovery of lead compounds, Pharmacophoric identification, Prodrugs and soft drug.
5. In organic chemistry, the following name reactions and molecular rearrangements will be discussed in detail with reference to their application in the synthesis of some medicinal agents, where possible.
 - (a) Claisen- Schmidt reaction e.g. Sulfoxazole.
 - (b) Perkins reaction e.g. sulinadac
 - (c) Friedal Craft Reaction
 - (d) Aldol condensation
 - (e) Mannich reactions e.g. Tolmetin, Atropine, Ethacrynic acid, Dextropropoxyphen.
 - (f) Beckmann's rearrangement.
 - (g) Wagner-Meerwein rearrangement

- (h) Wittig Reaction
- (i) Oppenaur oxidation.
- (j) (Meervein- pondroff-verley) M.P.V. Reduction.

BOOKS RECOMMENDED.

1. S.H. Salkovisky. A.A. Sinkula and S.C. Valvani, Physical Chemical Properties of Drug, Marcel Dekker Inc. New York.
2. E.J. Ariens : Drug Design, Academic Press New York (1975).
3. R.F. Doerge, Wilson and Gisvold's Text Book of Organic Medicinal and Pharmaceutical Chemistry, J.Lippincott Co., Philadelphia.
4. M.E. Wolff, Burger's Medical Chemistry, John Willey and Sons. New York.
5. J. March, Advanced Organic Chemistry, Reaction Mechanism and Structure, John Wiley and Sons, New York.
6. E.S. Gould, Mechanism and Structure in Organic Chemistry Holt, Rinewart and Winston, New York.

Semester No. 2

No. of Teaching Hrs. 4 Hrs / Week

Paper III

Duration of Exam 3 Hrs.

Max. Marks. 100

**PHARMACEUTICAL CHEMISTRY-II
CHEMISTRY OF NATURAL PRODUCTS.**

1. Natural products as Leads for new pharmaceutical.
2. The natural products obtained from terrestrial and microbial sources will be discussed in the light of various degradative and synthetic approaches supported by spectral data.
Important members representing the following classes of natural products shall be discussed.

2.1 ALKALOIDS

General introduction and classification, isolation and purification methods, general methods employed for determining the structure of alkaloids, constitution of morphine, reserpine and quinine.

2.2 STEROIDS

General introduction, stereochemistry, nomenclature and structure elucidation of sterols (cholesterol), sapogenin (diosgenin) and cardiac glycosides.

2.3 AMINO ACIDS AND PEPTIDES, NUCLEIC ACIDS :

General introduction, synthesis of peptides and amino acids. End group analysis, structural features of Insulin, vasopressin and oxytocin, structural features of DNA & RNA.

2.4 ANTIBIOTICS :

Classification of antibiotics, structural details of penicillins and tetracyclines, polypeptide antibiotics.

2.5 FLAVONOIDS :

Detailed chemical account of rutin and quercetin.

2.6 TRITERPENOIDS :

A general chemical treatment and structural elucidation of terpenoids

2.7 COUMARINS

General methods of isolation and purification and structural determination of Xanthotoxin and psoralene.

3. Marine products with therapeutic potential.

BOOKS RECOMMENDED

1. G.A. Cordell, Introduction to Alkaloids, John Wiley and Sons, New York.
2. I.L. Finar, Organic Chemistry, Vol.II, The English Language Books Society and Longman Group Limited.
3. L.F. Fieser and M. Fieser, Steroids, Reinhold Publishing Co. New York.
4. M.L. Wickery and B. Wickery, Secondary Plant Metabolism McMillan Press Ltd. London.
5. J.B. Harborne, Phytochemical Methods, Chapman and Hall, London.

6. K.B.G. Torsell, Natural Products Chemistry, John Wiley and Sons, New York.
7. Burger's Medicinal Chemistry and Drug Discovery, Vol. I. Principle and Practice, 5th, Edition, John Wiley Sons, New York.

Semester No. 2

No. of Teaching Hrs. 4 Hrs / Week

Paper IV

Duration of Exam 3 Hrs.

Max. Marks. 100

PHARMACEUTICAL CHEMISTRY-III MEDICINAL CHEMISTRY

The following topics will be discussed keeping in view the recent advances:-

1. Cardiovascular Agents : Anti-hypertensive agents, antiarrhythmic agents, antihyperlipidemic agents, antianginal agents.
2. Chemotherapy : Antiviral agents including the development in chemotherapy of AIDS, Drugs for neoplastic diseases.
3. Psychopharmacological agents : Antipsychotic Agents : Introduction, Biochemical basis of mental disorders, Development of antipsychotic agents : Phenothiazines, Butyrophenones: Atypical antipsychotic agents. Antidepressant Drugs : Introduction, Development of tricyclic antidepressants, Monoamine oxidase inhibitors; Selective serotonin-reuptake inhibitors; Atypical antidepressants, Lithium salts. Antianxiety Agents : Introduction, medicinal Chemistry of benzodiazepines; SAR of benzodiazepine derivatives, medicinal chemistry of non-benzodiazepines; serotonin-reuptake inhibitors, development of meprobamate and analogues; atypical anxiolytic agents.
4. Radioprotective drugs.
5. Drug affecting immune responses.
6. Diuretics.
7. Analgesics and anti inflammatory agents, Prostaglandins, Non steroidal drugs, Steroidal drugs, Endorphins.
8. Chem. of cell membrane; Signal transduction and G. Proteins.

BOOKS RECOMMENDED

1. M.E. Wolf, Brugers Medicinal Chemistry, John Wiley and Sons, New York, Vol. I, II & III.
2. Burger's Med. Chem. & Drug Discovery, Vol. I.
3. Lednicer and Mitschler, Drug synthesis, Vol. I, II & III.
4. W.O. Foye, Principles of Medicinal Chemistry, Lea and Febiger, Philadelphia.
5. Martindale, The Extra Pharmacopoeia, Pharmaceutical Press, London.
6. T, Albert, Selective Toxicity, Chapman and Hall, London.
7. R.F. Doerge, Wilson and Gisvold's Text Book of Organic Medicinal and Pharmaceutical Chemistry, Lippincott.
8. Monographs and relevant Review articles appearing in various periodicals and Journals.

Semester No. 2

Practical

Duration of Exam 12 Hrs.

Max. Marks. 100

Practicals based on some topics covered in the theory part including synthesis of medicinal compounds and analysis of organic mixtures will be carried out.

Semester III

Pharm. Chemistry (Practical II): Practical based on synthesis and spectral analysis of some medicinal compounds.

100 Marks

Semester IV

Thesis of Research Work 300 Marks

Viva Voce 200 Marks

Syllabus For M. Pharm in

Pharmacognosy & Phytochemistry

SEMESTER-I

Paper Modern Pharmaceutical Analytical Techniques (Theory & Practical) is common subject in the first semester of the first five branches of M. Pharm course.

Semester-I Teaching Hours - 4 Hrs/week

Paper - II Duration of Exam - 3 Hrs

Maximum Marks - 100

PHARMACOGNOSY & PHYTOCHEMISTRY-I

(Advances in Pharmacognosy)

1. **Genetics in Pharmacognosy :**

Mendal's laws of hereditary and their application to Pharmacognosy, Chemical races, Selections, Hybridization, Polyploidy, mutation, plant growth hormones, their application and effect on plant growth and its constituents.

2. **Chemotaxonomic significance in medicinal plants :**

History of Chemotaxonomic developments. Chemotaxonomy of higher and lower plants and distribution of certain chemotaxonomical group of constituents in plant kingdom like alkaloids, glycosides and terpenoids.

3. **Comparative Phytochemistry :**

Relationship between Phytochemistry and Taxonomy. Comparative Phytochemistry of alkaloids, flavonoids and C-glycosides.

4. **Plant Tissue Culture techniques and its application in relation to Phytopharmaceuticals :**

Introduction, techniques of initiation and maintenance of various types of cultures. Immobilized cell techniques, Biotransformation studies including recent developments in production of biological active constituents in static, suspension and hairy root cultures, Bioreactors for production of biologically active constituents and other applications of plant tissue culture techniques.

5. **Recent advances in the field of Pharmacognosy** with special reference to anticancer, antidiabetic, anti-inflammatory, hepatoprotective, adaptogenic and immunomodulating drugs of plant origin.

Skin irritants and sensitizing agents from plant and marine products of medicinal importance. Plants sweeteners.

BOOKS RECOMMENDED

1. Evans WC (2002) Trease & Evans' Pharmacognosy, WB. Saunders & Co., London.
2. Swain T. (1963) Chemical Plant Taxonomy, Academic Press London.
3. Stace C.A. (1985) Plant Taxonomy and Biosystematics, Edward Arnold, London.
4. Cultivation and Utilization of Medicinal Plants by C.K. Atal, R.R. L. Jammu.
5. Street H.E. (1997) Plant Cell and Tissue Culture, Blackwell Scientific, London.
6. Narayanaswami S. (1997). Plant Cell and Tissue Culture, Madras Science Foundation, Madras.
7. Bajaj Y.P.S. "Biotechnology in Agriculture and Forestry-Volumes 4, 7, 8, 9, 15 (1988-91). Springer - Verlag, Berlin.
8. Takashashi N. (1986). Chemistry of Plant Hormones, CRC Press Inc., Florida
9. Gennaro AR (2000). Remington: The Science & Practice of Pharmacy, Lippincott Williams & Wilkins, Philadelphia.
10. Fitoterapia- (1980 onwards).
11. Planta Medica (1980 onwards).

Semester-II

Teaching Hours - 4 Hrs/week

Paper - III

Duration of Exam - 3 Hrs

Maximum Marks - 100

PHARMACOGNOSY & PHYTOCHEMISTRY-II

(Phytochemistry & Biogenesis)

1. General methods of phytochemical & biological screening, isolation and purification of plant constituents.
2. Natural sources, extraction, purification, isolation and characterization of the following Phytopharmaceuticals.

Alkaloids : Morphine, Quinine

Glycosides : Sennosides, Glycyrrhizine, Asiaticosides, Diosgenin, Solarodine, Rutin

3. Industrially important volatile oils : Natural occurrence, their chemistry, ontogenic variation and trade.
4. Methods of investigation of biogenetic pathways.
5. Biogenetic pathways for the production of phytopharmaceuticals, such as Alkylamine (Ephedra), Pyridine, Piperidine (Lobelia), Tropane (Belladonna), Quinoline (Cinchona), Isoquinoline (Opium), Diterpene (Aconite), Indole (Ergot), Cardiac glycosides, Coumarins and Flavones.
6. Study of some herbal formulation as drug and cosmetics.

BOOK RECOMMENDED

1. Evans WC (2002) Trease & Evans' Pharmacognosy, W.B. Saunders & Co., London.
2. Natural Products for Plants by Kaufmann, CRC Press New York.
3. Cultivation and Utilization of Medicinal & Aromatic Plants by C.K. Atal and B.M. Kapur, R.R.L. Jammu.
4. Pharmacognosy by Tyler and Brady, Lea & Febiger, Philadelphia.
5. Herbal Medicines by Jonne Bernes, Pharmaceutical Press, London.
6. Medicinal Plants in Skincare by Sushil Kumar, CIMAP, Lucknow.
7. Nakanishi K (1977). Chemistry of Natural Products, Kodansha Book Publishing Company, Osaka (Japan).

Semester-II

Teaching Hours - 4 Hrs/week

Paper - IV

Duration of Exam - 3 Hrs

Maximum Marks - 100

PHARMACOGNOSY AND PHYTOCHEMISTRY-III

(Cultivation & Standardization of medicinal plants)

1. Preparation of herbarium specifications, use of flora and keys of plant identification, Microtomy and advanced histological techniques as applied to pharmacognostical specimen, pharmacognostical drawings and macro and micro photography. Quantitative microscopy as applied to drug evaluation and pollen grain analysis.
2. Agrotechnology of medicinal plants ; Ecotypic, Phenotypic and Genotypic Variability affecting phytopharmaceuticals. Prospects and economics and medicinal and aromatic plants in India. Cultivation methods developed in India for the following plants of commercial significance. Glycyrrhiza, Ipecac, Mentha, Poppy, Psyllium and Senna. Tropane alkaloid and steroid containing plants.
3. Application of chromatographic techniques such as column, paper, TLC, HPTLC, GLC, HPLC and DCCC in the isolation and purification of phytopharmaceuticals.
4. Applications of UV, IR, NMR, ¹HNMR, ¹³CNMR and Mass spectroscopy for structural elucidation of phytopharmaceuticals. Standardization and quality procedures for the assay of plant products.

BOOKS RECOMMENDED

1. Chromatography by Heptman.
2. Techniques in Terpenoid Identification by Dr. Mohd. Ali, Birla Publications, Delhi.
3. Cultivation and Utilization of Medicinal & Aromatic Plants by C.K. Atal and B.M. Kapur, R.R.L. Jammu

Semester II

PHARMACOGNOSY & PHYTOCHEMISTRY PRACTICAL - I

List of Experiments

1. Isolation of Rutin from Fagopyrum species, Hesperidin from Orange peel, Aloin from Aloes, Rhein from rhizome of Rheum species, Piperine from *Piper nigrum*, Quinine from Cinchona bark, Berberine from *Berberis aristata*, Caffeine from Tea leaves, Menthol from Mentha species, Diosgenin from Dioscorea and Trigonella species. Determination of Anthracene derivatives in Senna by spectrophotometric method (Fair Buarian 1975), Reserpine in Rauwolfia by photometric method, Quinine in Cinchona bark, Thevetia seeds / bark calculated in terms of digitoxogenin by photometric method, Carvone content of Umbelliferous fruits, Citral content in Lemon grass oil, Bitter principles of Chirata, Solanaceous drugs, Tropane alkaloids using Vitali Morin reaction, quantitative estimation of Saponin as per W.H.O. protocol in suitable plant material, Resin content in sample of

Podophyllum by B.P.C. method, Optical rotation of oil of Lemon, Acid value of Colophony resin by B.P. method. Swelling factor of husk and seeds of Isaphgol, Moisture content of Acacia by toluene distillation methods, Water soluble extractive values of sample of Cascara B.P. method, extractive value of sample of Rhubarb or Ginger, Iodine values of Arachis oil, TLC of volatile oil samples, Antimicrobial activity of some volatile oils, Phytohaematoglutinin activity of extract of some seeds. Examination of Rhubarb for the presence of Rhapontic Rhubarb by the use of paper chromatography and ultraviolet light. Separation of Solanaceous alkaloids from Belladonna leaf by TLC using hyoscine and hyoscyamine as reference compound, anthracene glycosides of Senna leaf by paper chromatography. Isolation of Solanaceous alkaloids over alumina column. To develop callus culture of Senna on Wood and Brauin's medium, the root culture of *Trigonella foenum-graecum* on Street & McGroger medium.

Semester III

PHARMACOGNOSY & PHYTOCHEMISTRY PRACTICAL II

List of Experiment

1. Determination of Ascorbic acid (Vitamin C) by UV. Spectroscopic method in crude drugs.
2. Determination of Hyoscyamine/Hyoscine in Datura species by UV. Spectroscopic method.
3. Quantitative estimation of Reserpine in *Rauwolfia serpentina* by HPLC method.
4. Quantitative estimation of Quinine in Cinchona bark by HPLC method.
5. Quantitative estimation of Ephedrine in Ephedra extracts by HPTLC.
6. Quantitative estimation of glycyrrhizine in *Glycyrrhiza glabra* by HPTLC.
7. Exercises on Identification of simple Naturally occurring molecules by UV. & IR spectroscopy.
8. Exercises on interpretation of at least 5-different known compounds of Natural origin by using spectroscopic data (NMR & MASS)
9. Preparation of permanent microscopic slides and section cutting by microtone
10. Determination of Microbial load in Crude drugs.
11. Separation and identification of aflotoxins in Crude drugs.
12. Preparation of detailed monograph of at least one medicinal plant covering taxonomy, phytochemical and pharmacological investigation and its use in traditional system of medicine.

Semester-IV

Thesis	300 Marks
Viva Voce	200 Marks

SINGHANIA UNIVERSITY, PACHERI BARI
PROPOSED ORDINANCE & SYLLABUS RELATING TO
BACHELOR OF PHYSIOTHERAPY (B.P.T)

These ordinances shall be called "The Ordinances, Syllabus and Scheme of Examination, Training to the Bachelor of Physiotherapy Course (B.P.T.)

Nomenclature of the course: **BACHELOR OF PHYSIOTHERAPY (B.P. T.)**

1. **AIM OF THE COURSE:** The course aims at imparting in depth both the theoretical knowledge as well as the skills in Physiotherapeutic System of Medicine.
2. **OBJECTIVES OF COURSE:** During the comprehensive academic programme the basic and clinical Science are integrated to;
 - 2.1 Develop knowledge, skills and attitude necessary for competent health education, diagnosis, prevention, treatment, recovery & rehabilitation of patients from trauma and disease.
 - 2.2 Focus on development of clinical and research aptitude.
 - 2.3 Train them to practice the profession of Physiotherapy in a competent and ethical manner towards those who need such service with autonomy, quality care, assurance & humanitarian approach with compassion.
3. **ELIGIBILITY FOR ADMISSION**
 - 3.1 Candidates must have passed 10+2, or Pre-University or Equivalent with Physics, Chemistry, Biology and English as the main subjects.
 - 3.2 Minimum marks for eligibility in 10+2 subjects in aggregate should be 50%.
 - 3.3 The Candidate must have completed 17 years of age on 31st December year of admission.
4. **DURATION OF THE COURSE:** The duration of the Bachelor of Physiotherapy Course shall be four & half year including compulsory internship of six months.
5. Candidate will be admitted to B.P.T course strictly on merit, as decided by the competent authority.
6. **MEDIUM OF INSTRUCTION:** English shall be the medium of instruction for all the subjects of study and the examination of B.P.T. course.
7. **ATTENDANCE:** A candidate is required to attend at least 75 percent of the total classes conducted in a year in all subjects prescribed for the year, separately, in theory and practical to become eligible to appear for the

university examination in the first attempt. The Principal / HOD should notify at their college the attendance details at the end of each term without fail, under Intimation to the University.

- 8. INTERNAL ASSESSMENT:** It shall be based on evaluation of periodic tests of assignment, clinical presentations etc. Regular periodic examination should be conducted through out the course. Although the question of number of examination is left to the colleges, there should be a minimum of at least three (3) sessional examinations during I, II, III and final year. The average of best two examination marks should be sent to the University before the University examination as per notification. Proper record, which forms the basis of the Internal Assessment, should be maintained for all students and should be available for scrutiny. Principal / HOD should display the marks of periodical tests on the student notice board.
- 9. SCHEDULE OF EXAMINATION:** There will be two examination in the year, i) annual examination and ii) a Supplementary Examination to be conducted as per notification issued by the University from time to time. First, Second, Third and Final Examinations of Bachelor of Physiotherapy course shall be held at the end of 1st , 2nd , 3rd and 4th years respectively. The examination for all the subjects shall be conducted by the University.
- 10. CRITERIA FOR PASSING:** A candidate is declared passed in an examination in a subject, if he/she secures 50% of marks in theory and 50% in practical separately. For passing in theory, a candidate has to secure a minimum of 50% marks in the University conducted written examination, and 50% aggregate i.e. marks scored in the university conducted written examination and internal assessment (theory) added together and for a passing in practical, a candidate has to secure a minimum of 50% of marks in University conducted practical examination and 50% in aggregate, i.e. marks scored in University conducted practical examination and internal assessment (practical) added together.
- 11. DECLARATION OF CLASS:**

 - 11.1 A successful candidate obtaining 75% and more marks in the Grand Total Aggregate in the First attempt shall be declared to have passed these subjects with distinction. A successful candidate obtaining 60% and more but less than 75% of the marks in the Grand Total Aggregate in the first attempt shall be declared to have passed these subjects with First Class. A candidate securing 50% and more but less than 60% of the marks in the grand total in aggregate in the first attempt shall be declared Second Class and candidate who passes in more than one attempt will be placed in Pass Class irrespective of the percentage of marks secured.
 - 11.2 Ranks shall be declared on the basis of the aggregate marks obtained by a candidate in the university subjects of the course. Only those candidates who have passed all subjects in all examination including the University examination in the first attempt shall be eligible for the award of rank.
 - 11.3 Ranks shall be declared on the basis of the aggregate marks obtained by a candidate in the University subjects

of the course. Only those candidates who have passed all the subjects in all examinations including the University examination in the first attempt shall be eligible for the award of rank.

12. CARRY OVER

First year: A candidate who has failed in 1st year is permitted to carry any three of the seven subjects and shall have to pass these subjects before appearing for the second year examination.

Second year: A candidate who has failed in 2nd year is permitted to carry any five of the ten subjects and shall have to pass these subjects before appearing for the third year examination.

12.3 **Third year:** A candidate who has failed in 3rd year is permitted to carry any four of the nine subjects and shall have to pass these subjects before appearing for the fourth year examination.

12.4 **Internship:** There shall be six months of compulsory rotatory Internship after the final examination, for candidates declared passed the final examination in all subjects. Internship should be done in a teaching hospital recognized by the University. No candidate shall be awarded degree certificate without successfully completing six months of Internship.

13. A deficiency in the required number of lecturers, clinical and practical may be condoned by the Principal up to the extent of 5 percent under special circumstances.

14. Notwithstanding the integrated nature of this course which is spread over more than one Academic Year, the ordinance in force at the time a student joins the course shall held good only for the examination held during or at the end of the academic year and nothing in this ordinance shall be deemed to debar the University from amending the Ordinance and the amended ordinance, if any, shall apply to all the students, whether old or new.

15. In case of any dispute in the interpretation of rules & regulations, interpretation of the same by the Vice-Chancellor shall be final.

BPT COURSE STRUCTURE

HOURS DISTRIBUTION

FIRST YEAR			
PAPER NO.	SUBJECT	THEORY	PRACTICALS
PAPER-1	ANATOMY	200	100
PAPER-2	PHYSIOLOGY	150	50
PAPER-3	BIOCHEMISTRY	100	50
PAPER-4	PSYCHOLOGY	80	NA
PAPER-5	PREVENTIVE SOCIAL MEDICINE & SOCIOLOGY	80	25
PAPER-6	INTRODUCTION TO PHYSIOTHERAPY	100	50
PAPER-7	BASIC NURSING	NA	40

Total=1025

SECOND YEAR

PAPER-8	KINESIOLOGY & BIOMECHANICS	150	NA
PAPER-9	ELECTROTHERAPY	150	100
PAPER-10	EXERCISE THERAPY	150	100
PAPER-11	REHABILITATION, PROSTHETICS & ORTHOTICS	75	25
PAPER-12	PATHOLOGY & MICROBIOLOGY	150	25
PAPER-13	PHARMACOLOGY	100	NA
PAPER-14	GENERAL MEDICINE	150	NA
PAPER-15	ORTHOPEDICS & SPORTS MEDICINE	150	NA
PAPER-16	GENERAL SURGERY & PLASTIC SURGERY	150	NA
PAPER-17	RADIOLOGY	35	NA

Total= 1500

THIRD YEAR

PAPER-18	CLINICAL ASSESSMENT & PHYSICAL DIAGNOSIS	75	25
PAPER-19	MANUAL THERAPY	75	50
PAPER-20	BIOSTATISTICS & RESEARCH METHODOLOGY	100	NA
PAPER-21	NEUROLOGY & NEURO SURGERY	150	NA
PAPER-22	CARDIORESPIRATORY DISEASE & THORACIC SURGERY	150	NA
PAPER-23	PAEDIATRICS	NA	50
PAPER-24	GYNAECOLOGY & OBSTETRICS	NA	50
PAPER-25	PSYCHIATRY	NA	50
PAPER-26	DERMATOLOGY	NA	25
	CLINICAL TRAINING		650

Total= 1450

FINAL YEAR

PAPER-27	CARDIOPULMONARY PHYSIOTHERAPY	100	50
PAPER-28	NEUROLOGICAL PHYSIOTHERAPY	100	50
PAPER-29	ORTHOPAEDIC PHYSIOTHERAPY	100	50
PAPER-30	SPORTS PHYSIOTHERAPY	100	50
PAPER-31	GENERAL PHYSIOTHERAPY	100	50
PAPER-32	ETHICS, ADMINISTRATION AND COMPUTER APPLICATION	50	NA
PAPER-33	PHYSIOTHERAPY PROJECT		50
	CLINICAL TRAINING		650

Total = 1500

BPT COURSE MARKS DISTRIBUTION

First BPT Examination

Paper	Subject	Theory	Practical-	Viva	Total
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			Viva		
Paper-1	Anatomy	80+20*	80+20*	NA	200
Paper-2	Physiology	80+20*	80+20*	NA	200
Paper-3	Biochemistry	40+10*	50	NA	100
Paper-4	Psychology	40+10*	NA	NA	50
Paper-5	Preventive Social Medicine & Sociology	40+10* + 40+10*	NA	NA	100
Paper-6	Introduction to Physiotherapy	80+20*	80+20*	NA	200
Paper-7	Basic Nursing	NA	40+10*	NA	50

**Internal Assessment Marks*

Second BPT Examination

Paper	Subject	Theory	Practical- Viva	Viva	Total
Paper-8	Kinesiology & Biomechanics	80+20*	80+20*	NA	200
Paper-9	Electrotherapy	80+20*	80+20*	NA	200
Paper-10	Exercise Therapy	80+20*	80+20*	NA	200
Paper-11	Rehabilitation, Prosthetics & Orthotics	80+20*	80+20*	NA	200
Paper-12	Pathology & Microbiology	40+10* + 40+10*	NA	40+10* + 40+10*	200
Paper-13	Pharmacology	40+10*	NA	40+10*	100
Paper-14	General Medicine	80+20*	NA	40+10*	150
Paper-15	Orthopedics	80+20*	NA	40+10*	150
Paper-16	General Surgery & Plastic Surgery	80+20*	NA	40+10*	150
Paper-17	Radiology	NA	NA	40+10*	50

**Internal Assessment Marks*

Third BPT Examination

Paper	Subject	Theory	Practical- Viva	Viva	Total

Paper-18	Clinical Assessment & Physical Diagnosis	80+20*	80+20*	NA	200
Paper-19	Manual Therapy	80+20*	80+20*	NA	200
Paper-20	Biostatistics & Research Methodology	80+20*	NA	NA	100
Paper-21	Neurology & Neuro Surgery	80+20*	NA	40+10*	150
Paper-22	Cardiorespiratory Disease & Thoracic Surgery	80+20*	NA	40+10*	150
Paper-23	Paediatrics	40+10*	NA	40+10*	100
Paper-24	Gynecology & Obstetrics	40+10*	NA	40+10*	100
Paper-25	Psychiatry	40+10*	NA		50
Paper-26	Dermatology	NA	NA	40+10*	50

**Internal Assessment Marks*

Fourth BPT Examination

Paper	Subject	Theory	Practical-Viva	Viva	Internal Evaluation	Total
Paper-27	Cardiopulmonary Physiotherapy	80+20*	80+20*	NA	NA	200
Paper-28	Neurological Physiotherapy	80+20*	80+20*	NA	NA	200
Paper-29	Orthopedic Physiotherapy	80+20*	80+20*	NA	NA	200
Paper-30	Sports Physiotherapy	80+20*	80+20*	NA	NA	200
Paper-31	General Physiotherapy	80+20*	40+10*	NA	NA	150
Paper-32	Ethics, Administration and Computer Application	80+20*	NA	NA	NA	100
Paper-33	Physiotherapy Project #	NA	NA	50	NA	50

**Internal Assessment Marks*

Compulsory Physiotherapy Project: To develop analytical, research aptitude, learn about diseases existing in society treatable with comprehensive physiotherapy & rehabilitation.

BPT FIRST YEAR

PAPER-1 ANATOMY

- **Course Description:** This course involves a detailed study of the microscopic, macroscopic and surface anatomy of the various systems of the body with a particular emphasis on the musculoskeletal, neurological and cardiopulmonary systems.
- **Course Objectives:** The student should be able to describe the structure and function of the various system of the body with an emphasis on musculoskeletal, neurological and cardiopulmonary systems as they relate to Physiotherapy.

1. Cells & Tissues

- a) Anatomical Nomenclature
- b) Structure Of Cell, Reproduction Of Cells.
- c) Tissues: Epithelial, Connective, Muscle & Nervous

2. Embryology & Development

- a) Early Human Development
- b) Development of Individual Systems: Respiratory, gastro-intestinal, Urinary and Vascular System.
- c) Prenatal Growth in Form And Size
- d) Neonatal Anatomy and Growth

3. Skin

- a) Types of Skin, Epidermis, Dermis, Nerves, Blood Vessels, age related Changes, Repair
- b) Appendages of Skin: Pilo sebaceous Unit, Nail Unit.

4. Skeletal System

- a) Morphology of Human Skeleton: The Skeleton in Life, Shape and Proportions of Bone, Functions of Bone and Skeleton, mechanical Properties of Bone, Growth of Individual Bones
- b) Skeletal Connective Tissues: Structure of Cartilage, Bone as a Tissue, Microscopic Structure and Organization of Bone, Blood Vessels and Nerves of Bone
- c) Types of Joints:
- d) Axial Skeleton: Vertebral Column, Ribs, Sternum, Skull.
- e) Appendicular Skeleton: upper limb, Lower Limb.

5. Muscle

- a) Types of Muscle, Attachments of Skeletal Muscle
- b) Form and Function in Skeletal Muscle: Form and Fibre Architecture, Functional Implications of Form.
- c) Muscle and Movement.
- d) Muscles and Fasciae of Head, Neck, Trunk, Upper Limb, Lower Limb

6. Nervous System

- a) Regional Organization of Central Nervous System: Spinal Cord, Rhombencephalon, Mesencephalon, Diencephalon,
Telencephalon, Basal Nucleii, Fluid Compartments and Fluid Balance in the CNS.
- b) Peripheral Nervous System: Cranial Nerves, Spinal Nerves, and Autonomic Nervous System Peripheral Apparatus of Special Senses: Gustatory, Olfactory, Peripheral Visual, Accessory Visual, Auditory, Vestibular.

7. Hemolymphoid and Cardiovascular System

- a) Haemal Cells and tissue, Haemopoiesis, Lymphoid Cells And Tissues.
- b) Blood Vessels, Thoracic Cavity and Heart.
- c) Arterial System, Venous System, Lymphatic.

8. Respiratory System

Nose and Paranasal Sinuses, Larynx, trachea. Bronchi, Lungs, Pleura, Mediastinum

9. Alimentary System

Oral Cavity, Abdomen, Oesophagus to Anus

10. Urinary and Reproductive System

- a) Kidneys, Ureter, Bladder, Urethra.
- b) Reproductive organs of Male and Female.

11. Endocrine System

Pituitary Gland, Pineal Gland, Thyroid Gland, Parathyroid Gland, Chromaffin System, Diffuse Neuroendocrine System, Adrenal Gland, Paraganglion, Para-aortic Bodies, Tympanic Bodies, Coccygeal Body.

ANATOMY PRACTICAL

Course Description: This course involves a detailed study of the microscopic, macroscopic and surface anatomy of the various systems of the body with a particular emphasis on the musculoskeletal, neurological and cardiopulmonary systems. Students will be instructed using dissected cadavers and organ specimens

Course Objectives: The student should be able to recognize various specimens and describe the structure and function of the various systems of the body with an emphasis on the musculoskeletal, neurological and cardiopulmonary systems as they relate to Physiotherapy.

1. Surface Anatomy: Identification and Description of surface land marks on Human Specimen
2. Muscles, Bones Ligaments, Joints of head, face, trunk, lower and upper extremities on a dissected human specimen.
3. Gross And Microscopic Anatomy of the Central and Peripheral Nervous System.
4. Gross anatomy of Respiratory, Digestive Endocrine, Urinary and Reproductive Systems on a dissected human body.

Recommended Books

1. Human Anatomy-By Snell
2. Anatomy By Chaurasia-All 3 Volumes
3. Kinesiology By Katherine Wells
4. Neuro-Anatomy By Inderbir Singh
5. Gray`s Anatomy

PAPER-2 PHYSIOLOGY

- **Course Description:** This course involves a detailed study of the physiology of the various systems of the body at a microscopic and macroscopic level, with a particular emphasis on the musculoskeletal, neurological and cardiopulmonary systems
- **Course Objectives:** The student should be able to describe the structure and function of the various system of the body with an emphasis on musculoskeletal, neurological and cardiopulmonary systems as they relate to Physiotherapy.

1. Functional Systems of Cell
 - a) Cell and its Function
 - b) Extra-Cellular Fluid, Intra-Cellular Fluid.
 - c) Functional Systems of Cell, DNA, RNA.
 - d) Control of Genetic Function and Biochemical Activity in Cells.

e) Cell Differentiation, Cancer.

2. Membrane Physiologies, Nerve and Muscle

a) Transport of Substances Through the Cell Membrane: diffusion, Active Transport.

b) Membrane Potentials and Action Potentials: Resting Membrane Potential of Nerves, Nerve Action Potential, Propagation of AP, Signal Transmission in Nerve Trunks.

c) Contraction of Skeletal Muscle: Molecular Mechanics of Muscle Contraction, Energetics of Muscle Contraction, Characteristics of Whole Muscle Contraction, N-M Junction, Muscle AP, Excitation-Contraction Coupling.

d) Contraction and Excitation of Smooth Muscles.

e) Hormonal Control of Smooth Muscle Contraction.

3. Heart and Circulation

a) Cardiac Muscle, Cardiac Cycle, Regulation of Heart Pumping, Cardiac Failure.

b) Rhythmical Excitation of the Heart: Specialized Excitatory and Conductive System of the Heart, Control of Excitation and Conduction in the Heart.

c) Normal ECG, Methods of Recording, ECG Leads.

d) Heart Sounds

e) Basic Theory of Circulatory Function, Interrelationships among Pressure, Flow and Resistance, Vascular Dispensability, Arterial Pressure Pulsation, Veins and their Function, Lymphatic system, Microcirculation, Capillary System, Exchange of Nutrients and Other Substances, Interstitial Fluid, Local Control of Blood Flow, Humoral and Nervous Regulation of Circulation, Cardiac Output, Venous Return Arterial Pressure and their Regulation.

f) Muscle Blood Flow and cardiac Output During Exercise, Coronary Circulation.

g) Circulatory Shock.

h) RBC, Anemia, Polycythemia, WBC, Resistance of Body to Infection, Blood Groups.

i) Hemostasis and Blood Coagulation

4. Kidney and Body Fluids

a) Body Fluid Compartments: ECF, ICF, Interstitial Fluids and Edema.

b) Urine Formation By the Kidneys: Nephron, Glomerular Filtration, Renal Blood Flow, Tubular Reabsorption.

c) Regulation of ECF Osmolarity and Sodium Concentration

d) Integration of Renal Mechanisms for Control of Blood Volume and ECF Volume.

e) Renal Regulation of Potassium, Calcium, Phosphate and Magnesium, Regulation of Acid- Base Balance.

f) Diuretics

5. Respiration

a) Mechanics of Pulmonary Ventilation, Pulmonary Volumes and Capacities, Alveolar Ventilation, Functions of the Respiratory Passageways

b) Pulmonary Circulation, Pulmonary Edema, pleural Fluid

c) Physical Principles of Gas Exchange, Transport of Oxygen and carbon dioxide in the Blood and Body Fluids

d) Regulation of Respiration.

e) Respiratory Dysfunction.

6. Aviation, Space and Deep Sea Diving Physiology

Effects of Low Oxygen Pressure on the Body, Mountain Sickness, Effects of Acceleratory Forces, Artificial Climate, Weightlessness in Space, effects of High Partial Pressure of Gases on the Body, Hyperbaric Oxygen Therapy.

7. Nervous System

a) Sensory Receptors, Neuronal Circuits for Processing Information.

b) Somatic sensations: Touch, Position, Pain, Thermal, Headache.

c) Special Senses

d) Motor Functions of the Spinal Cord: Cord Reflexes, Spinal cord Transection, Spinal Shock.

e) Cortical and Brain Stem Control of Motor Function: The Motor Cortex, Corticospinal Tract, Vestibular Sensations and

Maintenance of Equilibrium.

f) Cerebellum, Basal Ganglia, Motor Control: Integration of the Many parts of the total Motor Control System.

g) Intellectual Functions of the Brain, Learning and Memory.

h) Behavioral and Motivational Mechanisms of the Brain: The Limbic System, Hypothalamus.

i) States of Brain Activity: Sleep, Brain waves, Epilepsy, Psychoses

j) Autonomic Nervous System

k) Cerebral Blood Flow, CSF and Brain Metabolism.

8. Gastrointestinal System

- a) Motility, Nervous Control, Blood Circulation
- b) Propulsion and Mixing of Food
- c) Secretory Functions
- d) Digestion and Absorption.

9. Endocrinology and Reproduction

- a) Hormone Secretion, Transport and Clearance from Blood
- b) Hormones: Pituitary, Thyroid, Adrenocortical, Insulin, Parathyroid, Reproductive.
- c) Puberty, Menarche, Menopause
- d) Pregnancy and Lactation
- e) Fetal and Neonatal Physiology: Special Functional Problems of Neonate, Prematurity.

10. Physiology of Exercise and Work

- a) Neuromuscular activity human movement, physiological mechanism in movement, behavior, strength, endurance, & analysis of movement.
- b) Circulatory and respiratory response to exercise including effects on the heart, blood circulation, body fluid changes
pulmonary ventilation, gas exchange and transport, etc.
- c) Effects of exercise and work on other body functions.
- d) Metabolic and environmental aspects of exercise and work-metabolism, energy requirement, efficiency of muscular work,
nutritional aspects, heat and body temperature regulation and environmental factors.
- e) Effects of Exercise training - endurance, fatigue and recovery.
- f) Fitness and health - age, sex, body type, race, stress and medical aspects of exercise.

PHYSIOLOGY PRACTICAL

- **Course Description:** This course involves a detailed study of the physiology of the various systems of the body by demonstration and performance of practicals with a particular emphasis on the musculoskeletal, neurological and cardiopulmonary systems

- **Course Objectives:** The student should be able to describe the structure and function of the various system of the body with an emphasis on musculoskeletal, neurological and cardiopulmonary systems as they relate to Physiotherapy.

1. Identification of blood cells and differential counts
2. W.B.C. count
3. R.B.C. count
4. Hemoglobin percentage and color index
5. E.S.R. and Blood group
6. Bleeding time and clotting time
7. Respiratory efficiency tests
8. Artificial respiration and C.P.R.
9. Pulse rate, Heart rate and measurement of Blood Pressure
10. Respiratory rate and Auscultation
11. Normal E.C.G.
12. Reflexes- Superficial and Deep
13. Sensations
14. Tests for functions of Cerebrum
15. Tests for functions of Cerebellum

Recommended Books

1. Course In Medical Physiology—Vol-I & II-By Dr Chatterjee
2. Medical Physiology By Dr. Bijlani
3. Text Book Of Medical Physiology-Guyton
4. Manual of Practical Physiology- A.K.Jain

PAPER-3 BIOCHEMISTRY

- **Course Description:** This course involves a study of the metabolism of carbohydrates, proteins, fats, minerals, vitamins and essential enzymes. The role of these in the functioning of the human body will be discussed.
- **Course Objectives:** At the end of the course, the student should be able to describe normal functions of different components of food, enzymes, describe in details biochemical aspects of muscle contraction, and describe in brief the biochemical basis of some common lab tests.

1. Cell Biology

- a) Membrane, Structure & Function;
- b) Junction Of Intracellular Organelle In Brief

2. Carbohydrates

- a) Chemistry-Definition, Classification With Examples
- b) Functions Of Carbohydrates With Mucopolysaccharides
- c) Reducing Properties Of Sugars Of Clinical & Diagnostic Importance (Eg. Benedict's Test , Banfood's Test Etc)
- d) Metabolism-Digestion & Absorption Of Carbohydrates, glycolysis, Aerobic, Anaerobic, Energetics & Regulation ;
- e) Kreb's Cycle-Its Energetics & Regulation- Role Of T.C.A. Cycle;
- f) Glycogenesis, Glycogenolysis & Their Regulation-Role Of Liver In Muscle Glycogen
- g) Glyconeogenesis-Significance Of H.M.P. Shunt
- h) Hormonal Regulation of Blood Sugar Levels-Important Metabolic Disorders of Glycogen, Lactose Intolerance, Diabetes Mellitus.

3. Proteins

- a) Chemistry-Definition-Function-Classification Of Amino Acids-Protein Structure-Effect Of Temperature On Proteins-Denaturation-Coagulation ;Isoelectric Ph & Its Importance
- b) Metabolism-Digestion & Absorption- Decarboxylation- De-Amination- Transmethylation-Transamination & Their Importance-Detoxification Of Ammonia Including Urea Cycle ;
- c) Special Products Of Amino Acid-E.G. Phenylalanine Glycine ,Methionine[No Biosynthesis] ;
- d) Neuro-Transmitters No Bio-Synthesis]

4. Lipids

- a) Chemistry-Definition-Classification-[Including Fatty Acids With Examples]-Function -
- b) Metabolism-Digestion & Absorption Of Lipids-B-Oxidation-Of Saturated Fatty Acids & Its Energetics & Regulation Of
Fat Metabolism In Adipose Tissue-Ketone Bodies Formation & Utilization—Cholesterol & Its Importance[No Biosynthesis Needed]-Classification, Sources & Function Of Lipoproteins-Lipoproteinemia Atherosclerosis

- c) Fate Of Acetyl-Coenzyme A
- d) Cholesterol Biosynthesis
- e) Ketogenesis
- f) Fatty Acids Biosynthesis
- g) Neuro -Transmitters
- h) T.C.A.
- i) Fate Of Glycerol In Gluconeogenesis, Energy (Glycolysis), Tri-Glycerides,
- j) Phospholipid Synthesis,

5. Nuclie Acids

D.N.A., R.N.A.-Definition-Structure & Function-Types-Genetic Code-Catabolism Of Purine –Gout

6. Enzymes

- a) Definition-Co-Enzymes-Classification-Factors Affecting-;
- b) General Metabolism Of Enzymes [In Brief] ;
- c) Inhibition & Types Of Inhibitors ;
- d) Iso-Enzymes ;
- e) Clinical & Therapeutic Use Of Enzymes

7. Vitamins

- a) Water & Fat Soluble-Definition-Classification ;
- b) Individual Vitamins-Sources-Co-Enzyme Forms- Function-Reaction Related To Metabolism Covered ;
- c) RDA, Absorption-& Transport-Deficiency & Toxicity
- d) Biological Oxidation
- e) Oxidative Phosphorylation & ETC In Brief

8. Minerals

- a) Phosphate, Calcium, & Iron [In Details];
- b) Magnesium, Fluoride, Zinc, Copper, Selenium Molybdenum, Iodine-Sources, RDA, Absorption,-Transport-Excretion

Function & Disorder

9. Acid- Base Balance,Water & Electrolyte

- a) Body Water, Ph-Osmolarity Extra & Intra Cellular Fluid-;
- b) Buffers-Ph, Buffer System In Blood-
- c) Role Of Kidneys & Lungs In Acid-Base Balance
- d) Water- Electrolyte Balance Imbalance-Dehydration

10. Hormones

- a) Definition-Classification-Mechanism & Action
- b) Second Messenger (Ca, Camp, Inositol Phosphate,
- c) Metabolic Effects Of Insulin, Glucagon, Catecholamines, Thyroxine
- d) Mineralo-Corticoids, Gluco Corticoids

11. Muscle Contraction

- a) Contractile Elements;
- b) Biochemical Events During Contraction;
- c) Energy Metabolism In Skeletal & Cardiac Muscle

12. Connective Tissue

Biochemistry Of Connective Tissue-Collagen –Glyco-Protein –Proteoglycans

13. Nutrition

- a) Importance Of Nutrition-Calorimetry-Energy Value-Calorimeter-Respiratory Quotient & Its Significance
- b) Basal Metabolic Rate-Definition-Normal Values-Factors Affecting BMR;
- c) Energy Requirement-With-Age/Sex/ Thermogenesis/-Specific Dynamic Action Of Food,-Energy Expenditure For Various Activities
- d) Composition Of Food, Balanced Diet Dietary Recommendations Nutritional Supplementation- Nutritional Value Of Carbohydrates/Proteins/Fats & Fibers,
- e) Nitrogen Balance & Its Significance-Protein Energy Malnutrition-Kwashiorkor & Marasmus

14. Clinical Biochemistry

- a) Liver Function Test & Renal Function Test ;
- b) Relevance Of Blood Levels Of Glucose, Urea, Ca-Phosphate-& Uric Acid;
- c) Enzymes-Amylase, CPK, LDH,Isoenzymes
- d) Lipid Profile-Tri -Glyceride, Cholesterol/HDL/LDL/ALDL Etc;
- e) Protein & Aggression, Glycosuria
- f) Introduction to genetics
- g) Medical bio-chemistry

BIOCHEMISTRY PRACTICAL

PRACTICALS

A. QUALITATIVE

Qualitative analysis of carbohydrates

Reaction of protein

Abnormal constituents of urine

Milk analysis

B. QUANTITATIVE

Verification of Beer's and Lambert's law

Estimation of Blood glucose

Estimation of Blood urea

Estimation of Blood protein

Estimation of Blood creatinine

Estimation of Blood uric acid

Estimation of Blood calcium

Estimation of Blood bilirubin

DEMONSTRATION

Electrophoresis

Chromatography

Recommended Books

1. Fundamentals of Biochemistry-by Dr. Deb Jyoti Das,
2. Biochemistry-by-Dr Satyanarayan
3. Textbook of Medical Biochemistry –Chatterje and Shinde

PAPER-4 PSYCHOLOGY

- **Course Description:** This course involves a description of some common psychological parameters especially as they relate to physiotherapeutic practice
- **Course Objectives:** The student will be able to apply some general psychological principles when dealing with patients.

1. Definition, application and methods in psychology.
2. Biology of Behavior.
3. Sensory processes and perception.
4. Principles of learning: Classical and Instrumental Conditioning, Cognitive learning.
5. Memory: Theories, long and short – term memories, forgetting, amnesia.
6. Thinking and Language: Concepts, thinking process, problem- solving and decision making, creative thinking and language communication.
7. Motivation: Theories, Biological and Social motives, frustration and conflict of motives, motives to know and be effective.
8. Emotion and Stress: Expression and perception of emotions, physiology and application of emotion.
9. Social perceptions, influences, and relationships.
10. Attitudes; Nature and measurement of attitudes, Attitude theories, Factors in attitude change, Behavior and attitudes
11. Development – A Lifespan Perspective (infancy, childhood, adolescence, adult, old age)
12. Communication
13. Counseling
14. Brief description of Psychological assessment and testing.
15. Personality: Defining and thinking about personality, Theories and issues and controversies and research
16. Abnormal Psychology.
17. Therapy for Psychological distress.
18. Anxiety disorders
19. Personality disorders

Recommended Books

1. Introduction to Psychology- Morgan and King

PAPER-5 PREVENTIVE SOCIAL MEDICINE & SOCIOLOGY

PREVENTIVE SOCIAL MEDICINE

1. Communicable diseases
2. Non-communicable diseases
3. Family planning
4. Health programmes in India
5. Mental health
6. Genetics and health
7. Occupational health
8. Preventive medicine in obstetrics, paediatrics and geriatrics
9. Nutrition and health
10. Environment and health
11. Hospital waste management
12. Communication for health
13. Health planning and management

SOCIOLOGY

- **Course Description:** This course will introduce students to the basic sociological concepts, principles and social process. Social institutions and the various social factors affecting the family in rural and urban communities will be studied.
- **Course Objectives:** The student will be able to demonstrate and understanding of the role of socio cultural factors on health and disease as relates to Physiotherapy.

1. Introduction: Definitions of sociology, sociology as a science of society, uses of the study of sociology, application of knowledge of sociology in Physiotherapy.

2. Sociology and Health: Social factors affecting health status, social consciousness and perception of illness, social consciousness and meaning of illness, decision making in taking treatment. Institutions of health, their role in the improvement of the health of the people.

3. Socialization: Meaning of socialization, influence of social factor on personality, socialization in hospitals, socialization in the rehabilitation of patients.

4. Social Groups: Concept of social groups, influence of formal and informal groups on health and sickness, the role of primary groups and secondary groups in the hospitals and rehabilitation settings.

5. Family: Influence of family on human personality, discussion of changes in the functions of a family on the individual's health, family and nutrition, the effects of sickness on family, and psychosomatic disease.

6. Community: Concept of community, role of rural and urban communities in public health, role of community in determining beliefs, practices and home remedies in treatment.

7. Culture: Components of culture, impact of culture on human behaviour, cultural meaning of sickness, response of sickness and choice of treatment (role of culture as social consciousness in moulding the perception of reality), culture induced symptoms and disease, subculture of medical workers.

8. Caste System: Features of the modern caste system and its trends.

9. Social Change: Meaning of social change, factors of social change, human adaptation and social change, social change and stress, social change and deviance, social change and health programs, the role of social planning in the improvement of health and in rehabilitation.

10. Social Control: Meaning of social control, role of norms, folkways, customs, morals, religion law and other means of social control in the regulation of human behaviour, social deviance and disease.

11. Roles: Role taking and making , concepts of role , multiple roles , role set, role conflicts , role loss and transition , roles and health.

12. Organization: Goals and functions, organization as systems, organizational impact -individual, family, community, social structure, power and control in organizations, feminist perspectives on organizations.

13. Sex, gender and feminism: Social construction of sex and gender, sex / gender roles, feminist critiques of sociology.

14. Work: Work, culture and work, theories of work, unemployment, women and work.

15. Leisure: Conceptual and methodological

16. Social Problems of the Disabled

18. Social Security: Social security and social legislation in relation to the disabled.

19. Social Worker

Recommended Books

3. Introduction to Sociology- Vidya Bhushan

1. The Structure of Sociological Theory- Turner

2. Perspectives in Sociology- Cuff, Shaerock

PAPER-6 INTRODUCTION TO PHYSIOTHERAPY

BIO-PHYSICS

- **Course Description:** This course involves a study of the basic physical principles as they relate to the application of electrotherapeutic modalities.
- **Course Objectives:** The student should be able to explain the physical rationale for the use of physical agent modalities.

1. Physical principles

a) Structure and properties of matter -solids, liquids and gases, adhesion, surface tension, viscosity, density and elasticity.

b) Structure of atom, molecules, elements and compound

c) Electricity: Definition and types. Therapeutic uses. Basic physics of construction. Working Importance of currents in

treatment.

d) Static Electricity: Production of electric charge. Characteristic of a charged body. Characteristics of lines of forces. Potential energy and factors on which it depends. Potential difference and EMF.

e) Current Electricity: Units of Electricity: farad, Volt, Ampere, Coulomb, Watt

f) Condensers: Definition, principle, Types: construction and working, capacity and uses.

g) Alternating current.

h) Magnetism: Definition. Properties of magnets. Electromagnetic induction. Transmission by contact. Magnetic field and

magnetic forces. Magnetic effects of an electric field.

i) Conductors, Insulators, Potential difference, Resistance and intensity

j) Ohm's law and its application to DC and AC currents. Fuse: construction, working and application.

k) Transmission of electrical energy through solids, liquids, gases and vacuum.

l) Rectifying Devices-Thermionic valves, Semiconductors, Transistors, Amplifiers, transducer and Oscillator circuits.

m) Display devices and indicators-analogue and digital.

n) Transformer: Definition, Types, Principle, Construction, Eddy current, Working uses

o) Chokes: Principle, Construction and working, Uses

2. Effects of Current Electricity

a) Chemical effects-Ions and electrolytes, Ionisation, Production of an EMF by chemical actions.

b) Electromagnetic Induction.

c) Electromagnetic spectrum.

3. Electrical Supply

a) Brief outline of main supply of electric current

b) Dangers-short circuit, electric shocks.

c) Precaution-safety devices, earthing, fuses etc.

d) First aid and initial management of electric shock

4. Various agents

a) Thermal agents: Physical Principles of cold, Superficial and deep heat.

- b) Ultrasound: Physical Principles of Sound
- c) Electro magnetic Radiation: Physical Principles and their Relevance to Physiotherapy Practice
- d) Electric Currents: Physical Principles and their Relevance to Physiotherapy Practice.

5. Circuit diagrams

- a) SWD
- b) US
- c) MWD
- d) LASER.

FUNDAMENTALS OF EXERCISE THERAPY

- **Course Description:** This course involves a study of the basic physical principles as they relate to the application of Exercise Therapy.
- **Course Objectives:** The student should be able to explain the physical rationale for the use of physical agent modalities. The student should be able to explain the physical rationale for the selection of appropriate exercises. This course will enable the student to understand the basic mechanics and their application in Physiotherapy in restoration of the physical bodily function.

1. Mechanical Basis of Movement

2. Force and force Systems, Motion and its Laws, Levers, Angle of Pull, Pulleys and its types, Pendulum, Friction, Work, Energy and Power, Friction, Stress and Strain.

3. Skeletal Basis of Movement

4. Planes and Axes, Joints and their Classification, Classification of Movement, Degrees of Freedom, Bones and their Classification.

5. Musculoskeletal Basis of Movement

6. Structure of Muscle and its Classification, Muscle Tension, Muscle Fibre, Group Action of Muscles, Torque & angle of pull

7. Gravity: Effects, Centre of gravity, Line of Gravity and their Alterations, Role in Human Body and Movement.

8. Equilibrium: Effects, Supporting Base, Role in Human Movement.

9. Simple Machines: Levers and their Functions and classification, Pulleys and their Functions and classification, Inclined Planes and their Functions and classification.

10. Elasticity: Definition, Stress, Strain, Hooke's Law. Springs. Properties of springs, springs in series and parallel.

11. Principles of Hydrotherapy: Hydrostatics and Hydrodynamics, Archimedes's principles, Properties of water, properties of liquids, pressure, Buoyancy, laws of floatation, Apparent loss in weight, factors determining up thrust, Effects of buoyancy on movements performed in water, Movement of force, further effects of apparent loss of weight, Equilibrium of a floating body, movement of water, Inertia, Movement of objects in water.

12. Fundamental and Derived Positions

13. Traction:Principles

FUNDAMENTALS OF PHYSIOTHERAPY PRACTICAL

- **Course Description:** This course involves a demonstration of some basic physical principles as they relate to the application of electrotherapeutic modalities and the basic physical principles as they relate to the application exercise therapy.
- **Course Objectives:** The student should be able to explain the physical rationale for the use of physical agent modalities and the physical rationale for the use of exercise therapy

1. Clinical observation

2. Mechanical Principles applied in Physiotherapy like force, Torque, Centre of Gravity, etc.

3. Demonstration of different types of levers in the human body.

4. Demonstration of different types of pulleys and strings used in Physiotherapy.

5. Demonstration of Archimedes' Principle of floatation and Bernoulli's Theorem in Hydrotherapy.

6. Demonstration of axial and pendular suspension.

Recommended Books

1. Practical Exercise Therapy- Hollis and Cook
2. Principles of Exercise Therapy- Dina Gardiner
3. Clayton's Electrotherapy
4. Physical Principles Explained-Low and Reed

PAPER-7 BASIC NURSING

1. Basic Nursing
2. What is Nursing?
3. Nursing Principles
4. Inter Personal relationship
5. Bandaging: Basic turns, Bandaging extremities: Triangular bandages and their application
6. Environment safety
7. Bed making
8. Prone, lateral dorsal, dorsal recumbent, Fowler's position
9. Comfort measures, Aid to rest and sleeps.
10. Lifting patients up in the bed: Transferring from bed to wheel chair.
11. Transferring from bed to stretcher.
12. Providing for patients Elimination.
13. Giving and taking Bedpan, Urinal: Observation of stools, Urine Observation of sputum
14. Understand use and case of catheters
15. Enema giving
16. Methods of giving nourishment
17. Feeding Tube feeding Drips Transfusions.
18. Care of rubber goods
19. Observation, Reporting and Recording Temperature, Respiration and pulse simple Aseptic Techniques Sterilization and Disinfection.
20. Surgical Dressing
21. Parental Administer of Medicine
22. Emergencies
23. Proceedings during shock
24. Snake & Animal Bites
25. Traumatic Injuries
26. Electric shocks
27. Cardio-Pulmonary Resuscitation

First Aid

Syllabus as for certificate of Red Cross Society of St. John's Ambulance Brigade.

BOOK RECOMMENDED:

1. Principles of Nursing by Sister A. Nancy
2. First aid (Book by Jhon's Ambulance Brigade)
3. Medical Emergencies

Paper-8 BIOMECHANICS & KINESIOLOGY

- **Course Description:** This course involves a description of biomechanical principles
- **Course Objectives:** The student will be able to tailor an effective treatment programme using biomechanical principles

1. Mechanics

- a) Introduction to mechanics including motion, forces, parallel forces system vectors.
- b) Newton's Law of motion, concurrent force system-composition forces, muscle action line etc.
- c) Centre of Gravity, line of gravity, stability and equilibrium, law of inertia.
- d) Levers, torque, mechanical advantage.
- e) Moment arm and anatomic pulleys.

2. Joint Structure and Function.

- a) Basic principles of joint design and a human joint.
- b) Tissues present in human joint including dense fibrous tissue, bone, cartilage and connective tissue.
- c) Classification of joints.
- d) Joint function, Kinematics chains and range of motion.
- e) General effects of injury and disease
- f) Recall anatomy and study the biomechanics of the spine, shoulder girdle, joints of the upper extremity, pelvic girdle and the joints of the lower extremity.

3. Muscle Structure and Function

- a) Mobility and stability functions of muscle
- b) Elements of muscles structure and its properties.
- c) Factors affecting muscle tension.
- d) Types of muscle contraction and muscles work.
- e) Classification of muscles and their functions.
- f) Group action of muscles, co-ordinated movement.

4. Postures and Gait

- a) Posture: Definition, factors responsible for posture, relationship of gravity on posture Postural in balance: factors responsible for in balance in static and dynamic positions including ergonomics.
- b) Description of normal gait, determinants of gait, spatio temporal features, and analysis
- c) Gait division: Types, causative factors and analysis.

5. Regional Structure and Function

- a) The vertebral column
- b) Shoulder complex
- c) Elbow complex
- d) Wrist and Hand complex
- e) Hip complex
- f) Knee complex
- g) Ankle and Foot complex.

Recommended Books:

- 1. Joint Structure and Function- Norkin
- 2. Biomechanics of Human Motion- Leveau

PAPER-9 ELECTROTHERAPY

- **Course description:** This course involves a detailed study of production, physiological effects, application techniques, effects, indications, contra-indications, precautions, operational skills of equipment, patient preparation of physical agent modalities used in Physiotherapy.
- **Course Objectives:** Student should be able to operate all physical agent modalities safely and effectively.

1. Low Frequency Currents

- a) Introduction to AC, DC and Modified Currents
- b) Production of DC, physiological and therapeutic effects of constant currents
- c) Iontophoresis
- d) Modified Direct Current-various pulses, duration and frequency and their effect on Nerve and. Muscle tissue. Production of interrupted and surged current & their effects.
- e) Transcutaneous Electric Nerve Stimulation (TENS)
- i) Types of low frequency, pulse widths, frequencies & intensities used as TENS applications.

ii) Theories of pain relief by TENS

iii) Principle of clinical application effects & uses indications, contraindications, precautions, and operational skills of equipment & patient preparation.

2. Medium Frequency Currents: Interferential therapy (IFT)

3. Electrical Reactions and Electro-diagnostic tests

a) Electrical Stimuli and Electrical Properties of Nerve and muscle tissue.

b) Types of lesion and development of reaction of degeneration

c) Faradic - Intermittent direct current test.

d) S.D. Curve and its interpretation.

e) Chronaxie, Rheobase & pulse ratio

f) EMG, NCV tests

4. Actinotherapy

a) Infra Red Rays (IRR)-wavelength, frequency, types & sources of IRR generation, technique of irradiation, physiological and therapeutic effects.

b) Ultra-Violet Rays (UVR): Physics: Electric arc, process of ionisation, and transmission of current through gases; types of lamps. Construction of lamps: High pressure Hg vapor lamps, Kromayer lamp, Tridymite formation, Cooling, Spectrum - Hg vapor lamps (in brief), Fluorescent tube for UV production, PUV A apparatus, Care of lamp. Physiological and Therapeutic effects - in detail. Photosensitization in brief. Indication, Contra - indications and dangers. Technique of application: Test dose, local treatment, general irradiation, treatment. Conditions (common) in which above treatment given. Sensitisers (in brief) Filters. Comparison between I. R. and U.V. Erythema-Development, appearance, and duration. Wavelength. Penetration. Pigmentation. Tolerance.

5. Thermal Agents

a) Superficial heat - paraffin wax bath, moist heat, electrical heating pads, mode of heat Transfer

b) Cryotherapy

c) Deep heating modalities:

I. Short Wave Diathermy

II. Long wave Diathermy

III. Microwave Diathermy

IV. Ultrasound

Properties, principle of production, construction of apparatus with diagram, methods of application, physiological and therapeutic effects, technique of application, testing of machine, preparation of patient, types of electrodes, position and size of Electrodes, therapeutic dosage, dangers, precautions, Indications and contra indications for these modalities.

6 .Therapeutic Light in Physiotherapy

LASER: Define laser and briefly outline its therapeutic indications, contra - indications, efficacy, and precautions advisable.

7. Biofeedback: Introduction, principles, therapeutic effects, indications, contra-indications and techniques of treatment

8. Advanced electrotherapy: Computerization in electrotherapy, programming parameters, appropriate selection of parameters and combination therapy.

ELECTROTHERAPY PRACTICAL

- **Course description:** This course involves a detailed study of production, physiological effects, application techniques, effects, indications, contra-indications, precautions, operational skills of equipment, patient preparation of physical agent modalities used in Physiotherapy.
- **Course Objectives:** Student should be able to operate all physical agent modalities safely and effectively.

1. Basic operation of electric supply to the equipment and safety device.
2. Sensory and motor stimulation of nerves and muscles by various types of low frequency currents on self.
3. Locate and stimulate different motor points region wise, including the upper and lower limb, trunk & face.
4. Therapeutic application different low frequency currents faradic foot bath, faradism under pressure, iontophoresis.
5. Reaction of degeneration of nerves. Plot strength duration curves. Chronaxie and Rheobase.
6. Hydrocollator unit, its operation and therapeutic application of Hot packs-regionwise.
7. Various types of infrared lamps and their application to body regionwise.
8. Paraffin wax bath unit, its operation and different method of application- regionwise.
9. Different types of Ultra violet units, their operation, assessment of test dose and application of UVR - regionwise.
10. TENS Stimulator, its operation and application - regionwise.
11. Short wave diathermy unit, its operation and different methods of application - regionwise.
12. Microwave diathermy unit, its operation and different methods of application - regionwise.
13. Ultrasound unit, its operation and methods of application - regionwise.
14. LASER unit, its operation and methods of application - regionwise.

15. Various forms of therapeutic cold application region wise including ice, cold packs, vapocoolant sprays, etc.

16. Intermittent pneumatic therapy unit its operation and different methods of application - regionwise.

Recommended Books

1. Clayton's Electrotherapy
2. Clinical Electrotherapy- Nelson and Currier
3. Electrotherapy Explained- Low and Reed

PAPER-10 EXERCISE AND MANUAL THERAPY

- **Course description:** This course involves a detailed study of physiological effects, application techniques, effects, indications, and contraindications, precautions for exercises used in Physiotherapy.
- **Course Objectives:** Student should be able to explain the rationale for the prescription of safe and effective exercises.

1. Mechanics: Define the following terms and describe the principles involved with suitable examples.

a) Force: Composition of force, Parallelogram of forces. Equilibrium: Stable, unstable, neutral. Forces applied to the body

b) Gravity: Centre of gravity, Line of gravity. Levers: 1st order, 2nd order, 3rd order, Their examples in the human body and their practical applications in physiotherapy.

c) Levers. Pulleys: Fixed, Movable.

d) Springs: Series and Parallel. Tension. Elasticity: Hooke's law.

e) Axis: Sagittal, Frontal, Transverse, Vertical. Planes: Sagittal, Frontal, Horizontal.

f) Definition of: Speed, velocity.

g) Work, Energy, power, Acceleration, Momentum, Friction and Inertia.

2. Muscle Action

Muscle work: Isotonic (concentric, eccentric), Isometric (static). Group action: Agonists (prime movers). Antagonists, synergists, Fixators. Angle of muscle pull, Mechanical efficiency of the muscles.

3. Pelvic Tilt

Normal pelvic tilts, alterations from normal, anterior tilt (forward) posterior tilt (backward), Lateral tilt. Muscles responsible for alterations and pelvic rotation. Identification of normal pelvic tilt, pelvic rotation and altered tilts and their corrective measures.

4. Starting Positions

Positions, their muscle work, effects and uses. Specify the importance and derived positions for each one: standing, kneeling, sitting, lying, and hanging.

5. Movements

a) Anatomic movements: Flexion, Extension, Abduction, Inversion, Eversion, Supination, Pronation, Internal rotations, External rotations, Gross flexion, Gross extension, Trunk side flexion.

b) Surface Anatomy of the individual joints.

c) Rhythm of movement. Timing of movement. Duration of movement.

d) Classification of Movement: Active, passive, Effects of exercise: Physiological effects, Therapeutic effects. Indications and contra - indications of the following and demonstrate the technique for each: Active movements: Voluntary (free, active assisted, assisted resisted, resisted), Involuntary (associated reflex, peristaltic, visceral, cardiac). Passive movements: Relaxed passive, mobilizing passive (forced P.M. manipulations, serial manipulations). Passive stretching.

6. Passive Movements

Passive stretching of following muscles/ muscle groups and describe the indications, contra -indications, physiological effects, advantages and disadvantages of each. Upper limb: pectoralis major, biceps brachi, triceps brachi, and long flexors of the fingers.

Lower limb: rectus femoris, iliotibial band (tensor fascia lata), gastro - soleus, hamstrings, hip abductors, iliopsoas.
Neck:

Sternocleidomastoid.

7. Active Movements

Types, techniques, indication and contraindications, physiological effects, advantages and disadvantages and demonstrate three progressive resisted exercises in progression for the following muscle groups: Shoulder abductors, shoulder forward flexors, Triceps Brachi, Hip abductors, Hip flexors, Quadriceps femoris, Abdominal Muscles, Back extensors. Home programme for strengthening neck muscles and back extensors

8. Progressive Resisted Exercises

Advantages and disadvantages and demonstrate the techniques of the following types of PRE's: Fractional system, Mac queens set system, Mac Queen's power system. Delorme's boot, Dumbbells, Sand bags in pulleys, powder board and suspension therapy.

9. Muscle Grading:

- a) Principles and applications techniques of manual muscle testing
- b) Testing position, procedure and grading of muscles of the upper limb, lower limb and trunk etc.

10. Re- Education Of Muscles

- a) Re-Education Of Muscles: Techniques, Spatial Summation, Temporal Summation.
- b) Re-Education Techniques And Facilitating Methods On Various Groups Of Muscles. Progressive Exercises In Strengthening Using Various Application: (According To Their Muscle Power) Grade 1- Grade IV.

11. Joint Mobility

Joint ranges (outer range, middle range, innerrange). Individual joint structures, joint movements (anatomic, accessory). Causes of joint range limitations, prevention of joint stiffness. Positioning (physiological resting position) of joints and teaching home programme.

12. Goniometry

- a) Normal range of various joints, Description of goniometer, range of measuring systems (180 foot trunk and head), Techniques of goniometry. Demonstrate measuring of individual joint range using goniometer.
- b) Demonstrate measurement of limb girth (using measuring tape): arm, forearm, thigh

13. Crutch Walking

Components of a crutch, classifications of crutches, characters of a good crutch, preparing a patient for crutch walking, crutch walking muscles, Measurement of crutches (axillary piece, hand piece). Crutch stance, crutch palsy. Types of crutch walking (4 point, 3 point, 3 point) (non - weight bearing and partial weight bearing), modified 3 point (paraplegic and shuffling gait, swing to and swing through. Crutch measurement (sitting standing and lying positions) and various types of crutch walking (even ground stairs and ramps).

14. Relaxation

Relaxation, Muscle fatigue, Muscle spasm, General causes, signs, symptoms of tension (mental and physical). Factors

contributing to fatigue. Types of relaxation (local and general), indications for relaxation, and techniques of relaxation (local and general).

15. Posture

- a) Posture (static and dynamic). Definition of good posture, Muscles responsible for good posture.
- b) Postural mechanisms

c) Definition of abnormal posture (Kyphosis, Scoliosis, Lordosis, Kypho - scoliosis, kypholordosis).

d) Assessment of posture (inspection, measurement - length of legs, width of pelvis, plumb line. ROM of trunk in flexion,

extension, side flexion and rotation). Postural correction by: strengthening of muscles, mobilisation of trunk, Relaxation, Active correction of the deformities. Passive correction (traction) postural awareness, abdominal and back extensor.

e) Outline principles in bracing of the trunk and surgical correction. Identification of abnormal posture, and postural corrective measures.

16. Gait

a) Gait and centre of gravity of the human body.

b) Muscles responsible for normal gait, six determinants of gait (pelvic rotation, pelvic tilt, hip flexion, lateral displacement of pelvis knee flexion in stance phase, normal foot pattern during walking).

c) Walking cycle: Stance (heel strike, foot flat, midstance, and push off), Swing (acceleration, mid swing and deceleration).

d) Following pathological gaits: Gluteus medius Gait, Gluteus maximus gait, Hip flexor weakness gait, Quadriceps weakness gait; Foot drop gait, hemiplegics gait, Ataxic waddling gait, equinus gait, calcaneus's gait, Equinovarus gait.

e) Skills in identifying pathological gait and proper gait training.

17. Co - Ordination

Balance (static and dynamic). Mechanism of neuromuscular co-ordination. In coordination : Lower motor neuron lesions, uppermotor neuron lesions (spasticity), Cerebellar lesions, Loss of kinesthetic sense (tabes dorsalis, syringomyelia, leprosy), imbalance due to muscular disease. Re- education of balance. Re-education co-ordination: Frenkels Exercises, proprioceptive neuromuscular facilitation (PNF) techniques. Re-education techniques of balance and coordination.

18. SUSPENSION THERAPY

Basic physics of simple pendulum and pendular movement. Type of suspension: Pendular, Axial, Eccentric fixation (anterior, posterior, medial and lateral). Indications and technique for each type of suspension. Axial and eccentric fixation for mobilizing, strengthening and re - education of various muscles and joints.

19. HYDROTHERAPY

Hydrostatic pressure, upward thrust of water, buoyancy. To list the indications and contra-indications for hydrotherapy. Dress codes for patients and therapists, and necessary hydrotherapy equipment. Construction of

hydrotherapy tank: Design, Construction, safety features, cleaning the pool, water heating systems, Hygiene of patient and pool.

20. BED REST COMPLICATIONS:

Complications of patients on prolonged bed rest. Maintenance exercises for patients on prolonged bed rest.

21. Massage

a) History of massage. Mechanical points to be considered. Points to be considered while giving massage. Manipulations. The time of day for treatment. The comfort and support of the patient (draping and positioning). Position of operator (therapist's stance)

b) Using body weight, Contact and continuity, Techniques, indications, and contra indications. Physiological effects of massage on various system of body: Excretory system, Circulatory system, Muscular system, Nervous system and Metabolic system

c) Various manipulation techniques used in massage.

d) Stroking manipulation: Effleurage, stroking. Pressure manipulations: Kneading: Squeezing, stationary, circular ironing

(reinforced kneading), Finger kneading, petrissage (picking up, wringing, rolling), Frictions. Percussion manipulation:

Tapotement, hacking, clapping, Beating and pounding. Shaking manipulations: Vibration, shaking, Technique, effects, uses and contra indications of the following manipulations: Stroking manipulations. Pressure manipulations. Percussion manipulations Shaking manipulations. Massage for upper limb, Scapular region, Shoulder joint, Upper arm, Elbow joint, Forearm, Wrist, Hand. Massage for lower limb: Thigh, Knee joint, Leg, Foot (including ankle joints and toes). Massage for back: Neck and upper Middle and lower back. Gluteal region, arm and leg Massage for the face

23. Therapeutic Gymnasium

i) Set-up of gymnasium & its importance

ii) Various equipment in the gymnasium

iii) Operational skills, effects, & uses of each equipment

24. Functional re-education-general therapeutic techniques to re-educate ADL function.

25. Special Techniques

a) Introduction to special mobilization & manipulation techniques, effects indications, effects, indications & contraindications.

b) Conceptual framework, principle of proprioceptive neuromuscular facilitation (PNF) techniques, including indications,

therapeutic effects and precautions.

c) Review normal breathing mechanism, types, techniques, indications, contraindications, therapeutic effects & precautions of breathing exercises.

d) Postural Drainage

e) Mat exercises

26. Basic principles of General fitness-warming up exercises, aerobics – cool down exercises

EXERCISE THERAPY PRACTICAL

- **Course description:** This course involves a detailed study of physiological effects, application techniques, effects, indications, and contraindications, precautions for exercises used in Physiotherapy.
- **Course Objectives:** Student should be able to explain the rationale for the prescription of safe and effective exercises.

1. Soft tissue manipulative techniques regionwise-upper limb, lower limb, neck, back and face.

2. Measurement of ROM of joints-upper limb, lower limb and trunk.

3. To practice the grading of muscle strength regionwise upper limb and lower limb and trunk.

4. Position of joints, muscle work, and stability of various fundamental and derived positions.

5. Different types of muscle contraction, muscle work, group action of muscles and coordinated movement

6. Various types of suspension therapy and its applications on various part of body-regionwise.

7. Local and general relaxation techniques.

8. Structure and functions along with application of various equipment in a gymnasium.

9. Assessment & evaluative procedures, including motor, sensory, neuromotor coordination, vital capacity, limb length & higher

functions.

10. Various techniques of mobilization of joints regionwise.

11. Various techniques of progressive strengthening exercises of muscles regionwise.

12. Use of various ambulation aids in gait training.

13. Evaluate ADLs and practice various training techniques.

14. Mat exercises.

15. Normal and abnormal posture & practice various corrective techniques.

16. Equilibrium/balance & practice various to improve balance.

17. Structure and functions of hydrotherapy equipment and their applications.

18. Various traction techniques, including manual, mechanical & electrical procedures.
19. Various group exercise therapies.
20. Breathing Exercises
21. Postural Drainage
28. Basic Yogic postures: Padahasthasana /Padangusthanasana, Trikonasana, Utkatasana, Padmasana, Siddhasana,/Sukhasana,
Bhujangasana, Ardha- Salabhasana, Paschimottanasana, Savasana,Dhanurasana, Ardha Halasana, Yogamudrasana, Uttanasana,
Virasana, Vajrasana, Setu Bandhasana, Gomukhasana, Pavan-Muktasana, Halasana, Sarvangasana, Naukasana,
29. Warm up exercises, aerobics – cool down exercises
22. Introduction to manual therapy techniques such as Maitland's, Cyriax, Mulligan's, Tensigrity, etc

Recommended Books

1. Principles Of Exercise Therapy–Dena Gardiner
2. Massage, Manipulation & Traction---Sydney Litch
3. Massage- Holly
4. Suspension Therapy In Rehabilitation—Margaret Hollis
5. Hydrotherapy - Duffield
6. Measurement Of Physical Function - Cynthia Norkins
7. Therapeutic Exercise—Carolyn Kisner

Paper-11 Rehabilitation Prosthetics and Orthotics

Unit-I: Introduction to rehabilitation

1. Concept of Rehabilitation, principals & role of physiotherapist.
2. Present Rehabilitation services including reservation & legislation for rehabilitation of disabled.
3. Team concept & role of different professionals in Rehabilitation.
4. Vocational & social Rehabilitation.

Unit-II: Disability & Rehabilitation.

1. Definition of Impairment, disability & handicap, their causes & role of physiotherapy.
2. Disability evaluation.
3. Activities of daily living.
4. Physical rehabilitation of Disabled or Handicapped.
5. Principals of communication impairment including speech production, communication disorders, aphasia 7 its management principals of speech therapy.

Unit-III: Community Based Rehabilitation.

1. Definition, aims, objectives, approach of CBR , organization & administration of CBP projects.

Unit-IV: Orthotics

Definition Principles, Usage, checkups, indicates contradiction

Paper-12 PATHOLOGY & MICROBIOLOGY

(Pathology: 70%; Microbiology: 30%)

Course Description: This course involve a detailed study of the various systems of the body at a microscopic and macroscopic level, with

a particular emphasis on the musculoskeletal, neurological and cardiopulmonary systems

Course Objectives: The student should be able to describe the structure and function of the various system of the body with an emphasis

on musculoskeletal, neurological and cardiopulmonary systems as it relates to its applications in Physiotherapy

PATHOLOGY

1. Introduction to Pathology

a) Definitions

b) Branches

c) Pathology as a Science

d) Correlation Between Pathology and Physiotherapy

2. Cell Injury, Death and Adaptation

a) Definitions and Causes

b) Mechanisms

c) Morphology of Cell Injury

d) Apoptosis

e) Cellular Adaptations to Growth and Injury

3. Acute and Chronic Inflammation

a) General Features of Inflammation

b) Vascular Changes and Cellular Events-Acute Inflammation.

c) Chemical Mediators of Inflammation.

d) Definitions, Causes and Histological Features-Chronic Inflammation.

4. Tissue and Cell Repair

a) Normal Cell Growth

b) Repair by Connective tissue

c) Wound Healing

d) Fracture Healing

e) Pathological Aspects of repair

5. Hemodynamic Disorders

Edema, Hyperemia and Congestion, Hemorrhage, Hemostasis and Thrombosis, Embolism, Infarction, Shock.

6. Disorders of Immune System

a) Cells of the Immune System

b) Immune Mechanisms of Tissue Injury

c) Autoimmune Disease: Mechanism, RA, SLE, Myasthenia Gravis.

d) Immunodeficiency Diseases: Differences Between Primary and Secondary, AIDS.

7. Neoplasms

a) Definitions and Nomenclature.

b) Characteristics.

c) Carcinogenesis, Carcinogenic agents,.

d) Biology of Tumor Growth, Tumor Immunity.

8. Environmental Disorders

a) Injury by Chemical Agents

b) Injury by Physical Agents

9. Infectious Diseases

a) Categories of Infectious Agents

b) Host barriers to Infection

c) Immune Evasion by Microbes

10. Nutritional Disorders

a) Nutritional Deficiencies

b) Obesity

c) Diet and Systemic Disease

11. Vascular System

a) Vascular Wall Cells and their Response to Injury

b) Arterial Diseases: Arteriosclerosis, Hypertension and Hypertensive Vascular disease, Buerger's disease, Aneurysm.

c) Venous Disease: Varicose Veins, Phlebothrombosis, And Thrombophlebitis.

d) Lymphatic Diseases: Lymphangitis, Lymphoedema.

12. Cardiac System

a) Principles of Cardiac Dysfunction

b) Types of Heart Disease: Ischemic Heart Disease, Hypertensive Heart Disease, Valvular Heart Disease, Myocardial Heart

Disease, pericardial Heart Disease, Congenital Heart Disease.

13. Hematopoietic and Lymphoid System

Anemia, Polycythemia, Leukopenia, Leukemia, Deficiencies of factor VIII and IX, Splenomegaly.

14. Respiratory System

Atelectasis, obstructive Lung disease, Restrictive Lung Disease, Vascular Lung Diseases, Pulmonary Infections: Pneumonia,

Tuberculosis, Lung Abscess, Pleural Disorders: Pneumothorax, Hemothorax.

15. Gastrointestinal System

Gastritis, Gastric Ulcerations, Ischemic Bowel Disease, Appendicitis, GI Tract Infections, Crohn's Disease, Jaundice, hepatic

Failure, Cirrhosis, Hepatitis, Cholelithiasis, Cholecystitis, Diabetes Mellitus, Pancreatitis.

16. Urinary and Reproductive System

a) Nephritis, Kidney Stones.

b) Male Genital Tract: Specific Inflammation.

c) Female Genital Tract: Pelvic Inflammatory Disease, Menopause and Post Menopausal Changes, Endometritis, Carcinoma

of the Mammary Glands.

17. Endocrine System

Hyperpituitarism, Hypopituitarism, Hyperthyroidism, Hypothyroidism.

18. Musculoskeletal System

Osteoporosis, Osteomyelitis, Osteoarthritis, Gout, Osteoma, Osteosarcoma, Chondroma, Chondrosarcoma,

Osteochondrosarcoma, Muscular Dystrophy.

19. Integumentary System

Psoriasis, SLE, Acne Vulgaris.

20. Nervous System

Hydrocephalus, Meningitis, Hematoma, Multiple Sclerosis, Alzheimer's Disease, Parkinsonism, G.B. Syndrome.

PRACTICALS

Demonstration of slides

Anaemia

Leukaemia

Acute inflammation

Chronic inflammation

Tuberculosis of lymphnode

Leprosy

Squamouscell" carcinoma

Osteoclastoma

Specimen Demonstration

BOOK REFERENCES:

1. Pathology : Robbins
2. Aids of Pathology : Dixson
3. Boyd's Text Book of Pathology : Boyd
4. Text Book of Pathology : N. C. Dey

MICRO BIOLOGY

1. General Bacteriology
 1. Introduction, Historical background, Classification of microorganisms.
 2. Morphology of Bacteria
 3. Staining of bacteria.
 4. Sterilization
 5. Cultivation and culture media

2. Systemic Bacteriology

1. Gram-positive Cocci-Streptococci Staphylococci and Pneumococci
2. Gram-negative cocci-Gono. & Meningo cocci.
3. Gram negative bacilli - Typhoid, Cholera Dysentery
4. Gram positive bacilli
 - a) Aerobic - Diphtheria, Tuberculosis, Leprosy
 - b) Anaerobic - Tetanus, Gas Gangrene, Botulism.

3. Immunology

Immunity, Antigen, Antibodies,

Antibodies, Antigen and Antibody Reactions

Agglutination. Precipitation Hypersensitivity reactions:

4. General Virology

a) Poliomyelitis

b) Rabies

c) Demonstration of tests in

Diagnosis of AIDS

Diagnosis of Hepatitis

Diagnosis of Syphilis

5. Parasitology

Malaria

Amoebiasis

Roundworm & Hookworm

6. Mycology

Candidiasis, Ringworm, Scabies

PRACTICALS

1. Demonstration of collection of clinical specimens and cultivation of samples.
2. Demonstration of cultures
3. Demonstration of H.D. & Simple Grams and Ziehl Neelsen staining
4. Demonstration of Sterilization techniques
5. Demonstration of Serological tests.
6. Demonstration of Diagnostic tests of AIDS, Hepatitis. Syphilis.
7. Demonstration of Fungi.
8. Demonstration of Hypersensitivity tests

BOOK REFERENCES:

1. Microbiology : Rajesh Bhalani
1. Text Book of Microbiology : Rajesh Bhatia
2. Text Book of Parasitology : Bhatia

Paper-13 PHARMACOLOGY

Course Description: This course involves the principles involved in using common drugs,

Course Objectives: The student should be able to explain the indication, Contra indication and side effects of commonly used drugs

1. General pharmacology
 - a. Definitions and Routes of Drug Administration
 - b. Pharmacokinetics:
 - c. Transportation across membranes, Absorption, Distribution, Biotransformation, Excretion, Kinetics of elimination
 - d. Pharmacodynamics:
 - e. Principles and Mechanisms of Drug Action, Combined effects of drugs , Drug dosage , Factors modifying Drug Action .
 - f. Adverse Drug Effects
2. Systemic Pharmacology
 - a. Drugs acting on Central Nervous System: Anaesthetics, alcohols, alkaloids, narcotics, neuroleptics
 - b. Hypnotics, anticonvulsants,
 - c. Sedatives, stimulants, antianxiety, etc
 - d. Drugs acting on peripheral nervous system: Skeletal muscle relaxants
 - e. Local anaesthetics
 - f. Drugs acting on the Autonomic Nervous System: Cholinergic &
 - g. Anticholinergic drugs ,
 - h. Adrenergic & Antiadrenergic drugs.
 - i. Drugs acting on cardiac vascular system.
 - j. Drugs acting on the respiratory system
 - k. Drugs acting on the Kidney.
 - l. Drugs affecting Blood and Blood formation
 - m. Gastrointestinal Drugs

- n. Antimicrobial Drugs
- o. Drugs acting on Skin and Mucous membrane
- p. Antiseptics, Disinfectants, and Ectoparasiticides
- q. Chelating agents
- r. Chemotherapeutic agents.
- s. Hormones and drugs affecting endocrine functions
- t. Vitamins
- u. Metabolic and other inorganic compounds.
- v. Immunologic agents.
- w. Diagnostic agents.
- x. Respiratory System
- y. Geriatrics

Recommended Books

1. Essential of Medical Pharmacology- K. D. Tripathi
2. Pharmacology in Rehabilitations- Ciccone

Paper-14 GENERAL MEDICINES

Course Description: This course involves the management of general medical, cardiopulmonary, skin, psychiatric conditions and common

emergencies requiring medical care. Identification and description of the relevant instruments used for investigation and practice for

management of general medical, cardiopulmonary, skin and psychiatric conditions will also be discussed.

Course Objectives: The student should be able to describe the management of general medical, cardiopulmonary, skin and psychiatric

conditions with a special emphasis on conditions involving physiotherapy management. The student should be able to understand the

importance of first aid and explain the rules of first aid, identify and give first aid in common emergencies, describe the types of wounds,

haemorrhages, shock and respiratory emergencies, acquire knowledge about ambulances service and their functions in relation to

emergencies. The student should be able to describe the assessment of general medical, cardiopulmonary, skin and psychiatric conditions

with a special emphasis on conditions involving physiotherapy management.

I. GENERAL MEDICINE

1. Genetic, Immunological, Environmental, Climatic Factors in Disease.
2. Diseases due to Infection
3. Major Manifestations of Infection, Principles of Management, Diseases due to : Viruses, Chlamydiae, Rickettsiae, Bacteria,
Spirochaetes, Fungi, Protozoa, helminthes, Arthropods, STD.
4. Diseases of the alimentary tract and pancreas
5. Diseases of the teeth, stomach and duodenum, large and small intestine and pancreas
6. Gastro-intestinal haemorrhage
7. Inflammatory Bowel Disease.
8. Diseases of the Liver and Biliary System
9. Jaundice, portal hypertension, ascites, renal failure , hepatic encephalopathy fulminant hepatic failure , acute and chronic
parenchymal disease , tumors of the liver, liver transplantation , gall stones , cholecystitis
10. Nutritional factors in disease
11. Disturbances in water, electrolyte and acid – base balance.
12. Physiology of water and electrolytes, major manifestations of electrolyte and acid – base disorders ,
hyponatremia , hyperkalaemia , hypokalaemia , sodium and water excess , calcium , phosphate and magnesium disorders ,
metabolic acidosis and alkalosis , respiratory acidosis and alkalosis mixed acid – base disorders.
13. Diseases of Kidney and Genito- urinary system
14. Acute glomerulonephritis syndrome, nephrotic syndrome, recurrent haematuria, renal failure, glomerular diseases , infections if
the kidney and urinary tract , obstruction of the urinary tract , urinary tract calculi and nephrocalcinosis , congenital abnormalities
of the kidney , drug – induced kidney disorders and tumors.
15. Diseases of the endocrinal system and metabolic
16. Hypothalamus, pituitary, thyroid, parathyroid, adrenal diseases
17. Sexual disorders
18. Diabetes Mellitus
19. Diseases of the Blood.

20. Disorders of the erythrocytes & leucocytes,
21. Blood transfusion, haemostasis
22. Disorders of the venous thrombosis
23. Oncology
24. Clinical presentation and principles of management
25. Principles of Geriatric Medicine.
26. Demography of aging, normal old age
27. Atypical presentation of disease
28. Acute confusion, urinary incontinence, immobility, falls.
29. Acute poisoning
30. Assessment of severity, general principles, general features and management and prevention.

II. CARDIAC DISEASE

1. Disorders of heart rate, rhythm, and conduction.
2. Ischaemic (Coronary) heart disease.
3. Myocardial Infarction.
4. Vascular disease
5. Diseases of the heart valves.
6. Congenital Heart Disease.
7. Diseases of the myocardium.
8. Diseases of the pericardium.

III. PULMONARY DISEASE

1. Obstructive pulmonary disease.
2. Infections
3. Tumors of the Bronchus and lungs.
4. Interstitial pulmonary diseases.
5. Diseases of the nasopharynx, larynx, trachea.
6. Diseases of the pleura, diaphragm, chest wall.

IV. SKIN

1. Signs & symptoms of skin disease.
2. Skin damage from environmental hazards.

3. Infections, infestations, insect bites, & stings.
4. Immunologically mediated skin disorders.
5. Skin disorders in AIDS, immunodeficiency & venereal disease.
6. Brief description of eczematous dermatoses, psoriasis, lichen planus, acne , rosacea , and similar disease , malignant disease of skin , disorders of keratinization , skin problems in infancy , old age , pregnancy & the skin , metabolic disorders & reticulo histiocytic proliferative disorders , disorders of hair & nails , systemic disease , disorders of pigmentation , principles of management of skin diseases.

V. PSYCHIATRY

1. Brief description of epidemiology and etiological factors.
2. Classification of psychiatric disorders.
3. Clinical interview (MSE)
4. Brief description of psychological and physical treatments used.
5. Brief description of clinical syndromes (organic psychiatric disorders, substance abuse, schizophrenia, affective disorders, neurotic, stress related and somatoform disorders, eating disorders, sleeping disorders, sexual dysfunction, puerperal disorders personality disorders, factitious disorders)
6. Psychiatric problems in a general hospital, community psychiatry, legal aspects of psychiatry.

Recommended Books

Principles and Practice of Medicine by Davidson

Paper-15 ORTHOPAEDICS & SPORTS MEDICINE

Course Description: This course introduces and enables the student to understand orthopaedic conditions which commonly cause

disability and their medical and surgical management.

Course objectives: The student will demonstrate an understanding of orthopaedic conditions which commonly cause disability and their

medical and surgical management.

1. Traumatology: Definition, Classification, Clinical Features, Differential Diagnosis, Investigations, Medical and Surgical

Management of the Following

A. General Principles, outline the following

- I. Types of Fractures including patterns. Open and closed fractures and fracture dislocations.
- II. Differences between dislocation subluxation.
- III. General & Local signs & symptoms
- IV. Principles of management-Conservative and Surgical.
- V. Prevention and treatment of complications including fracture disease, Volkmann's ischaemic contracture, Sudeck's Atrophy, Carpal Tunnel syndrome. Myositis ossificans, and shoulder-hand syndrome.
- VI. f .Functional Bracing
- VII. Soft Tissue Injuries

B. Upper Limb Trauma

- I. Enumerate major long bone fractures and joint injuries.
- II. Enumerate the major soft tissue Injuries.
- III. Describe their clinical features. Principles of management and complications.

C. Lower Limb Trauma

- I. Enumerate major long bone fractures and joint injuries.
- II. Enumerate major spinal fractures and joint injuries.
- III. Enumerate the major soft tissue Injuries.
- IV. Describe their clinical features. Principles of management and complications
- V. Enumerate the major soft tissue Injuries.
- VI. Describe their clinical features. Principles of management and complications

D. Spinal Trauma

E. Polytrauma

- I. Nerve Injuries
- II. Vascular Injuries

3. Amputations

- I. Classify amputations. List indication for surgery.
- II. Outline pre-operative, operative and prosthetic management.
- III. Outline prevention and treatment of complications.

4. General Orthopedics

A. Congenital Deformities: Outline the clinical features and management of CTEV, CDH, Flat foot, vertical talus, limb deficiency

(radial club hand and femoral, tibial and fibular deficiencies meningomyelocele, Arthrogryposis multiplex congenita and

Osteogenesis imperfecta, Congenital Torticollis, Spina Bifida, Sprengel's Shoulder, etc.

B. Developmental Disorders of Bone: Outline the Clinical Features and Management of Cartilage Dysplasia And Bony Dysplasia.

C. Infections of Bones and Joints: Outline the Clinical Features, Pathogenesis, Investigations, Differential Diagnosis and

Management of Osteomyelitis, Pyogenic Arthritis, Septic Arthritis, etc.

D. Tuberculosis of Bones and Joints: Outline the Clinical Features, Pathogenesis, Investigations, Differential Diagnosis and

Management of spine, Hip, Knee, SI Joint, Poncet's Tuberculous Rheumatism, Tubercular Osteomyelitis, etc.

5. Regional Orthopedics: Outline the Definition, Classification, Clinical Features, Pathogenesis, Investigations, Differential Diagnosis,

Complications and Management of the following conditions:

A. Shoulder; Tendinitis, Peri Arthritis, Rotator Cuff Injury, Deltoid Fibrosis, Adhesive Capsulitis, Frozen Shoulder, etc.

B. Elbow: Tennis Elbow, Golfer's Elbow, Recurrent Slipping of Ulnar Nerve, Pulled Elbow, etc.

C. Wrist and Hand: Ganglion, DeQuervain's Disease, Trigger Thumb and Finger, Carpal Tunnel Syndrome, Dupuytren's Contracture,

etc.

D. Spine: Cervical: Brachial Neuralgia, Brachial Plexus Injury, Thoracic Inlet Syndromes, Torticollis, Cervical Spondylitis, PID, etc.

Thoracic and Lumbar Spine: Deformities of the spine, Spondylolisthesis, Lumbosacral Strain, Lumbar Canal stenosis, Spondylitis,

PID, etc

E. Hip: Coxa Vara, Slipped Upper Femoral Epiphysis, AVN, etc.

F. Knee: Deformities, Quadriceps Fibrosis, Recurrent Dislocation of the Patella, Osgood Schlatter's Disease, Loose Bodies, Anterior

Knee Pain, Chondromalacia Patellae, etc.

G. Foot and Ankle: Painful Heel, Plantar Fasciitis, Posterior Heel Pain, Deformities, Forefoot pain, metatarsalgia, Tarsal Tunnel

Syndrome, etc

H. Peripheral Nerve Injuries: Outline the clinical features and management, including reconstructive surgery of, Radial, median

and ulnar nerve lesions, Sciatic and lateral popliteal lesions, Brachial Plexus injuries including Erb's, Klumpke's and crutch palsy.

6. Special Surgical Techniques

A. General Principles and Applications of the Following:

B. Arthrodesis and Arthroplasty

C. Tendon Transfer

D. Muscle Lengthening

E. Tenotomy

F. Tendon repair

G. Osteotomy

H. Nerve Suturing

I. Discectomy

J. Spinal Fusion

K. Laminectomy

L. Soft Tissue Release

7. Common Sports Injuries

Recommended Books

1. Outline of Fractures- Adams
2. Outline of Orthopedics- Adams
3. Turek
4. Campbell

Paper-16 GENERAL SURGERY & PLASTIC SURGERY

Course Description: This course involves the management of general surgical, eye, ENT, cardiopulmonary, gynaecological and obstetrical conditions. Identification and description of the instruments used for investigation and practice for management of general surgical, eye,

ENT, cardiopulmonary, gynaecological and obstetrical conditions will be discussed.

Course Objectives: The student should be able to describe the management of general surgical, eye, ENT, cardiopulmonary, gynaecological and obstetrical conditions with a special emphasis on conditions involving physiotherapy management. The student should

be able to describe the assessment of general surgical, eye, ENT, cardiopulmonary, gynaecological and obstetrical conditions with a special

emphasis on conditions involving physiotherapy management.

Introduction:

Description of events frequently accompanying General Anesthesia.

Blood transfusion and

Physiological response of the body.

Wounds, Scars, Ulcers, Boils, Carbuncles etc.

Principles of Pre and Post Operative Physical examination

Investigations

Surgical Post operative complications and their examination

Surgery:

Incisions, Complications and management of following

Nephrectomy, Appendectomy, Herniorrhaphy

Mastectomy, Thyroidectomy, Colostomy, Adrenalectomy

Cystectomy, Hysterectomy, Prostatectomy, Cholecystectomy

Nesostomy, Incisional Hernia and its prevention

Lectures on the familiarity of various instruments used in surgical procedures and their demonstration.

BOOK REFERENCES:

1. Baily & Love Short Practice of Surgery - by Rains & Ritelife
2. Surgery by Nan
General Surgical Operations by R.M. Kirk and R.C.N. Williamson.

PLASTIC SURGERY

1. Burns; Causes. Classification, medical Management and precautions in the acute stage.
Complications of burns and their management.
2. Plastic Surgery:
 - a) Principles of plastic surgery Post-operative management, and

Complications.

- b) Cincoplasty
- c) Principles of cosmetic surgery
- d) Skin Grafting
- e) Surgery of hand with emphasis on the management of traumatic and leprosy hand.
- f) Burns and plastics surgery management.

Paper-17 RADIOLOGY
(Both in Normal and Pathological conditions)

- 1. Radiology of bones spine and joints.
- 2. Radiology of chest including heart.
- 3. Study of Computerised Axial Tomography of spine, bones and joints.
- 4. Study of Magnetic Resonance Image Diagnosis
- 5. Study of Ultrasound in soft tissue, Muscle, and Ligaments Diagnosis (Lecture Demonstration only).

SYLLABUS FOR THIRD YEAR

Paper-18 Clinical Assessment & Physical Diagnosis

Objective

To understand the basic skill and logical reasoning of assessment and planning the treatment of the patient.

Unit-I:Assessment

Demographic Data, History taking, observation, Examination, Investigation, Differential Diagnosis, Problem Test, Formulation of long term & short term goals, treatment planning, home advice, follow-up.

Unit-II:Orthopedic & Sport Assessment

Detailed regional orthopedic assessment & evaluation with emphasis on special tests head & face, cervical spine, TMJ, shoulder, Elbow, Forearm, wrist, Head, Thoracic spine, lumbar spine, pelvis, hip, knee, foot, and complex.

Unit-III: Neurological Assessment

Neurological assessment and evaluation with emphasis on surface testing, sensory & motor examination, higher mental functions, cranial nerve testing, balance & coordination, functional evaluation etc.

Unit-IV: Cardiopulmonary Assessment

Detailed cardiopulmonary assessment & evaluation with emphasis on chest symmetry & expansion, exercise testing methodology, percussion, investigations, (That is x-rays, PFT, ABG) dyspnea etc.

Unit-V: Electro Diagnosis

Electromyography, NCV, Instrumentation, and technique.

H- reflex, F response, Blink reflex, FG Test, SD curve.

Paper-19 PHYSIOTHERAPY III - (Manual Therapy)

Objective

To understand & apply the basic biomechanical and exercise therapy principle in manual treatment of the patients.

Definition

Local effects of Massage

Types of Massage

Physiological effects.

Therapeutic application Techniques

Tissue Mobilization

Definition and description,

Therapeutic Techniques

Physiological Effects

Kneading

Picking

Skin Rolling

Clapping

Friction

Tapping

Effleurage

Stroking

Petrissage

Hacking

Concepts, Technique, procedure and skills of Manual Medicine

Mackenzie,

Mulligan.

Maitland and

Kaltenbora

Assessment of the Tissue Pathology

Therapeutic Application for

Pain management

Joint Mobilization.

Paper -20: Biostatistics and Research Methodology

Objective

To understand the step of research process and research method.

To develop the skills of critical thinking and selection of research strategy.

Unit- I: Introduction:

Introduction to Biostatistics, types of variables and scales of measurement, measures of central tendency and dispersion, rate, ratio, proportion, incidence and prevalence.

Unit-II: Sampling

Methods of sampling, Randomization, Sampling and non-sampling errors and methods of minimizing these errors.

Unit-III: Basic probability distribution and sampling distributions:

Concept of probability and probability distribution. Normal, Binomial distribution, Standard error and confidence intervals, Skewness and kurtosis.

Unit-IV: Tests of Significance:

Basic of Testing of hypothesis-Null and alternate hypothesis, type I and type II errors, level of significance and power of the test, p value.

Parametric test, non-parametric test, correlation and regression.

Research Methodology

Unit-I: Research in Physiotherapy

Introduction, Definition, Types of research, aims and objective of research, methodology, analysis and report writing.

Unit-II: Concepts of Measurement

Reliability, validity, direct and indirect measurement variables.

Unit-III: Research Design

Types of design- clinical trials, surveys, observations, exploratory, case study, case reports etc.

Unit-IV: Clinical Research

Hypothesis, formulation writing research work, collection, interpretation, presentation of data.

Paper-21 NEUROLOGY AND NEUROSURGERY

Objective

To know the clinical manifestation of neurological disorders and their medical management.

1. Basic New physiology
 - a) Motor (Pyramidal Extra pyramidal & Cerebellar)
 - b) SENSORY
 - c) Reflexes, Bladder and Bowel control.
2. Principle of clinical examination, Diagnosis, Differential diagnosis and prognosis of neurological disorders.
3. Salient Clinical feature & Management of common Neurological disorders.
 - a) Cerebral Palsy
 - b) Stroke
 - c) Neuro-infections
 - (i) Meningitis
 - (ii) Encephalitis
 - (iii) Poliomyelitis
 - (iv) Neurosyphilis.
 - d) Movement disorders (Parkinsonism, Dystonia, chorea Tremors and Writer's Cramps) Cerebellar ataxia, Friedreich ataxia etc.
 - e) Motor Neurone Disease
 - f) Dementia .
 - g) Diseases of Spinal cord
 - i) Compressive (Spondylotic Tumors)
 - ii) Non-Compressive
 - h) Peripheral Neuropathies
 - i) G.B. Syndrome
 - ii) Non-compressive
 - iii) Diabetic Neuropathy
 - i) Muscle Disorders
 - i) Dystrophies
 - ii) Polymyositis
 - iii) Myasthenia Gravis

NEUROSURGERY

THEORY

Neurophysiology: .

Review in brief the neurophysiological basis of Tone and Disorder of Tone and Posture Bladder control, Muscle contraction.

Movement and pain.

Brief clinical features and surgical management of the following neurological disorders.

1. Congenital and Childhood disorders
 - a) Hydrocephalus
 - b) Spina bifida
2. Trauma-Broad localisation. First Aid and management of sequelae of Head injury and spinal cord injury.
3. Diseases of the Spinal cord.
 - a) Syringomyelia
 - b) Craniovertebral junction anomalies
 - c) Cervical and lumbar disc disease
 - d) Tumors
 - e) Spinal arachnoiditis
4. Peripheral Nerve Disorders
 - a) Peripheral nerve injuries : Localisation and Management
 - b) Entrapment neuropathies
5. Intracranial tumours : Broad classification, Signs and Symptoms.
6. Pre-Operative assessment and indications and contraindications for Neurosurgery.
7. Management of pain. Electrical Stimulation of brain and spinal cord.

PRACTICAL

Clinical assessment of neurological function by

1. Basic history taking to determine whether the brain, spinal cord peripheral nerve is involved.
2. Assessment of higher mental function such as Orientation, Memory, Attention, Speech and Language. .
3. Assessment of Cranial nerves
4. Assessment of Motor System

5. Assessment of Tone Spasticity Rigidity and Hypotonia
6. Assessment of Sensory function, Touch, Pain and Position
7. Assessment of cerebral function
8. Assessment .of Higher cortical function - Apraxia etc.
9. Assessment of Gait abnormalities.

BOOK REFERENCES:

1. Davidson's Principles and Practice of medicine
2. Brains Clinical Neurology
3. Medicine and Neurology By Golewala
4. Surgery By Nan
5. Bailey and Love - Short Practice of Surgery

Paper-22 Cardiopulmonary Disease & Thoracic Surgery

Objective

To know the clinical manifestations cardiac and thoracic diseases and their management.

- A) Brief idea of Anatomy and physiology of Cardio-respiratory system
- B) Outline Aetiopathogenesis of Cardio-respiratory disorders, Investigations.
Diagnosis, Differential diagnosis and principles of management.
- C) Cardio Vascular System
 - i) Cardiac failure - Definition, Causes, Symptoms and Signs and Brief management of cardiac failure.
 - ii) Rheumatic Fever-Definition, Causes. Symptoms and Signs and' Brief description of aetiology, Clinical features, Complications and Treatment.
 - iii) Congenital Heart Diseases: Classification and brief outline of diseases like ASD, VSD, PDA. Fallot's Tetralogy with complication.
 - iv) Infective Endocarditis - Brief aetiopathogenesis, Clinical features, Diagnosis and treatment.
 - v) Brief description of Deep Vein Thrombosis and Pulmonary embolisms.
 - vi) Vascular Disease Atherosclerosis Burgers disease, Phlebitis etc.

Respiratory System:

1. Chronic Bronchitis and Emphysema, Definition, Clinical features, . Investigation Complication and Treatment.

2. Bronchial Asthma Definition, Aetiopathogenesis, Clinical features, Diagnosis and Treatment.
3. Pneumonia- Definition, classification Clinical features complications & Treatment.
4. Tuberculosis Aetiopathogenesis Clinical tests of pulmonary Tuberculosis, Diagnosis. Complication and Treatment.
5. Lung Abscess and Bronchiectasis Definition Clinical features.
6. Chest wall deformities Describe various Deformities of chest wall and effect and pulmonary diseases associated with it.
7. Occupational Lung disease, Clinical features, diagnosis & Treatment.
8. Respiratory failure Classification, Causes and Treatment.

Cardio thoracic Surgery

1. Introduction:

Types of incision, Pre and Postoperative Assessment. Management and complications of Cardio thoracic Surgery and their management.
2. Cardiac Surgery
3. Outline indications: Contra-indications, site of incision, Pre and Post . Operative Valvotomy and Valve Replacement Open Heart Surgery Cardiac By Pass Surgery.

Surgery on Pericardium

Operations in Congenital disorders

Heart Transplantation

Pacemaker

Coronary Angioplasty

Balloon Angioplasty and Vascular Surgery (Outline surgery) of artery and veins)
4. Thoracic Surgery:
 - i) Outline clinical features and management of the following Fracture of ribs. Flail chest stove in chest, Pneumothorax, Haemothorax, Lung Contusion and Laceration and Injury to vessels and Bronches.
 - ii) Outline Indications, Contraindication : Site of incision, Pre and post operative management and complications of following Lobectomy, Pneumonectomy, Segmentectomy
 - iii) Outline clinical features and management of Carcinoma: of lung
 - iv) Describe in detail the following procedures

Management of endotracheal tubes, Tracheal suction, Weaning the patient from Ventilator Extrubation and Post extrubation care.

- v) Describe! the principles of cardio pulmonary resuscitation cardiac massage, Artificial respiration Defibrillators and their use.

BOOK REFERENCES

1. Davidson's Principles and Practice of medicine
2. Harrison's internal medicine
3. General Surgient Operations by Kirk/ Williamson
4. Surgery by Nan
5. Bailys and Love-Short Practice of surgery.

Paper-23: Paediatrics

Objective

To understand the Paediatric patients and their special needs in relation to physical therapy.

1. Growth and development of child.
2. Nutrition
3. Immunization programs
4. Common Paediatric disease
5. Club foot
6. Scoliosis
7. Congenital Deformaties.
8. Osteogenesis Imperfecta (OI)
9. Genetic Disorders
10. Duchenne Muscular Dystrophy (DMD)
11. Spina Bifida Occulta. Meningocele, Myelomeningocele
12. Chromosomal Disorders Down syndrome
13. Environmentally Related Disorders
14. Cerebral Palsy (CP) Zost Polio Paralysis
15. Observe children for their individual strengths and abilities.
16. Knowledge of normal development, movement patterns and transitions, abnormal movements
17. Development of the Disability
18. Planning of prevention, early identification, and evaluation. Diagnosis, treatment and rehabilitation.
19. Impairment disability and handicap acknowledge their inter relationship and impact one another.

BOOK REFERENCES:

1. Nelson Text Book of Paediatric - Behraman & Verghan

Paper-24 GYNAECOLOGY AND OBSTETRICS

1. History taking

2. Terminologies used..
3. Classification of Diseases.
4. Birth control.
5. Reproduction.
6. Placenta and placental membranes.
7. Foetus.
8. Physiological changes during pregnancy.
9. Endocrinology in relation to reproduction.
10. Foetus – in - utero.
11. Foetal skull and maternal pelvis.
12. Antenatal care.
13. Antenatal assessment of foetal well - being.
14. Normal labour, normal puerperium.
15. Complications of pregnancy and labour.
16. Special considerations (previous history of C- section, Rh. –, elderly primigravida, grand multipara, bad obstetric history, obesity.)
17. Term, newborn infant, low birth weight baby.
18. Diseases of the fetus and newborn.
19. Pharmacotherapeutics, induction of labour, operative obstetrics.
20. Special topics (foetal distress, intrapartum foetal monitoring, shock in obstetrics, acute renal failure, blood coagulation disorders,
high – risk pregnancy, immunology in obstetrics)
21. Aids to diagnosis in obstetrics.
22. Pelvic inflammatory disease
23. Abortions and ectopic pregnancy.
24. Dysfunctional uterine bleeding defunction, causes, differential diagnosis, management.
25. Genital malignancies, cervix, uterus, vagina.

BOOK REFERENCES:

1. Gynaecology and Obstetrics in Health care of a woman by Seymoul L, Romney Mary Jane Gray. J.A Merrill.
2. Shaw's Text Book Gynaecology.
3. Jeffcoat's Principles of Gynaecology.

Paper-25: PSYCHIATRY

Objective

To understand the implications of psychological disorders on disability.

1. Brief History of Psychiatry
2. Rationale of Psychotherapeutics
3. Causes of mental disturbances
4. Symptoms of Mental illness
5. Levels of consciousness
6. General appearances and behavior
7. Emotions and thoughts
8. Perception and intellectual functions.
9. Anxiety Disorders, Depression, Obsessive Compulsive Neurosis, Hysteria, Phobia.
10. Stress related disorders
11. Schizophrenia
12. Psychosis Manic depressive Paranoid, Involuntary
13. Organic Brain Syndromes, Toxic, Metabolic, Cerebro-Vascular.
Head Injury. Drug induced
14. Drug dependence and alcoholism
15. Psychosomatic illness
16. Mental retardation
17. Childhood disorders, Hyper and hypokinetic children
18. Assessment and methods of Treatment
19. Drug therapy ECT, Psychotherapy Behavior therapy. Biofeedback, and counseling.
20. Geriatric Psychiatry

BOOK REFERENCES:

1. Noves Modern clinical Psychiatry
2. Text Book of Psychiatry by Henderson and Gellispie
3. Short book of Psychiatry by Ridge
4. An Introduction to Psychiatry by Peter
5. Rehabilitation in Psychiatry by Home
6. Asychiatric Clinical skills by George U. Bells Leon Warnon and Ellen M. Denial.

Paper-26 Dermatology

Objective

To understand the skin diseases and their manifestations.

1. Structure and functions of normal skin primary and secondary lesions.
2. Scable and pediculosis.
3. Fungal infection of skin Dermatophylosis, Pityriasis Versicolor, Candidiasis.
4. Bacterial infection of skin- Impedigo, Boil.
5. Viral infection of skin-Herpes.
6. Eczema, Dermatitis, Allergies.
7. Acne, Alopecia, Vitiligo, Lecoderma.

8. Common skin infection.
9. Psoriasis.
10. Leprosy – Aetiopathogenesis clinical feature and treatment.
11. Sexually transmitted diseases, -Syphilis, Gonorrhoea, HIV etc.
12. Brief description & prevention (Lecture Demonstration only)

NEUROLOGY, NEUROSURGERY

Course Description: This course introduces and enables the student to understand neurological conditions which commonly cause

disability and their medical and surgical management.

Course objectives: The student will demonstrate an understanding of neurological conditions which commonly cause disability and their

medical and surgical management.

1. **NEUROANATOMY:** Review the basic anatomy of the brain and spinal cord including: Blood supply of the brain and spinal cord,

anatomy of the visual pathway, connections of the cerebellum, and extra pyramidal system, relationship of the spinal nerves to

the spinal cord segments, Long tracts of the spinal cord, the brachial and lumbar plexuses, and cranial nerves.

2. **NEUROPHYSIOLOGY:** Review in brief the Neurophysiologic basis of tone and disorders of tone and posture, bladder control,

muscle contraction and movement and pain.

3. Approach to symptoms and signs: 1. The neurologic history and examination 2. Dizziness 3. Approach to symptoms and sign 4.

Paresthesias 5. Pain 6. Headaches 7. Weakness (UMN vs LMN, NM junction, myopathy) 8. Movement disorders 9. Gait and

balance disorders 10. Fatigue 11. Memory and praxis complaints 12. Speech disorders 13. Language disorders 14. Syncope vs

seizure 15. Encephalopathy, coma, herniation, and brain death 16. Neurological eponyms

4. **Diagnostic Testing:** 1. Lumbar puncture and cerebrospinal fluid evaluation 2. EMG and NCV 3. Electroencephalography 4.

Evoked Potentials 5. Nerve and muscle biopsy 6. Autonomic testing 7. MRI 8. CT 9. MRA and cerebral angiography 10.

Molecular genetic testing 11. Neuropsychological testing

5. Neurovascular disorders: 1. Localization in neurovascular disease 2. Transient ischemic attacks 3. Stroke 4. Primary

intracerebral hemorrhage 5. Subarachnoid hemorrhage and saccular aneurysms 6. Arterovenous malformations 7. Spinal cord

stroke 8. Stroke in younger adults 9. Cerebral venous thrombosis

6. Movement disorders: 1. Parkinson's disease 2. Parkinson's plus syndromes 2. Dystonia 3. Wilson's disease 8. Ataxias

7. Multiple sclerosis and other demyelinating diseases: 1. Multiple sclerosis 2. Acute disseminated encephalomyelitis

8. Epilepsy: 1. Etiology and manifestations 2. Childhood disorders (include febrile) 3. Adult seizure disorders 4. Medical treatment

5. Status epilepticus 6. Surgical treatment

9. Neuro-oncology: 1. Epidemiology and pathophysiology 2. Clinical presentations of Gliomas and Meningiomas 3. Spinal cord

tumors 9. Metastatic tumors

10. Cranial neuropathies: 1. Tinnitus 2. Vertigo (peripheral vs central) 3. Benign positional vertigo 4. Bell's palsy 5. Disorders of cranial

nerve IX and X 10. Disorders of cranial nerves XI and XII

11. Trauma : 1. Mild head injury and the postconcussion syndrome 2. Moderate and severe head injury 3. Subdural and epidural

hematomas 4. Cranial neuropathies 5. Neurorehabilitation of brain injuries 6. Post-traumatic movement disorders 7. Spinal

cord injury 8. Whiplash injuries 9. Reflex sympathetic dystrophy and causalgia 10. Mountain sickness 11. Decompression

sickness 12. Lightning and electrical injuries

12. Neuromuscular disorders: 1. Myasthenia gravis and myasthenic syndromes 2. ALS 3. Spinal muscular atrophies

13. Peripheral neuropathies: 1. Manifestations of peripheral neuropathies 2. Guillain-Barre syndrome 4. Diabetic neuropathies 5.

CIDP 6. Brachial and lumbosacral plexopathies 7. Thoracic outlet syndrome 8. Carpal Tunnel Syndrome and other median

neuropathies 9. Ulnar and radial neuropathies 10. Peroneal, sciatic, and tibial neuropathies.

14. Myopathies : 1. Manifestations of myopathies (include muscle masses) 2. Muscular dystrophies (Duchenne, limb girdle, GSH,

scapuloperoneal, myotonic, etc) 3. Dermatomyositis and polymyositis.

15. Infectious disorders: 1. Bacterial meningitis 2. Chronic meningitis 3. Encephalitis 4. HIV + HTLV-1 5. Brain and spinal abscess 6.

Spirochetes (neurosyphilis and Lyme) 7. Creutzfeldt-Jakob disease 8. Cerebral malaria 9. Neurocysticercosis

16. Neck, back and spinal cord disorders: 1. Approach to neck and low back disorders 2. Diagnostic testing for neck and back

disorders 3. Radiculopathy and cauda equina syndrome 4. Spondylosis including spondylolytic cervical myelopathy and facet

joint pain 5. Myofascial pain and SI joint 6. Facet joint pain 7. Treatment of chronic neck and back pain

Suggested Readings

1. Saunder's Manual for Neurologic Practice. Randolph Evans, Elsevier
2. Neurology And Neurosurgery Illustrated. Lindsay And Bone
3. Diseases of the Nervous System. R Bannister
4. Brain's Clinical Neurology. R Bannister
5. Pediatric Orthopaedics And Fractures. Sharrard
6. Disorders of Muscle. Dubowitz
7. Normal Development. Illingworth

PHYSIOTHERAPY IN GENERAL MEDICINE AND GENERAL SURGERY PRACTICAL

Course Description: This course involves a description of the assessment and treatment of general medical and general surgical

conditions.

Course Objectives: The student will be able to conduct a safe and effective treatment of patient with General medical and general

surgical conditions

The students will be shown patients of relevant diseases and disorders for:

1. History taking of the conditions of patients.
2. Assessment of medical and cardiopulmonary functions
3. Clinical diagnosis of the presentations.
4. Investigations and tests of different clinical presentations
5. Physiotherapy management of the various diseases & surgeries

Recommended Books

1. Physiotherapy In Gynaecological & Obstetrical Conditions-Poldon
2. Astrand P. A. Rodahe K. -Text Book Of Work Physiology
3. Therapeutic Exercise –Kisner

RESEARCH METHODOLOGY AND BIostatISTICS

Course Description: This course involves a description of principles for conducting research.

Course Objectives: The student will be able to frame a research project using the principles of research methodology and biostatistics.

1. Introduction

a) Introduction Importance of research in clinical practice, scientific approach, characteristics, purposes, and limitations.

b) Ethical issues in research, elements of informed consent.

c) Structure of a research proposal.

2. Research Methodology

a) Research question including literature review.

b) Measurement: Principles of measurement, reliability and validity.

c) Experimental sampling and design.

d) Descriptive and Inferential research research

3. Biostatistics:

a) Descriptive statistics.

b) Comparison of means, T-tests.

c) Analysis of Variance

d) Multiple comparisons

e) Non-parametric statistics

f) Correlation

Recommended Books

1. Handbook of Research in Physical Therapy. C. E. Bork

2. Physical Therapy Research: Principles and Application. E. Domholdt

3. Research Methodology for Physical Therapists. C. Hicks

BPT FOURTH YEAR

Paper-27 CARDIOPULMONARY PHYSIOTHERAPY

Course Description: This course involves a description of the assessment and treatment of patients with cardiopulmonary conditions.

Course Objectives: The student will be able to conduct a safe and effective treatment of patient with cardiopulmonary conditions

A. ANATOMY: Review the regional anatomy of thorax, upper respiratory tract - trachea and bronchial tree. Lung and bronchopulmonary

segments. Muscles of respiration. Heart and great vessels. Movements of the chest wall and surface anatomy of lung and heart.

B. PHYSIOLOGY; Review the mechanics of respiration, inspiration and expiration, lung volumes, respiratory muscles, compliance of lung

and chest wall, work of breathing, dead space, gas exchange in lung and pulmonary circulation.

C. GENERAL OVERVIEW:

I. ASSESSMENT: Describe physical assessment in cardiorespiratory dysfunction: Inspection: Posture (recumbent, erect,

orthopneic): breathing pattern (rate, rhythm, use of accessory muscles), chest movement (symmetry, Intercostals and diaphragmatic components), Chest deformity (Barrel chest, pigeon chest), Spinal deformity(scoliosis, kyphosis, kyphoscoliosis),

sputum (color, type, volume, consistency), cough (types, productive/non-productive, presence of a normal cough reflex).

Palpation: Tactile and vocal fremitus, mobility of thoracic spine and rib cage. Percussion: Dullness and hyper resonance.

Auscultation: Normal and abnormal breath sounds. Measurement: Chest expansion at different levels (auxiliary), nipple,

xiphoid); exercise tolerance (six minute walking test); post - operative range of motion and muscle assessment.

II. PHYSICAL TREATMENT: Indication, goals and procedure of breathing exercises. Describe diaphragmatic breathing, localised

basal expansion, apical expansion, specific segmental exercise raising the resting respiratory level. Chest mobilisation

exercises. Relaxation positions for the breathless patient - high side lying, forward lean sitting, relaxed sitting, forward lean

standing, relaxed standing. Controlled breathing during walking and during functional activity. Exercise for the breathless

patient. Exercise tolerance testing and exercise programme. Technique of huffing and coughing, forced expiratory technique,

vibratory chest shaking and percussion. Techniques of postural drainage, including indications, general precautions and contraindications,

preparation, drainage of individual bronchopulmonary segments, modified postural drainage and continuing

postural drainage as a home programme.

III. Mechanical Respiration: Classification and principles of operation of commonly used ventilators and outline the use of Bear,

Bennett, Emerson & Bird type ventilators. Principles of Aerosol Therapy. Describe the physical properties of aerosols and their

deposition in the alveoli. Describe the principles of operation of nebulisers. Principles of humidification therapy and methods of

correcting humidity deficits. Describe the principles of operation of pass - over humidifiers and bubble -diffusion humidifiers.

Techniques of sterile nasopharyngeal and endotracheal suctioning.

D. PHYSIOTHERAPY IN OBSTRUCTIVE LUNG DISEASES: Assess: Effort of breathing. Extent of wheeze, pattern of breathing, sputum

production, chest deformity, exercise tolerance (Patients efforts tolerance.) Identify problems: Decreased outflow due to

bronchospasm, anxiety due to difficulty in ventilation, exhaustion due to increased work of disturbed breathing, increased secretions

which are difficult to remove, decreased exercise tolerance. Demonstrate treatment techniques: Relaxation postures and techniques,

reassurance and education about disease. Controlled breathing, breathing exercise, postural drainage, vibratory shaking, huff ing and

coughing, graduated exercise programme and posture correction.

E. PHYSIOTHERAPY IN CHEST INFECTIONS: Assess: Sputum, cough, fever and dyspnea. Identify problems: Productive cough with risk

hemoptysis, exhaustion due to increased work of breathing, chest deformity, decreased exercise tolerance. Treatment techniques:

postural drainage with use of adjuncts, percussion, vibration, huffing, and coughing to expectorate mobilising exercises to thorax and

graduated exercise.

F. G. PHYSIOTHERAPY IN RESTRICTIVE LUNG DISORDERS: Assess:. Chest expansion at different levels, mobility of thorax and spine,

posture (kyphosis or scoliosis) and tests for exercises tolerance (six minutes walking test). Identify problems: Decreased expansion of

lung due to restriction of chest wall movement causing decreased ventilation, defective posture and decreased exercise tolerance.

Demonstrate treatment techniques: Vigorous mobilising exercises to thorax and spine, breathing exercise to increase ventilation and

drain secretions, exercises for posture correction, graduated exercises to increase tolerance.

G. PRINCIPLES OF INTENSIVE CARE PHYSIOTHERAPY: Principles of intensive care therapy. Knowledge of the following equipment:

Endotracheal tubes, tracheostomy tubes, Humidifiers, ventilators, High frequency ventilators, differential ventilators, CPAP masks,

suction pump, Electrocardiogram. Pressure monitors - arterial, central venous, pulmonary artery and pulmonary wedge, Intracranial.

Temperature monitors. Assess: special instructions pertaining to any operation performed, respiration, level of consciousness . Colour,

blood pressure, pulse, temperature, sputum expectorated (colour and quantity), drugs (time last does of analgesic given), drains,

presence of pacemaker or intra aortic balloon pump. ECG and blood gas results. Describe chest radiograph with respect to expansion

of lungs, size of heart, presence of secretions and placement of chest tubes.

H. PHYSIOTHERAPY AFTER PULMONARY SURGERY: Preoperative: Demonstrate treatment techniques: Explanation to patient, care of

incision, mechanical ventilation, breathing exercise, huffing and coughing, mobilising exercise, posture correction, graduated exercise

programme. Post - operative: Assess: Special instructions pertaining to operative procedure performed, breath sounds, cyanosis,

respiratory rate, temperature and pulse, blood pressure, drainage from pleural drain (bubbling or swinging) sputum expectorated,

analgesia, movements of chest wall (symmetry) position of patient and effort of breathing, chest radiograph and blood gases.

Identifying problems: Pain, intercostal drains in situ, decreased air entry, retained secretions, decreased movement of the shoulder of

affected side, decreased mobility and poor posture. Treatment techniques: Deep breathing and segmental breathing exercises,

vibrations, percussions, huffing and coughing, full range active-assisted arm exercises, ankle foot exercises, trunk exercises, posture

correction, positioning of patient, IPPB and inhalations.

I. PHYSIOTHERAPY AFTER CARDIAC SURGERY: Pre operative: Assess patients of medical history, normal breathing pattern of patient,

pulse, respiratory rate, BP, thoracic mobility, posture and patients exercise tolerance. Identifying problems: Excess secretions,

decreased mobility of thorax, defective posture, decreased exercised tolerance. Treatment techniques: Explain to the patients about

their operation and about the incision, ICU, Endotracheal tube. Central lines, nasogastric tube, catheter, ECG leads, drains, peripheral

lines, temperature probe etc. Teach breathing exercises, splinting of incision, huffing and coughing, correct posture, range of motion

exercises to trunk and shoulders, active exercise to ankle and foot. Post operative: Assess special instructions pertaining to operative

procedure performed, type of incision, blood pressure, pulse rate, respiration, colour, time of last analgesic dose, drains, temperature,

ECG, chest X-ray and blood gases. Identify problems: Pain, decreased air entry, retained secretions, reduced leg movements,

decreased mobility. Treatment techniques: Deep breathing exercises, suctioning, active/assisted exercises to arm and leg, graduated

exercise programme.

J. PHYSIOTHERAPY IN REHABILITATION AFTER MYOCARDIAL INFARCTION: Role of the physiotherapist in a coronary care unit during the

first 48 hours. Principles of formulation of an exercise programme: Bed exercises, walking, stair climbing. Home exercise programme

and advice on leisure activities. Describe physiotherapy for complications after myocardial infarction: Chest infections, cerebral

embolism and shoulder hand syndrome.

CARDIOPULMONARY PHYSIOTHERAPY PRACTICAL

Course Description: This course involves a description of the assessment and treatment of patients with cardiopulmonary conditions.

Course Objectives: The student will be able to conduct a safe and effective treatment of patient with cardiopulmonary conditions

The students will be shown patients of relevant diseases and disorders for:

1. History taking of the conditions of patients.
2. Assessment
3. Clinical diagnosis of the presentations.
4. Investigations and tests of different clinical presentations
5. Physiotherapy management of the various disorders & surgeries

Recommended Books

1. Cash`S Text Book For Physiotherapists In Chest, Heart & Vascular Diseases
2. Chest Physical Therapy & Pulmonary Rehabilitation-Donna Frownfilter
3. Brompton`S Hospital Guide
4. Physio Therapy In Cardio- Vascular Rehabilitation-Webber
5. Exercise & The Heart, Wenger

Paper-28 NEUROPHYSIOTHERAPY

Course Description: This course involves a description of the assessment and treatment of patients with neurological conditions.

Course Objectives: The student will be able to conduct a safe and effective treatment of patient with neurological conditions

A. REVIEW OF NEURONATOMY AND PHYSIOLOGY

Review the structure and function of a. neuron. b. synapse. c. supporting tissue. Review the organisation and function of a)

cerebral hemispheres b) cerebellum c) spinal cord d) peripheral nerves e) pyramidal system f) extra pyramidal system. Review

the factors influencing alpha motor neuron activity. Review the neurological basis of muscle tone and movement and demonstrate the following: a) hypotonia b) hypertonia- spasticity and rigidity c) ataxia d) athetosis e) chorea.

B. PRINCIPLES OF ASSESSMENT

Review a) skills in history taking. b) assessment of higher function, cortical sensations, cranial nerves, dorsal column sensation

and pain and temperature sensations. c) Assessment of motor function: grading of muscle power, assessment of range of

movement, balance and coordination. d) Assessment of superficial and deep reflexes. e) Assessment of reflex maturation in

terms of stimulus, position, negative/positive reactions and their significance. f) Assessment of gait - both normal and abnormal

(spastic, ataxic and paralytic patterns). Emphasis should be placed on teaching accurate assessment techniques and various

recording methods eg. Color-coding on body charts, graphs, etc.

C. PRINCIPLES OF TREATMENT

I. Review the treatment principles as follow

1. Sensory re -education: hypersensitivity, hyposensitivity and anesthesia.

2. Treatment of altered tone: hyper tonicity and hypotonicity

3. Motor re- education: Strengthening exercise coordination exercises, joint mobilization exercises, use of equilibrium and

labyrinthine system, use of PNF patterns, controlled sensory use of stretch to elicit movement (facilitation), light joint

compression (in habitation) use of reflex activity to improve motor function, physiogenic sequence of motor behaviors:

Treatment to improve functions: Free exercises, gait training with and without aids, activities of daily living, mat exercises

and exercises and recreation.

4. Review the use of ambulatory aids in neurological conditions: in spastic upper motor neuron lesions, in lower motor neuron lesions, in dorsal column dysfunction and cerebellar dysfunction.

5. Revise the use of splints and braces in spastic upper motor neuron and in flaccid lower motor neuron lesions in both

upper and lower limbs.

6. Revise the management of chronic pain in neurological conditions with respect to the types of pain, treatment modalities

available, selection criteria for each modality and possible complications.

II. THEORETICAL BASIS OF TREATMENT:

Rood's approach

Bobath Neurodevelopmental Therapy

Proprioceptive Neuromuscular Facilitation

Motor Relearning Program

I. CEREBRAL PALSY

Define cerebral palsy and describe the topographical classification - monoplegia, diplegia, paraplegia hemiplegia and tetraplegia. Describe types of cerebral palsy: Visual, hearing, speech and intelligence. Assess reflex activity at different levels:

cortical, mid brain, brain stem, spinal, Assess developmental milestones from birth to five years. Assess functional ability: prone

to supine (rolling) coming to sitting, quadripod, crawling, kneeling, stand with support and walking. Examine for contractures as

follows: hip flexion, adduction, internal rotation, knee flexion, ankle plantar flexion, inversion eversion, flexion contractures of

elbow, wrist and fingers and spinal deformities.

Treatment- Describe and demonstrate the treatment of motor disabilities: Passive movement, stretching of soft tissue tightness, use of ice to reduce spasticity, positioning the child to prevent soft tissue contractures, to inhibit abnormal reflexes

and to facilitate volitional movement. Techniques of carrying of different types of children, encouraging bimanual activities in

different starting positions like prone, sitting and standing and activities across the midline, appropriate home programmes for

position in the child, handling them and assisting improvement of function. Introduction to treatment techniques: Bobath,

Rood.

II. PERIPHERAL NERVE LESIONS:

Identify types of peripheral nerve lesions. Assess the motor system: Specific muscles, range of motion, active and passive

ranges, muscle girth. Assess sensory system: touch, pain, temperature, paraesthesia, and nerve regeneration. Assess

autonomic function: sweating, skin condition, soft tissue atrophy. Treatment: describe muscle re-education techniques,

electrical stimulation (selection of current), Passive and auto assisted stretching and massage. Sensory re-education and pain

relief by various modalities. Common splints used in peripheral nerve lesions: static, dynamic and functional. Muscle transfers:

preparation for transfer. Assessment of muscle power. Stretching of soft tissue tightness, isolation of muscle contraction,

specific muscle strengthening.

Post - operative management: Pressure bandaging and muscle re-education after transfer. Describe a home programme.

III. MUSCULAR DYSTROPHY:

Stages of the disease ambulatory, wheel chair and bed stages. Significance of exercise: resisted, active and free. Identify and

assess common contractures and deformities. Assess range of motion and muscle power. Assess functional ability.

Demonstration of treatment programme for strengthening weak muscle: active movements and hydrotherapy. Increase range

of motion by suspension therapy, powder board, passive stretching, positioning, etc. Demonstration of gait training with

appropriate orthoses. Describe management of chest complications: breathing exercises, chest percussion, drainage of

secretions and assisted coughing.

IV. PARKINSONISM:

Review the natural history, course and prognosis of the disease. Identify and assess problems in posture, sitting, kneeling and

standing balance, voluntary and automatic movements, rigidity, tremor and gait. Assess also hearing, speech and finger

dexterity. Describe disability grading according to Yahr. Demonstration of treatment: Postural awareness and relaxation

training, gait training techniques, associated reactions, heel toe gait, overcoming obstacles, start and stop on command,

turning and walking backwards, forwards and side wards. Describe an appropriate home exercise programme.

V. SPINAL CORD LESIONS:

Describe types of spinal cord lesions. Describe signs of tract and root interruptions. Positioning of the patient in acute spinal

cord injury. Describe assessment of the motor system tone, power of specific muscles, range of motion and limb girth. Describe

assessment of sensory system and reflexes. Assessment of functional ability and balance reactions in appropriate cases.

Assessment of respiratory function: Muscles of respiratory, coughing ability and vital capacity. Level of lesion is ascertained.

Treatment: Stages of immobilization and stage when loading of the spine is allowed. Describe spinal orthosis, Demonstration

motor re-education programmes and a programme for respiratory care in high level paraplegics and quadriplegics.

Demonstrate progressive ambulation, mat exercises, various strengthening programmes, methods of decreasing spasticity and

improving sitting balance. Demonstration of various types of paraplegic gaits and re-education in functional activities: transfers

and protective falling. Common ambulatory aids used in paraplegics and common splints used in tetraplegics. Use of hydrotherapy in paraplegics. Describe the concept of team approach in rehabilitations of these patients.

VI. HEMIPLEGIA

Hemiplegia and identify the following sensory disturbance, alteration in tone, loss of selective movement, loss of balance

reactions and communications problems.

Treatment: Unilateral and bilateral approaches to treatment. Describe positioning in the supine position, on the affected and

on the unaffected sides. Demonstration activities in the recumbent, position: arm mobilization, trunk elongation, scapular

movement, arm elevation activities for a recovering arm. Activities for the lower limb. Hip and knee flexion over the side of the

bed. Knee extension with dorsiflexion, hip control, isolated knee extension.

Mat activities: Demonstrate rolling on to affected, unaffected sides, sitting and kneeling. Technique of making a patient sit

passively and active assisted sitting. Demonstrate transfer techniques. Activities in sitting: equal weight transfer through arms

balance reactions of trunk. Head demonstrate activities in the standing position: Standing from plinth, from chair (assisted and

independent). Weight bearing on affected leg. Knee control in standing, weight transfers forward, backward and sideward, gait

training and stair climbing describe tilt board activities in the lying and sitting positions. Additional methods of stimulation using

verbal cues, ice pressure and tapping. Management of shoulder pain and shoulder hand syndrome. Identify and describe a

hemiplegic gait, identify synergy components and abnormal reflex activities.

Re-education of gait: motor relearning techniques, functional approach and use of orthoses.

VII. CEREBELLAR LESIONS: Identify and assess abnormal tone, decomposition of movement, rapid alternate movements,

pleurothotonus, proprioception, dysmetria, posture and gait.

Treatment: Exercise for incoordination. Frenkels and weighted exercises. Demonstrate techniques for re-education of balances

and equilibrium reactions by visual compensation. Use of appropriate aids for ambulation depending on the severity of

affection: Walker, elbow crutches, quadripod walking sticks, etc.

VIII. POLIOMYELITIS: Stages in the disease: acute, recovery, and residual paralysis. Describe treatment in the acute stage: heat,

chest care, positioning. Assessment of a patient in the recovery stage: active and passive range of motion, soft tissue tightness,

muscle power and spinal deformities. Treatment in the recovery stage: muscle strengthening - progressive resistive exercises,

active - assisted, active and active - resisted exercises. Role of suspension and hydrotherapy. Treatment of soft tissue tightness

by passive stretching. Auto stretching and positioning. Treatment in the stage of residual paralysis pre-operative assessment of

contractures: hip flexion, TFL contracture, and knee flexion and foot deformities. Assessment of limb length discrepancy and

spinal deformities. Orthotic aids commonly used in the management of polio. Tendon transfer operation commonly performed.

Functional retraining for self-care, gait training and posture correction.

NEUROPHYSIOTHERAPY PRACTICAL

Course Description: This course involves a description of the assessment and treatment of patients with neurological conditions.

Course Objectives: The student will be able to conduct a safe and effective treatment of patient with neurological conditions

The students will be shown patients of relevant diseases and disorders for:

1. Basic history taking to determining whether the brain spinal cord or peripheral nerve is involved.
2. Assessment of higher mental function such as orientation, memory, attention, speech and language.
3. Assessment of cranial nerves.
4. Assessment of motor power.
5. Assessment of sensory function touch, pain and position.
6. Assessment of tone- spasticity, rigidity and hypotonia.
7. Assessment of cerebellar function.
8. Assessment of higher cortical function- apraxia etc.
9. Assessment of gait abnormalities
10. Clinical diagnosis of the presentations.
11. Investigations and tests of different clinical presentations
12. Physiotherapy management of the various diseases & surgeries

Recommended Books

1. Cash`s Text Book For Physiotherapists In Neurological Disorders --Jaypee Bros. Publication
2. Proprioceptive Neuro Muscular Facilitation- By Herman Kabat
3. Practical Physical Therapy-Margaret Hollis
4. Therapeutic Exercise –O` Sullivan
5. "Right In The Middle"-Patracia Devis
6. Stroke Rehabilitation--Margaret Johnson
7. Therapeutic Exercise –Basmajjian.
8. Physical Rehabilitation -Krusen

Paper-29 ORTHOPAEDIC PHYSIOTHERAPY

Course Description: This course involves a description of the assessment and treatment of patients with orthopedic and sports conditions.

Course Objectives: The student will be able to conduct a safe and effective treatment of patients with orthopedic and sports conditions

1. Introduction
 - a) Assessment of the Patient
 - b) Setting of Treatment Goals and Plans

2. Traumatology

a) General Physiotherapy approach

b) Effects of different therapeutic modalities in various Traumatic conditions.

c) Principles of fracture management including Physiotherapy at different stage.

d) Prevention and management of complication of fractures.

e) Dislocations Fractures and Soft Tissue Injuries: Signs, symptoms, common sites, assessment and physiotherapeutic management.

i) Upper limb Trauma

ii) Lower limb Trauma

iii) Spinal trauma.

f) Assessment, Management and Treatment Goals of Amputation: Levels of Amputation, Stump Care, Bandaging, Pre and Post

Prosthetic Management, Prosthetic Checkout, Complications and their Management, etc

3. General Orthopedics: Review of the Condition, Assessment, Management and Treatment Goals and plans for the following Conditions

a) Congenital deformities: Torticollis Thoracic inlet Syndrome, CTEV, Foot deformities, Developmental dysplasia of the hip, etc.

b) Acquired Deformities: Deformities of spine, knee, shoulder, hip, hand etc. , VIC

c) Bone & joint tuberculosis

d) Diseases of the joints: Osteoarthritis, rheumatoid arthritis, Ankylosing spondylitis, Reiter's disease, Gout

4. Regional Orthopedics: Review of the Condition, Assessment, Management and Treatment Goals and plans for the following Conditions

a) Shoulder: Tendinitis, Peri Arthritis, Rotator Cuff Injury, Deltoid Fibrosis, Adhesive Capsulitis, Frozen Shoulder, etc.

b) Elbow; Tennis Elbow, Golfer's Elbow, Recurrent Slipping of Ulnar Nerve, Pulled Elbow, etc.

c) Wrist and Hand:Ganglion, DeQuervain's Disease, Trigger Thumb and Finger, Carpal Tunnel Syndrome, Dupuytren's Contracture, etc

d) Spine: Cervical: Brachial Neuralgia, Brachial Plexus Injury, Thoracic Inlet Syndromes, Torticollis, Cervical Spondylitis, PID,

etc. Thoracic and Lumbar Spine: Deformities of the spine, Spondylolisthesis, Lumbosacral Strain, Lumbar Canal stenosis, Spondylitis, PID, etc

e) Hip: Coxa Vara, Slipped Upper Femoral Epiphysis, AVN, etc.

f) Knee: Deformities, Quadriceps Fibrosis, Recurrent Dislocation of the Patella, Osgood Schlatter's Disease, Loose Bodies,

Anterior Knee Pain, Chondromalacia Patellae, etc.

g) Foot & Ankle: Painful Heel, Plantar Fasciitis, Posterior Heel Pain, Deformities, Forefoot pain, metatarsalgia, Tarsal Tunnel

Syndrome, etc

h) Peripheral Nerve Injuries: Outline the clinical features and management, including reconstructive surgery, Radial, median and

ulnar nerve lesions. Sciatic and lateral popliteal lesions, Brachial Plexus injuries including Erb's, Klumpke's and crutch palsy.

5. Orthopedic surgery; Pre and postoperative assessment and management of surgeries like:

a) Osteotomy, Arthrodesis, Arthroplasty, joint replacements

b) Tendon transplant, soft tissue release, Grafting.

c) Spinal stabilization, Reattachment of limbs, illizarov's technique.

c) Spinal surgeries. In Cerebral Palsy & Polio
6. Amputation

7. Introduction to manual therapy

ORTHOPEDICS PHYSIOTHERAPY PRACTICAL

Course Description: This course involves a description of the assessment and treatment of patients with orthopedic and sports conditions.

Course Objectives: The student will be able to conduct a safe and effective treatment of patients with orthopedic and sports conditions

The students will be shown patients of relevant disease and disorders for:

1. History taking of the conditions of patients.
2. Assessment
3. Clinical diagnosis of the presentations.
4. Investigations and tests of different clinical presentations
5. Physiotherapy management of the various disorders & surgeries

Recommended Books

1. Cash`S Text Book Of Orthopaedics & Rheumatology For Physio Therapists-Jaypee Bros.
2. Manual Mobilisation Of Extremity Joints-By Fredy Kaltenborn, Maitland
3. Therapeutic Exercise -----By-Kolby & Kisner

4. Therapeutic Exercises----By O`Sullivan
5. Taping Techniques - Rose Mac Donald
6. Orthopaedic Physical Therapy-By Donatelli
7. Manual Therapy –By Maitland,

Paper-30 SPORTS PHYSIOTHERAPY

Course Description: This course involves a description of the assessment and treatment of patients with orthopedic and sports conditions.

Course Objectives: The student will be able to conduct a safe and effective treatment of patients with orthopedic and sports conditions

1. The role of the physical therapies in sport, exercise and physical activity.
2. Foundations of Sports Injury Management
 - i. Sports Injury Management and the Athletic Trainer
 - ii. Preparticipation Examinations
 - iii. Protective Equipment.
3. Injury Assessment and Rehabilitation Sport Injury
 - i. Assessment Tissue Healing and Wound Care
 - ii. Therapeutic Modalities
 - iii. Therapeutic Exercise.
4. Axial Region
 - i. Head and Facial Conditions
 - ii. Spinal Conditions
 - iii. Thorax.
 - iv. Thorax and Visceral Conditions.
5. Upper Extremity
 - i. Shoulder Conditions
 - ii. Upper Arm.
 - iii. Elbow and Forearm
 - iv. Conditions Wrist and Hand Conditions.
6. Lower Extremity Pelvis.
 - i. Hip and Thigh Conditions

ii. Knee Conditions Lower Leg, Ankle, and Foot Conditions.

7. Special Considerations

i. Environmental Conditions

ii. Respiratory Tract Conditions

iii. Gastrointestinal Conditions

iv. The Diabetic Athlete

v. Common Infectious Diseases

vi. Blood Pressure Disorders

vii. Seizure Disorders

viii. Sudden Death Conditions of the Female Athlete.

ix. Disabled Athlete, & Senior

8. Medical considerations for rehabilitation practitioners in sport and exercise settings Pharmacological agents in sport and exercise

i. Medical imaging of injury.

ii. Medical issues in sport and exercise

9. Diet and Nutrition

10. Pharmacology in Sports

12. Rehabilitation in Sports

13. Young and Older age Athletes

14. Physiological effect of exercise in various body system

SPORTS PHYSIOTHERAPY PRACTICAL

Course Description: This course involves a description of the assessment and treatment of patients with sports conditions.

Course Objectives: The student will be able to conduct a safe and effective treatment of patients with sports conditions

The students will be shown patients of relevant disease and disorders for:

1. History taking of the conditions of patients.
2. Assessment
3. Clinical diagnosis of the presentations.
4. Investigations and tests of different clinical presentations
5. Physiotherapy management of the various Sports Injuries

Suggested Readings

1. Prentice, W. "Therapeutic Modalities for Allied Health Professionals.

2. Prentice, William E., Rehabilitation Techniques in Sports Medicine, /

3. Gregory Kolt Physiotherapy in Sports and Exercise

Paper-31 GENERAL PHYSIOTHERAPY

Objective

To understand the disease process and management of various general conditions.

1. Principles of Physiotherapy management in General Surgical Conditions. Complication of Surgery and management.
2. Pre and Post-operative assessment and physiotherapy management in the following.
Cholecystectomy

Gastractomy

Appendicectomy

Nephroctomy

Herniorraphy

Prostatectomy

Breast Surgery (Mastectomy)
3. Dermatology:

Physiotherapy management in the following Boils, Carbuncle, Ulcer, Scleroderma, Alopecia, Psoriasis, Acne-Vulgaris, Leprosy, Psoriatic Arthritis, Vitiligo etc.
4. Physiotherapy in Burns and Plastic Surgery.
5. Obstetrics and Gynaecology Physiotherapy in following, Pregnancy, Labour, Prenatal and Post natal period, Incontinence, Prolapse Uterus, Pelvic inflammatory diseases, Pelvic floor muscle disorders and pelvic surgeries.
6. Pediatrics' Physiotherapy

Neonatal screening of the following C.P. Erb's Palsy, Birth Asphyxia, CTEV, Congenital hip dislocation and Respiratory disorders, Physiotherapy assessment and management in the above conditions, Physiotherapy in ITU and ICCU. Physiotherapy in Paediatric Surgery.
7. Physiotherapy in E.N.T

Physiotherapy in following conditions sinusitis Rhinitis. Acute and Chronic otitis Media, Adenoids, Tonsillitis Orosclerosis, Mastoidectomy.
8. Geriatric Physiotherapy
9. Physiotherapy in Cancer.
10. Physiotherapy in Occupational disorders.
11. Physiotherapy in Psychiatry.
12. Physiotherapy in AIDS and Alcoholics.

13. Miscellaneous conditions Inflammations, Wound, Oedema, Fibrosities, Urological surgery etc.

PRACTICAL

Various physiotherapy procedure and treatment techniques for the above mentioned conditions to be demonstrated and practiced by the students

Paper-32 Ethics Administration and Computer Application

Objective

To understand the basics principle of administrative skills and computers.

Unit-I Ethics

Definition, principles, moral issues in health care, bioethics.

Unit-II: Professional conduct

Rule of professional conduct, relation ship with patients, medical colleagues, other professional.

Confidentiality, and responsibility personal and professional standard.

Unit-III: Legal Concepts

Consumer protection act, liability, documentation, negligence, protection from mal practice, claims, compensation.

Unit-IV: International Organization and regulation

WCPT, advertising, documentation, sale of services and goods, inform choice and consent continuing education and personal development.

Unit-V: Organization and administration

Organizational Characteristics physical facilities and planning, organizational structure and job design for physical therapy practice.

Unit-VI: Management

Management principles, work design for physiotherapy, recruitment and hiring of professional. Personnel development, and performance appraisal, physiotherapy marketing and strategies of marketing current trends and marketing finance planning and management.

Unit-VII: Computer application

Basics of computer application, hard ware and soft ware, windows, MS word, Excel, MS office, SPSS, and MS power point.

ORGANIZATION, ADMINISTRATION & ETHICS IN PHYSIOTHERAPY

Course Description: This course involves a description of ethical code of professional practice, as well as its moral & legal aspects; role of

W.H.O.& W.C.P.T. At the end of the course the student will acquire the knowledge of the basics in Managerial & Management skills

Course Objectives: This course is aimed to enable the candidate to acquire the knowledge of ethical code of professional practice, as well

as its moral & legal aspects; role of W.H.O.& W.C.P.T. At the end of the course the student will acquire the knowledge of the basics in

Managerial & Management skills.

1. General Administration

A. Planning & Organisation: Planning Cycle, Principles of Organisational Charts, Resource and Quality management, Planning change

B. Financial issues including budget and income generation

C. Hospital Management: Hospital Organisation, Staffing, information, Communication and co-ordination with Physiotherapy.

services of hospital, Cost of service, Monitoring and Evaluation.

D. Self Management:

i) Preparing for first job

ii) Time Management

iii) Career development

2. Administration of the department

a. Describe methods of administration in a Physiotherapy department: Records: their purpose eg. Attendance, statistics,

inventory, stock. Maintenance of records eg. Methods of community and institutional based departments (CBR & IBR)

.

Referrals- purpose and types of referral

b. Demonstrate administration of the following: Store keeping materials, inventory records, purchase ordering petty cash

accounting. General maintenance of equipment, furniture, buildings, costing of splints/ aids/ equipment/ articles/ made in

Physiotherapy

c. Describe and demonstrate: Types of correspondence, Methods of filing.

d. Describe methods for care of equipment and materials

e. Discuss budgeting- including items for an annual budget.

f. Discuss considerations for constructions of a new department, and modification of an old department including: Space required

Allotment of space, eg suitability for access, plumbing requirements & circulation of air.

g. Plan assessment forms eg. Pre-vocational ADL hand function & higher functions for initial evaluation and progress recording.

h. Outline method of writing Physiotherapy department annual reports. Calculate monthly and annual statistics. Make plans for

future requirements eg. Consider staff patient ratio, equipment and staff requirements.

i. Plan to organize picnic or sports program for patients

j. Outline legal aspects related to rehabilitation: Medico Legal cases, Workmans' Compensation Act & Insurance Facilities. Other

financial benefits available for the disabled.

k. Outline safety precautions in Physiotherapy

3. Physiotherapy Ethics

a) History of Physiotherapy

b) Philosophy of Physiotherapy

c) Major ethical principles applied to moral issues in health care

d) Rules of professional conduct & scope of practice.

e) Relationship with patient

- f) Relationship with medical
- g) Relationship with the profession
- h) Confidentiality and responsibility
- i) Provision of services and advertising
- j) Sale of goods.
- k) Professional and government licensing accreditation and education standards.
- l) Laws and legal concepts
- m) Law - protection from malpractice claim
- n) Consumer protection act, liability and documentation.
- o) Indian Association of Physiotherapists

Paper-33 Physiotherapy Project

SINGHANIA UNIVERSITY, PACHERI BARI

ORDINANCE AND SYLLABUS

MASTER OF PHYSIOTHERAPY (M.P.T)

1. A student may be admitted to one of the following four courses leading to the **Degree of Master of Physiotherapy (M.P.T):** -
 - i) M.P.T Musculo-Skeletal
 - ii) M.P.T Sports
 - iii) M.P.T Neurology
 - iv) M.P.T Cardiopulmonary
2. The duration of the course of instruction leading to the degree of Master of Physiotherapy (M.P.T) shall be two years including compulsory submission of dissertation and clinical practice. M.P.T Examination will be held at the end of first academic year, second is the at the end of second academic year, in the month of April/ May on such dates as may be fixed by the Vice Chancellor.
3. The examination shall be held twice in a year, one regular i.e. April/May and the other supplementary that is September/October on such dates as may be fixed by the Vice Chancellor.
4. The date fixed for the receipt of the application forms and examination fees shall be notified by the controller of the examination / registrar without and with late fees, as fixed by the Vice Chancellor.
5. A person who has passed from any Indian/Foreign Universities/ Board with aggregate 55% marks in Bachelor of Physiotherapy, Candidate will be admitted to M.P.T course strictly on merit, as decided by the competent authority.
6. A candidate may change his opted specialty within one month of the date of admission in the MPT-course.
7. A candidate who satisfied the following requirement duly certified by the Principal of Physiotherapy College/ Institute of singhania university for the MPT course shall be eligible to appear in the 1st MPT examination:
 - Of having good character.
 - Of having attended the prescribed course.
 - Of having attended not less than:
 - (i) 75%of the full course of the lectures delivered and
 - (ii) 75% of full course of practical held separately.
 - (iii) 75% of full of clinical practice held separately.
 - (iv) Submission of three proposals of research dissertation of respective discipline selected in MPT course out of which one will be finally approved or allowed.
8. **Promotion Criteria:** - A candidate who has passed MPT-1st year examination of this University shall be eligible to join the MPT-2nd year class. However, a candidate who passes the 3 compulsory subjects- Paper-3, Paper- 4 and Paper-5 and 50% papers of the remaining 4 papers (i.e. Paper-1, Paper-2, Paper-6, Paper-7) obtaining at least 50% marks in each paper in theory and practical separately, may also be allowed to attend MPT-2nd year class. Such candidates will be allowed to clear the re-appear papers of MPT-1st year along with MPT-2nd year examination, subject to clause-14.
9. A candidate is required to pass all the re-appear papers along with MPT-2nd year examination

to be held in April/May examination. If he/she fails to pass all the examination of MPT-1st year even in the third chance i.e. along with MPT-2nd year he/she is required to pass the whole examination of MPT-1st year as fresh (ex-student). However, the result of MPT-2nd year examination may be declared (pass provisional) if he/she passes all the subjects of the MPT-2nd year examination till the passing of MPT-1st year examination subject to clause-14 i.e. (within 4 years from the date of first MPT-1st year examination), otherwise the result will be declared as cancelled.

11. A candidate who satisfied the following requirement duly certified by the principal of

Physiotherapy College/ Institute of singhania university for the MPT course shall be eligible to appear in the 2nd year of MPT examination and as per clause-10

- Of having good character.
- Of having attended the prescribed course.
- Of having attended not less than:
 - (i) 75% of the full course of the lectures delivered and
 - (ii) 75% of full course of practical held separately.
 - (iii) 75% of full of clinical practice held separately.
 - (iv) Submission of Research dissertation of respective discipline selected in M.P.T course.

10. A candidate will be declared pass in the MPT-2nd year examination if he/she has passed all the papers including theory and practicals of MPT-1st year and has passed all the papers of the MPT-2nd year as well as passed research dissertation viva-voce and research dissertation accepted.

11. The Principal upto 5% under special circumstances may condone a deficiency in the required number of the lectures, clinical and practical.

12. A candidate who has completed the prescribed course as the laid down in these clauses and is unable to appear in the examination or having appeared has failed, may be admitted to subsequent examination as under on payment of the prescribed fee on each occasion, and on presenting a certificate signed by the Principal of Physiotherapy College/Institute in which he/ she completed the course, that he/she subsequent his/ her last failure attended a course of training / hospital practice in the subject of the examinations as the Principal may determine.

13. A candidate is required to pass all MPT-1st year and 2nd year examinations within 4 years from the date of first MPT-1st year examination.

14. A candidate is required to pass the re-appear paper(s) within 2 consecutive chances i.e. supplementary and annual examination excluding the chance of main examination. Failing which he/she shall repeat the entire course subject to clause-14.

15. The examination shall be held according to the scheme of examination and syllabus prescribed by the Academic Council. A candidate who fails in an examination or having been eligible fails to appear in an examination shall take the examination according to

syllabus prescribed by the university for regular students provided that the syllabus for the candidates of supplementary examination shall be the same was in force in the last main examination.

16. Every candidate shall offer the subjects as per scheme of examination.
17. Each written paper will be of the three hours duration.
18. A candidate who does not fulfill the conditions laid down for all subjects of the examination may be allowed to take the examination in the subjects in which the candidate has fulfilled the conditions.
19. Regular Internal Assessment through periodical examination shall be conducted throughout the course. The question of number of examination for Internal Assessment is left to the Physiotherapy Institute/College.
20. The examination fee to be paid by a candidate for the whole or part of the examination shall be as prescribed the university.
21. The medium of instruction and examination shall be English.
22. The minimum number of marks required to pass in each examination shall be:
 - 50% in theory including written, oral and internal assessment of theory subject and
 - 50% in the practical including clinical of each subject and internal assessment.
23. Successful candidate who obtain 80% marks or more in any subject shall be declared to have passed “the distinction” in that subject provided he passes in all the subjects of the examination at one and same time.
24. MPT degree with “Honors” shall be awarded to candidate who-
 - Has completed of the course in the minimum period.
 - Has passed each of the first and second examination in the first attempt obtaining not less than 70%of the marks in each subject of every examination.
25. A successful candidate of the first and second examination shall be granted a certificate.
26. A candidate first and second MPT examination shall have to undergo clinical practice in Physiotherapy/ Medical Institution/Hospital approved by the University.
27. At the end of clinical practice, the Principal of Physiotherapy Institution/ College shall forward report on attendance, character and knowledge of subject after due assessment. In case the Principal of Physiotherapy Institution / College is not satisfied; the training in the subject shall be repeated.
28. The University shall award annually Gold Medals, Silver Medals and Bronze Medals to the students who obtain first, second and third position in first attempt respectively, in order of merit in the various University Examination held at the end of each course. The name of the candidate(s) to whom the medal is/are to be awarded will be mentioned on each medal. Provided that if more than one candidate has obtained equal number of marks in the examination on the basis of which the medal is be awarded, the medal shall be awarded to each of them.
29. Not withstanding the integrated nature of this course which is spread over more then one academic year, the ordinance in force at the time a student joins the course shall held good only for the examination held during or at the end of the academic year and nothing in this ordinance, if any shall apply to all the student, whether old or new.
30. In case of any dispute in the interpretation of rules & regulations, interpretation of the same by the Vice-Chancellor shall be final.

FIRST M.P.T- MUSCULOSKELETAL EXAMINATION

Group	S.No.	Subject	Theory Marks	Practical/Oral M.	Total Marks
Group I	Paper 1	Applied Physiotherapy	80+20*	80+20*	200
	Paper 2	Applied Biomechanics & Ergonomics	80+20*	40+10*	150
Group II	Paper 3	Applied Basic Medical Sciences – (Anatomy, Physiology, Pathology, and Pharmacology) as applicable to- ABMS-Musculoskeletal	80+20*	Nil	100
	Paper 4	Medical & Surgical Management as applicable to- MSM- Musculoskeletal			
	Paper 5	Biostatistics and Research Methodology	80+20*	Nil	100
				80+20*	Nil

Group III	Paper 6	Practical:	Nil	80+20*	100
		i) Non-elective Case			
		ii) Elective Case Musculoskeletal	Nil	80+20*	100
	Paper 7	Seminars on Clinical Issues	Nil	100*	100
		Clinical Practice			

*Internal Assessment

Marks

Please Note:

- Paper 1, Paper 2, Paper 5 and Paper-6 (i) are common subjects for all.
- Papers 3, Paper 4 and Paper-6 (ii) are separate subjects for separate streams selected by the students.

FIRST M.P.T-SPORTS EXAMINATION

Group	S.No.	Subject	Theory Marks	Practical/Oral M.	Total Marks
Group I	Paper 1	Applied Physiotherapy	80+20*	80+20*	200
	Paper 2	Applied Biomechanics & Ergonomics	80+20*	40+10*	150
Group II	Paper 3	Applied Basic Medical Sciences – (Anatomy, Physiology, Pathology, and Pharmacology) as applicable to- ABMS-Sports			
	Paper 4	Medical & Surgical Management as applicable to- MSM- Sports	80+20*	Nil	100
	Paper 5	Biostatistics and Research Methodology	80+20*	Nil	100
				80+20*	Nil
Group III	Paper 6	Practical: i) Non-elective Case	Nil	80+20*	100

		ii) Elective Case	Nil	80+20*	
		Sports			
	Paper 7	Seminars on Clinical Issues	Nil	100*	100
		Clinical Practice			

*Internal Assessment

Marks

Please Note:

- ❑ Paper 1, Paper 2, Paper 5 and Paper-6 (i) are common subjects for all.
- ❑ Papers 3, Paper 4 and Paper-6 (ii) are separate subjects for separate streams selected by the students.

FIRST M.P.T-NEUROLOGY EXAMINATION

Group	S.No.	Subject	Theory Marks	Practical/Oral M.	Total Marks

Group I	Paper 1	Applied Physiotherapy	80+20*	80+20*	200
	Paper 2	Applied Biomechanics & Ergonomics	80+20*	40+10*	150
Group II	Paper 3	Applied Basic Medical Sciences – (Anatomy, Physiology, Pathology, and Pharmacology) as applicable to- ABMS-Neurology			
	Paper 4	Medical & Surgical Management as applicable to- MSM- Neurology	80+20*	Nil	100
		Biostatistics and Research Methodology	80+20*	Nil	100
	Paper 5		80+20*	Nil	100
Group III	Paper 6	Practical:			
		i) Non-elective Case	Nil	80+20*	100
		ii) Elective Case	Nil	80+20*	100
		Neurology			

	Paper 7	Seminars on Clinical Issues	Nil	100*	100
		Clinical Practice			

*Internal Assessment

Marks

Please Note:

- ❑ Paper 1, Paper 2, Paper 5 and Paper-6 (i) are common subjects for all.
- ❑ Papers 3, Paper 4 and Paper-6 (ii) are separate subjects for separate streams selected by the students.

FIRST M.P.T-CARDIOPULMONARY EXAMINATION

Group	S.No.	Subject	Theory Marks	Practical/Oral M.	Total Marks

Group I	Paper 1	Applied Physiotherapy	80+20*	80+20*	200
	Paper 2	Applied Biomechanics & Ergonomics	80+20*	40+10*	150
Group II	Paper 3	Applied Basic Medical Sciences – (Anatomy, Physiology, Pathology, and Pharmacology) as applicable to- ABMS-Cardiopulmonary			
	Paper 4	Medical & Surgical Management as applicable to- MSM- Cardiopulmonary	80+20*	Nil	100
		Biostatistics and Research Methodology	80+20*	Nil	100
	Paper 5		80+20*	Nil	100
Group III	Paper 6	Practical:			
		i) Non-elective Case	Nil	80+20*	100
		ii) Elective Case	Nil	80+20*	100
		Cardiopulmonary			
		Seminars on Clinical			

	Paper 7	Issues	Nil	100*	100
		Clinical Practice			

*Internal Assessment

Marks

Please Note:

- ❑ Paper 1, Paper 2, Paper 5 and Paper-6 (i) are common subjects for all.
- ❑ Papers 3, Paper 4 and Paper-6 (ii) are separate subjects for separate streams selected by the students.

SECOND M.P.T- MUSCULOSKELETAL EXAMINATION

Group	S.No.	Subject	Theory Marks	Practical/Oral Marks.	Total Marks
Group-I	Paper 1	Assessment and Diagnosis as applicable to – Musculoskeletal Conditions			
	Paper 2	Physiotherapy management-I as applicable to-	80+20*	Nil	100
			80+20*	Nil	100

	Paper 3	Musculoskeletal Conditions Physiotherapy Management-II as applicable to- Musculoskeletal Conditions	80+20*	Nil	100
	Paper 4	Professional Development	80+20*	Nil	100
Group II	Paper 5	Practical: i) Non-elective Case ii) Elective Case	Nil	80+20*	100
		Musculoskeletal	Nil	160+40*	200
	Paper 6	Dissertation (Including Dissertation Viva-Voice)	Nil Nil	Accepted/Rejected 80+20*	Accepted/Rejected 100
		Seminar on Clinical Issues	Nil	100*	100

		Clinical Practice			
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* Internal Assessment

Marks

Please Note:

- ❑ Papers 1, Paper 2, Paper 3, Paper 5 (i) and Paper 6 are separate subjects for separate streams selected by the students.
- ❑ Paper 4 is a common subject for all.

SECOND M.P.T-SPORTS EXAMINATION

Group	S.No.	Subject	Theory Marks	Practical/Oral Marks.	Total Marks
Group I	Paper 1	Assessment and Diagnosis as applicable to – Sports Injuries	80+20*	Nil	100
	Paper 2	Physiotherapy management-I as applicable to- Sports Injuries	80+20*	Nil	100
		Physiotherapy Management-II as			

	Paper 3	applicable to- Sports Injuries	80+20*	Nil	100
	Paper 4	Professional Development	80+20*	Nil	100
Group II	Paper 5	Practical:			
		i) Non-elective Case	Nil	80+20*	100
	ii) Elective Case				
	Sports	Nil	160+40*	200	
	Paper 6	Dissertation (Including Dissertation Viva-Voice)	Nil	Accepted/Rejected	Accepted/Rejected
		Sports	Nil	80+20*	100
		Seminar on Clinical Issues		100*	
		Clinical Practice			

* Internal Assessment

Marks

Please Note:

- Papers 1, Paper 2, Paper 3, Paper 5 (i) and Paper 6 are separate subjects for separate streams selected by the students.
- Paper 4 is a common subject for all.

SECOND M.P.T-NEUROLOGY EXAMINATION

Group	S.No.	Subject	Theory Marks	Practical/Oral Marks.	Total Marks
Group I	Paper 1	Assessment and Diagnosis as applicable to – Neurological Conditions	80+20*	Nil	100
	Paper 2	Physiotherapy management-I as applicable to- Neurological Conditions	80+20*	Nil	100
	Paper 3	Physiotherapy Management-II as applicable to- Neurological	80+20* *	Nil	100

	Paper 4	Professional Development	80+20*	Nil	100
Group II	Paper 5	Practical:			
		i) Non-elective Case	Nil	80+20*	100
	ii) Elective Case				
	Paper 6	Neurology	Nil	160+40*	200
		Dissertation (Including Dissertation Viva-Voice)	Nil	Accepted/Rejected 80+20*	Accepted/Rejected 100
Neurology		Nil	100*	100	
	Seminar on Clinical Issues				
	Clinical Practice				

* Internal Assessment

Marks

Please Note:

- ❑ Papers 1, Paper 2, Paper 3, Paper 5 (i) and Paper 6 are separate subjects for separate streams selected by the students.
- ❑ Paper 4 is a common subject for all.

SECOND M.P.T –CARDIOPULMONARY EXAMINATION

Group	S.No.	Subject	Theory Marks	Practical/Oral Marks.	Total Marks
Group I	Paper 1	Assessment and Diagnosis as applicable to – Cardiopulmonary Conditions	80+20*	Nil	100
	Paper 2	Physiotherapy management-I as applicable to- Cardiopulmonary Conditions	80+20*	Nil	100
	Paper 3	Physiotherapy Management-II Cardiopulmonary Conditions Professional Development	80+20*	Nil	100
	Paper 4		80+20*	Nil	100

Group II	Paper 5	Practical:			
		i) Non-elective Case	Nil	80+20*	100
	ii) Elective Case	Nil	160+40*	200	
	Paper 6	Cardiopulmonary			
		Dissertation (Including Dissertation Viva-Voice)	Nil	Accepted/Rejected 80+20*	Accepted/Rejected 100
		Cardiopulmonary			
Seminar on Clinical Issues		Nil	100*	100	
Clinical Practice					

* Internal Assessment

Marks

Please Note:

- ❑ Papers 1, Paper 2, Paper 3, Paper 5 (i) and Paper 6 are separate subjects for separate streams selected by the students.
- ❑ Paper 4 is a common subject for all.

FIRST M.P.T EXAMINATION

Paper-1: Applied Physiotherapy

□ **Exercise therapy**

1. Assessment techniques: Manual Muscle Testing and Goniometry
2. Stretching and Mobilization
3. Re-education and Strengthening
4. Balance and Co-ordination Exercises
5. Gait Analysis and Training (Both Normal and Pathological Gaits)
6. Relaxation and Soft tissue Manipulations
7. Posture
8. PNF and Neuro-muscular Coordination
9. Traction
10. Hydrotherapy

□ *Electrotherapy*

1. General Review of Low, Medium and High Currents and Their Modifications like Di-dynamic and Russian currents, electro diagnostics studies like S.D curve, chronaxie, rheobase etc...
2. Ultrasound Therapy
3. Cryotherapy and it's various forms of application.
4. UVR and IRR
5. Other Thermal Modalities like SWD, MWD, Hydro collator, Wax Therapy, Fluidotherapy

□ *Advanced Therapeutics*

1. Pain management
2. L.A.S.E.R.: production, type, effects, indications, contraindications and applications.
3. Nerve Conduction Studies and Electromyography: normal, abnormal action potentials, its recording protocols, analysis and apparatus.
4. Micro-currents: concept, indications, contra-indications and applications
5. Bio-feedback: principles, effects, uses and contra-indications

□ *Clinical Reasoning & Evidence Based Physiotherapy for the above Exercise Therapy, Electrotherapy and Advanced Therapeutics.*

Practicals in Applied Physiotherapy

- #### □ Exercise Therapy: Assessment of joint, muscles and nerves.
1. All types of strengthening techniques
 2. All types of mobilization techniques
 3. Soft tissue stretching and mobilization
 4. Gait analysis and training

5. Postural assessment and re-education
6. Balance and coordination
7. Special techniques of exercise therapy
8. Traction
9. Hydrotherapy.

□ Electrotherapy:: Indication, precautions of usage, contraindications, dosage, protocols, follow up after treatment of low, medium and high frequency currents and modalities.

1. Faradic
2. Galvanic
3. S.D curve, rheobase, chronaxie etc.
4. High voltage current
5. Di-dynamic
6. Russian
7. Interferential therapy
8. T.E.N.S
9. Micro currents
10. Short-wave Diathermy
11. Microwave Diathermy
12. Ultrasound
13. Cryotherapy and its various forms of application
14. Bio-feedback
15. U.V.R
16. I.R.R
17. L.A.S.E.R
17. Other Thermal Modalities like SWD, MWD, Hydro-collator, Wax Therapy, Fluidotherapy

Paper-2: Applied Biomechanics and Ergonomics:

Students will be able to identify and apply principles of Biomechanics and Ergonomics while setting up individualized treatment protocols.

1. Fundamental Mechanics

- i) Forces; composition and resolution of forces; force systems
 - ii) Force of gravity and COG
 - iii) Stability
 - iv) Reaction forces
 - v) Friction
 - vi) Moments
 - vii) Newton's Laws
 - viii) Equilibrium: static and dynamic
 - ix) Simple Machines: Levers, pulleys and wheel and axle
 - x) Work, power and energy
 - xi) Density and Mass
 - xii) Segmental dimensions
 - xiii) Poisson's effect
 - xiv) Stress and strain
 - xv) Modulus of rigidity and modulus of elasticity
 - xvi) Strain energy
 - xvii) Static and cyclic load behaviors
 - xviii) Load: Load sharing and load transfer
2. Kinematics
- i) Motion: types, location, magnitude and direction
 - ii) Angular motion and its various parameters
 - iii) Linear motion and its various parameters
 - iv) Projectile motion
3. Muscle Mechanics
- i) Structure and composition of muscle
 - ii) Fiber length and cross-section area
 - iii) Mechanical properties
 - iv) EMG changes during fatigue and contraction
 - v) Changes in mechanical properties because of aging, exercise and immobilized.
 - vi) Clinical applications.
4. Ligament and Tendon Mechanics:
- i) Structure, composition and mechanical properties.
 - ii) Cross-sectional area measurement
 - iii) Muscle tendon properties
 - iv) Temperature sensitivity
 - v) Changes in mechanical properties because of aging, exercise and immobilization.
 - vi) Mechanoreceptors
 - vii) Clinical application.
5. Joint Mechanics
- i) Joint design
 - ii) Joint categories
 - iii) Joint functions: Arthrokinematics, Osteokinematics and kinematics chains
 - iv) Joint forces, equilibrium and distribution of these forces
 - v) Degenerative changes in weight bearing joints and compensatory actions
 - vi) Joint stability and its mechanisms
 - vii) Clinical applications
 - viii) Joint Lubrication

6. Measurement Instruments
 - i) Goniometry
 - ii) Accelerometer
 - iii) Photo-optical devices
 - iv) Pressure transducers and Force plates
 - v) Gait Analyzer
 - vi) Isokinetic device
 - vii) EMG (Electro physiology of muscle contraction, recording, processing)
 - viii) Relationship between E.M.G and Biomechanical Variables.
7. Mechanical energy, Work & Power
 - i) Definitions
 - ii) Positive and negative work muscles
 - iii) Muscle mechanical power
 - iv) Causes of inefficient movement: co-contractions, Isometric contractions, against gravity jerky movement, energy generation at one joint and absorption at another, energy flow.
 - v) Energy Storage.
8. Gait
 - i) Gait parameter: kinetic, kinematics, time-space.
 - ii) Pathological gait
 - iii) Running
 - iv) Stair climbing
 - v) Changes in gait following various surgeries/ diseases/ disorders.
9. Pathomechanics
 - i) Bone Patho-mechanics
 - ii) Neural Patho-mechanics
 - iii) Cardio Patho-mechanics.
 - iv) Pulmonary Patho-mechanics
 - v) Vascular Patho-mechanics
10. Ergonomics:
 - i) Definitions
 - ii) Physiological and bio-mechanical risk factors
 - iii) Job design
 - iv) Developing and implementing work site program
 - v) Ergonomics in home, child care and leisure activities
 - vi) Addressing problems at computer workstation.

Practical in Applied Biomechanics & Ergonomics:

This course will enable the students to apply their knowledge of biomechanics and ergonomics in practical situations on their patients.

- i) Evaluation and assessment of joint motion (planes, axis etc...)
- ii) Evaluation and assessment of posture
- iii) Evaluation and assessment of Gait
- iv) Evaluation and assessment of the employed worker on the ergo-meter
- v) Practical usage of all examination and assessment devices

Paper-3: Applied Basic Medical Sciences (Anatomy, Physiology, Pathology, Pharmacology) for M.P.T Musculoskeletal

This course will enable the student to understand the applied aspect of the related specialty with the help of brief review of basic medical sciences.

Human Anatomy:

1. Outline of Fundamental Anatomy with histological review
 - i) Bone / joints (osteo and arthrology)
 - ii) Muscles (myology)
 - iii) Nerves and nervous system
 - iv) Vessels and vascular system
 - v) Integumentary system
2. Introduction to upper limb and lower limb
 - i) Bone and joints
 - ii) Muscles
 - iii) Nerve and plexuses
 - iv) Vascular system
 - v) Various regions:
 - Upper limb-pectoral, axilla, scapular, arm, forearm, cubital fossa and hand
 - Lower limb- thigh, gluteal region, popliteal fossa, leg and foot
3. Introduction to trunk region
 - i) Bone and joints (vertebrae, ribs and sternum)
 - ii) Muscles
 - iii) Nerve and plexuses
 - iv) Vascular structures
 - v) Various regions-
 - Thoracic
 - Lumbar
 - Sacro-coccygeal.
4. Head & Neck:
 - i) Bone and joints-skull, cervical vertebrae, hyoid
 - ii) Muscles.
 - iii) Nerve and plexuses.
 - iv) Vascular structures.
 - v) Various regions-
 - Head-cranial cavity, orbit, nasal cavity, oral cavity

- Neck-triangles (ant & post), back of neck

Human Physiology

1. Muscle Physiology
 - i) Electrical properties of neuron
 - ii) Classification of nerve fibers
 - iii) Effects of nerve injury
 - iv) Structure of skeletal muscle
 - v) Electrical properties of skeletal muscle
 - vi) The contractile mechanism
 - vii) Length-tension relationship
 - viii) Fast and Slow muscles
 - ix) Skeletal muscle metabolism

Pathology

1. General Pathology (cell injury, inflammation, repair, immune system)
2. Musculoskeletal System
 - i) Bones
 - Hereditary and metabolic diseases (Osteoporosis, rickets, osteomalacia, osteitis fibrosa cystica, renal osteodystrophy)
 - Infections (Osteomyelitis and tuberculosis)
 - ii) Joints
 - Degenerative joint disease
 - Bursitis
 - iii) Skeletal muscles
 - Muscle atrophy
 - Myositis
 - Muscular dystrophy
 - Myasthenia gravis

Pharmacology

1. Drugs used in pain
2. Local anesthetics
3. Steroids
4. Muscle relaxants
5. Drugs acting upon Musculoskeletal system
6. Topically acting drugs

This course will enable the student to understand the applied aspect of the related specialty with the help of brief review of basic medical sciences.

Human Anatomy:

1. Fundamental Anatomy

- ii) Bone / joints (osteo and arthrology)
- iii) Muscles (myology)
- iv) Nerves and nervous system
- v) Vessels and vascular system
- vi) Integumentary system

2. Upper limb and Lower limb

- i) Bone and joints
- ii) Muscles
- iii) Nerves and plexuses
- iv) Vascular system

Various regions:

- Upper limb-pectoral, axilla, scapular, arm, forearm, cubital fossa and hand.
- Lower limb- thigh, gluteal region, popliteal fossa, leg and foot.

3. Introduction to trunk region

- i) Bone and joints (vertebrae, ribs and sternum).
- ii) Muscles.
- iii) Nerve and plexuses.
- iv) Vascular structures.
- v) Various regions-
 - Thoracic
 - Lumbar
 - Sacro-coccygeal.

4. Head & Neck:

- i) Bone and joints
- ii) Muscles.
- iii) Nerve and plexuses.
- iv) Vascular structures.
- v) Various regions-
 - Head-cranial cavity, orbit, nasal cavity, oral cavity
 - Neck-triangles (ant & post), back of neck

5. Cardio-Respiratory system

- i) Pleura and lungs
- ii) Pericardium and heart
- iii) Vessels and large vessels

6. Neuro-anatomy

- i) Nervous System
 - Central nervous system (brain and spinal cord)
 - Somatic nervous system (cranial and spinal nerves)
 - Autonomic nervous system
- ii) Meninges and ventricular system of C.N.S
- iii) Blood supply to C.N.S

Human Physiology & Nutrition

1. Cardiovascular system

- i) Structure and properties of heart
- ii) Cardiac cycle
- iii) The regulation of heart's performance / circulation during exercise
- iv) Cardiac output
- v) The arterial blood pressure
- vi) The physiology of vascular system
- vii) Lymphatic circulation
- viii) Protection from coronary heart disease
- ix) Sudden cardiac death in sports

2. Respiratory System

- i) Ventilation and control of ventilation
- ii) Alveolar air
- iii) Regulation of breathing/ respiration during exercise
- iv) Pulmonary function test
- v) Air Conditioning
- vi) Second wind
- vii) Oxygen debt
- viii) Breath holding and scuba diving, high pressure ventilation

3. Muscle Physiology

- i) Electrical properties of neuron
- ii) Classification of nerve fibers
- iii) Effects of nerve injury
- iv) Structure of skeletal muscle
- v) Electrical properties of skeletal muscle
- vi) The contractile mechanism
- vii) Length-tension relationship
- viii) Fast and Slow muscles
- ix) Skeletal muscle metabolism
- x) Growth and exercise
- xi) Repair and adaptation during exercise
- xii) Pathophysiology of back
- xiii) Training for muscular strength and endurance
- xiv) Muscle tissue fiber typing and its significance

Energy Transfer for physical activity

- i) Energy transfer in body
- ii) Energy transfer in exercise
- iii) Energy expenditure during various activities
- iv) Fatigue

Gastrointestinal tract & Endocrine:

- i) Effects of sports on G.I.T and liver
- ii) Hormone regulation of fluid and electrolytes during exercise
- iii) Exercise and menstrual cycle
- iv) Stress hormones in exercise.
- v) Effects of exercise on various hormones in the body
- vi) Opioids, runner's high

Body Composition & Weight Control:

- i) Composition of human body
- ii) Somatotyping
- iii) Techniques of body composition analysis
- iv) Obesity
- v) Health risks of obesity
- vi) Weight control
- vii) Assessment of Age

Temperature Regulation:

- i) Heat & cold balance
- ii) Methods of assessing heat balance
- iii) Effect of climate
- iv) Effect of exercise in temperature regulation
- v) Limit of tolerance of heat
- vi) Acclimatization

Diet and Nutrition

- i. Uses and importance of various micro and macro Nutrients
- ii. Carbohydrates, fats, proteins, lipids.
- iii. Vitamins, minerals and water
- iv. Optimal nutrition for exercise
- v. Nutrition for physical performance
- vi. Pre-game meal, carbohydrate loading
- vii. Alcohol, mega vitamin therapy
- viii. Feed for various athletes of different disciplines
- ix. Nutrition for sportsperson
- x. Nutritional assessment in different sports
- xi. Nutritional recommendations in various sports

Miscellaneous Topics:

- i) High altitude training
- ii) Sports diving
- iii) Special aids to athletic performance-MORA, Blood Doping, Doping Oxygen inhalations, Sleep etc...
- iv) Sex and performance

Pathology

1. General Pathology (cell injury, inflammation, repair, immune system)
2. Musculoskeletal System
 - i) Bones
 - Hereditary and metabolic diseases (Osteoporosis, rickets, osteomalacia, osteitis fibrosa cystica, renal osteodystrophy)
 - Infections (Osteomyelitis and tuberculosis)
 - ii) Joints

- Degenerative joint disease
- Bursitis
- iii) Skeletal muscles
 - Muscle atrophy
 - Myositis
 - Muscular dystrophy
 - Myasthenia gravis

3. Cardiovascular system

- i) Rheumatic heart disease
- ii) Myocardial infarction
- iii) Atherosclerosis
- iv) Congenital heart diseases

Pharmacology

1. Drugs used in pain
2. Local anesthetics
3. Steroids
4. Doping
5. Muscle relaxants
6. Drugs acting upon Central and Autonomic nervous system
7. Topically acting drugs
8. Drugs acting upon Cardio-Respiratory system
9. Drugs acting upon Musculoskeletal system

Paper-3: Applied Basic Medical Sciences (Anatomy, Physiology, Pathology, Pharmacology) for M.P.T Neurology

This course will enable the student to understand the applied aspect of the related specialty with the help of brief review of basic medical sciences.

Human Anatomy

Neuro-anatomy

- i) Nervous System
- ii) Central nervous system (brain and spinal cord)
- iii) Somatic nervous system (cranial and spinal nerves)
- iv) Autonomic nervous system
- v) Meninges and ventricular system of C.N.S
- vi) Blood supply to C.N.S

Human Physiology

Nervous system

- i) Elementary neuroanatomy
- ii) Neurons and Neuroglia
- iii) Properties of nerve fibers, synapse
- iv) Spinal cord
- v) Cerebral cortex
- vi) Pyramidal and extra pyramidal system
- vii) The cerebellum
- viii) Autonomic nervous system
- ix) Cerebrospinal fluid
- x) Cranial nerves

Pathology

1. General Pathology (cell injury, inflammation, repair, immune system)
2. Nervous System
 - i) Infection
 - Meningitis
 - Encephalitis
 - ii) Vascular Disease
 - Ischaemic encephalopathy
 - Cerebral infarction
 - Intracranial infarction
 - Intracranial hemorrhage
 - iii) Degenerative diseases
 - Alzheimer's disease
 - Huntington's disease
 - Parkinsonism
 - Motor neuron disease
 - iv) Demyelinating disease
 - Multiple sclerosis
 - v) The peripheral nervous system
 - Peripheral neuropathy
 - Acute idiopathic polyneuropathy
 - Diabetic neuropathy

Pharmacology

- i) Drugs used in pain
- ii) Local anesthetics
- iii) Steroids
- iv) Muscle relaxants
- v) Drugs acting upon Central and Autonomic nervous system
- vi) Topically acting drugs

Paper-3: Applied Basic Medical Sciences (Anatomy, Physiology, Pathology, Pharmacology) for M.P.T Cardiopulmonary

This course will enable the student to understand the applied aspect of the related specialty with the help of brief review of basic medical sciences.

Human Anatomy

1. Cardiovascular system

- i) Histological review
 - ii) Pericardium
 - iii) Heart
 - iv) Major vessels
 - v) Lymphatic System
 - vi) Vascular and Nerve Supply
- ### 2. Respiratory system

- i) Histological Review
- ii) Pleura
- iii) Lungs
- iv) Upper respiratory tract and tracheobronchial tree
- v) Vascular and Nervous Supply

Human Physiology

1. Cardiovascular system

- i) Structure and properties of heart
- ii) Cardiac cycle
- iii) The regulation of heart's performance
- iv) Cardiac output
- v) The arterial blood pressure
- vi) The physiology of vascular system
- vii) Lymphatic circulation

2. Respiratory System

- i) Functional anatomy
- ii) Ventilation and control of ventilation
- iii) Alveolar air
- iv) Regulation of breathing
- v) Pulmonary function test

Pathology

- i) General Pathology (cell injury, inflammation, repair, immune system)
- ii) Cardiovascular system
 - Rheumatic heart disease
 - Myocardial infarction
 - Atherosclerosis
 - Congenital heart diseases

Pharmacology

- i) Drugs used in pain

- ii) Local anesthetics
- iii) Steroids
- iv) Muscle relaxants
- v) Drugs acting upon Central and Autonomic nervous system
- vi) Tropically acting drugs
- vii) Drugs acting upon Cardiovascular system
- viii) Drugs acting upon Respiratory tract

Paper-4: Medical and Surgical Management of Musculoskeletal Conditions for M.P.T Musculoskeletal

This course provides the student with information on the epidemiology, pathomechanics, clinical features & medical and surgical management of musculoskeletal conditions. Surgical management, indications, contra-indications for surgery, precautions after surgery in these conditions.

Students will be able to use this information in planning and tailoring effective, specific, safe Physiotherapy treatment programmes.

Following are the topics to be included but not limited to:

1. GENERAL ORTHOPAEDICS
 - i) Metabolic Disorders of the Bone and Joints.
 - ii) Infectious Disorders of the Bone and Joints.
 - iii) Congenital Disorders of the Bone and Joints.
 - iv) Inflammatory Disorders of the Bone and Joints.
 - v) Degenerative disorders of the bones and joints
 - vi) Developmental disorders of bone and joints
 - vii) Myopathies
 - viii) Connective tissue disorders
 - ix) Neuromuscular Disorders
 - x) Bone and Joint Tumors
 - xi) Complex Regional Pain Syndromes
 - xii) Burns
2. Geriatric Care
 - i) Theories of ageing
 - ii) Examination and assessment of geriatric patient
 - iii) Pathological and physiological changes of ageing
 - iv) Disorders specific to ageing
3. Traumatology (Fractures, subluxations, dislocations and soft tissue injuries)
 - i) Trauma of the Upper Limb
 - ii) Trauma of the Lower Limb
 - iii) Trauma of the Spine
 - iv) Trauma of the Peripheral Nerves
4. Regional Orthopaedics

- i) Disorders of the Upper Limb
 - ii) Disorders of the Lower Limb
 - iii) Disorders of the Spine
5. Special surgical techniques:
- 1. Osteotomy
 - 2. Arthrodesis
 - 3. Arthroplasty
 - 4. Tendon transfers, repairs and grafting
 - 5. Nerve Suturing
 - 6. Soft-tissue release
 - 7. Spinal stabilization,
 - 8. Spinal Fusion
 - 9. Discectomy
 - 10. Laminectomy
 - 11. Re-attachment of limbs
 - 12. Ilizarov's techniques
6. Amputations
- 1. Classification
 - 2. Pre-operative, operative and prosthetic management
 - 3. Prevention and treatment of complications

Paper-4: Medical and Surgical Management of Sports Injuries for M.P.T Sports.
This course provides the study of the definition, terminologies, epidemiology, pathomechanics, clinical features, prevention, medical and surgical management of all sports injuries but not limited to the following. It will also enable the students to use this information in planning and tailoring effective, specific, safe Physiotherapy treatment programmes.

Medical Problems

1. Definitions and terminologies.
2. Medical problems of Athletes-fungal infections, viral infections, common cold, diarrhea, dysentery, T.B, amoebiasis etc...
3. Special consideration:
 - Female athlete-Sports amenorrhea, injury to female reproductive tract, menstrual asynchrony
 - Adolescent athlete
 - Disabled athlete
4. Emergency care, athletic first-aid, and cardiopulmonary resuscitation.
5. Sports Injuries –
 - Frequency and site of injury
 - Etiological factors
6. Prevention of Injury
7. Mechanism of injury
8. Role of teachers and coaches in prevention of injury
9. Physiology of sports rehabilitation.
10. Sports Specific Injury Pattern
11. Acute, Overuse Injuries and traumatic related to Cricket
12. Acute, Overuse Injuries and traumatic Injuries related to Judo
13. Acute, Overuse Injuries and traumatic Injuries related to Throw Ball
14. Acute, Overuse Injuries and traumatic Injuries related to Basket Ball
15. Acute, Overuse Injuries and traumatic Injuries related to Discus Throw
16. Acute, Overuse Injuries and traumatic Injuries related to Foot Ball
17. Acute, Overuse Injuries and traumatic Injuries related to Base Ball
18. Acute, Overuse Injuries and traumatic Injuries related to Bad Minton

19. Acute, Overuse Injuries and traumatic Injuries related to Tennis
20. Acute, Overuse Injuries and traumatic Injuries related to Gymnastics
21. Acute, Overuse Injuries and traumatic Injuries related to Javelin
22. Sports Injuries of Upper limb
23. Sports Injuries of Lower limb
24. Sports Injuries of the spine
25. Sports Injuries of head and neck
26. Internal and External bleeding

Paper-4: Medical and Surgical Management of Neurological Conditions for
M.P.T Neurology

This course provides the student with information on the epidemiology, pathomechanics, clinical presentation and medical and surgical management in sports related injuries

Students will be able to use this information in planning and tailoring effective, specific, safe Physiotherapy treatment programmes.

1. Congenital and hereditary disorders.
2. Head injury.
 - Comatose patient
 - Closed skull fractures
 - Haematomas, subdural, epidural and intracerebral
 - Open cranio-cerebral injuries
 - Reconstruction operations in head injuries
3. Disorders of spinal cord and cauda equina.
 - Acute traumatic injuries
 - Haematomyelia and acute central cervical cord injuries
 - Slow progressive compression of the spinal cord
 - Syringomyelia
 - Ischaemia and infarction of the spinal cord and cauda equina
 - Spina bifida
4. Disorders of cranial nerves
5. Disorders of peripheral nerves
 - Peripheral neuropathies
 - Causalgia
 - Reflex sympathetic dystrophy
 - Irradiation neuropathy
 - Peripheral nerves tumors
 - Traumatic, compressive and ischaemic neuropathy
 - Spinal radiculitis and radiculopathy
 - Hereditary motor and sensory neuropathy
 - Acute idiopathic polyneuritis/ chronic
 - Neuropathy due to infections
 - Vasculomoor neuropathy
 - Neuropathy due to systemic medical disorders
 - Drug induced neuropathy
 - Metal poisoning chemical neuropathies
6. Disorders of muscle
 - The myotonic disorders
 - Inflammatory disorders of the muscle
 - Myasthenia gravis
 - Endocrine and metabolic myopathies
 - Muscular dystrophy
7. Cerebellar disorders
 - Ataxia
 - Motor neuron disease
8. Demyelinating disorders

- Multiple sclerosis
 - Diffuse sclerosis
9. Deficiency and nutritional disorders
 - Deficiency of vitamins and related disorders
 - Other nutritional neuropathies
 10. Disorders of cerebral circulation- Stroke
 11. Infectious disorders
 - Meningitis
 - Encephalitis
 - Brain abscess
 - Syphilis
 - Herpes simplex
 - Chorea
 - Poliomyelitis
 - Tuberculosis
 - Transverse myelitis
 12. Disorders of the vestibular system
 13. Extra pyramidal disorders
 - Parkinsonism
 - Balance disorders
 14. Epilepsy, dementia, Alzheimer's
 15. Development of child-Weight, height, circumference measurement related to age in normal child, developmental milestones, neonatal reflexes, factors influencing growth and development, types of body built, physical examination of the child, growth patterns
 16. Nutrition and immunization of a normal child- normal nutritional requirement of a child, infant feeding, prevention of nutritional disorders, immunization
 17. General principles of neurosurgery
 18. Tumors
 - Tumors of cranial bones
 - Meningiomas
 - Tumors in spinal cord
 - Intra-cranial tumors
 - Other space-occupying lesions
 19. Intracranial abscess
 20. Hydrocephalus
 21. Vascular disease of the brain
 - Aneurysms
 - Thrombosis
 22. Stereo tactic surgery
 23. Cerebral malformations
 24. Operations o the discs-cervical and lumbar disc operations
 25. Malformations of the spine and spinal cord
 26. Lumbar and cisternal punctures technique and complication
 27. General rules of surgical repair of the peripheral nerves
 28. Muscle lengthening / release operations
 29. Spasticity reductions
 30. Intensive Care Unit management of the neurologically Impaired Patient

Paper-4: Medical and Surgical Management of Cardiopulmonary Conditions for M.P.T Cardiopulmonary.

This course provides the student with information on the epidemiology, pathomechanics, clinical presentation and medical and surgical management in disorders of the cardiovascular system.

Students will be able to use this information in planning and tailoring effective, specific, safe Physiotherapy treatment programmes.

CARDIOLOGY.

1. Assessment of system of heart disease
2. Disorders of cardiac rate rhythm and conduction
3. Cardiac Arrest
4. Cardiac Failure
5. Shock
6. Rheumatic fever
7. Congenital Heart Diseases
8. Disease of Heart Valves
9. Infective endocarditis
10. Ischemic heart disease
11. Hypertension
12. Orthostatic hypertension
13. CPR
14. Pericarditis
15. Heart disease in pregnancy
16. Degenerative arterial Disease
17. Inflammatory arterial disease
18. Raynaud's Disease
19. Venous Thrombosis
20. Peripheral Vascular Disease
21. Cardiomyopathy
22. Diseases of the pericardium

Pulmonology

1. Obstructive Pulmonary Diseases
2. Infections of the respiratory System
3. Interstitial and Infiltrative Pulmonary Diseases
4. Pulmonary Diseases due to Exposure to Organic and Inorganic Pollutants

5. Pulmonary Disorders due to Systemic Inflammatory disease
6. Pulmonary Vascular disease
7. Diseases of The Pleura
8. Respiratory Failure
9. Supplementary Oxygen and Oxygen Delivery Devices in chronic Respiratory disease
10. Neuromuscular and Skeletal disorders leading to Global alveolar Hypoventilation, Myopathies, Spinal muscular Atrophies, Poliomyelitis, Motor Neuron Diseases, Kyphoscoliosis, Pectus carinatum, Pectus Excavatum
11. Pathophysiology of Paralytic-Restrictive Pulmonary Syndromes
12. Conventional Approaches to Managing Neuromuscular Ventilatory Failure
13. Mechanical Ventilation: Concepts, Physiological effects and Complications

Cardiothoracic Surgeries

1. Closed versus Open Heart Surgeries
2. Incisions
3. Preoperative Assessment of Patients
4. Pre and Post Operative Blood Gas Exchange
5. Haemodynamics Performance Of CTVS Patient
6. Emergencies in CTVS
7. AV Shunts
8. Heart Transplant
9. Left Ventricular Assistive Devices
10. Procedure on Sternum, Chest Wall, Diaphragm, Mediastinum and Oesophagus
11. Cardiopulmonary Bypass
12. Maintaining and Removing Artificial Airways
13. All Pulmonary Surgeries like Lobectomy, Pneumonectomy, Pleurectomy, Thoracotomy etc.

Paper-5: Biostatistics and Research Methodology

Students will be provided an understanding of statistical measures used in the analysis and interpretation of research data. Information on research design and their implementation will be provided. This course will enable the student to read and critique research articles and understand and apply the principles of research to perform a guided research as part of their course requirement

Research Methodology

1. How to read and critique research
2. Introduction to research: framework, levels of measurement, variables
3. Basic research concepts: validity and reliability
4. Design, instrumentation and analysis for qualitative research
5. Design, instrumentation and analysis for quantitative research
6. Design, instrumentation and analysis for quasi-experimental research
7. How to write a research proposal
8. The use and protection of human and animal subjects

Biostatistics

9. Descriptive and inferential statistics
 10. Types of data: qualitative and quantitative
 11. Frequency distribution
 12. Describing data and graphs
 13. Describing data with averages: mode, median and mean
 14. Describing variability: variance, standard deviation
 15. Normal distribution
 16. Interpretation of r
 17. Hypothesis testing
 18. Tests
 19. ANOVA
 20. Probability
 21. Type I and Type II errors
 22. Parametric and non-parametric tests
- Simple statistical analysis using available software

Paper-6: Practicals

Students will be judged on one elective and one non-elective case. They will be expected to assess, diagnose and plan effective treatment plan for both the cases

Paper-7: Seminars on Clinical Issues

These will serve as platform for students to integrate various components of patient management and debate contentious issues on the efficacy of physiotherapy techniques. Students will give presentations on topic provided to them.

Clinical Practice

Students will engage in clinical practice in hospital based medical and physiotherapy departments/ settings to enhance their clinical skills and apply contemporary knowledge gained during teaching sessions

SECOND M.P.T EXAMINATION

Paper-1: Assessment and Diagnosis in Musculoskeletal Conditions for M.P.T Musculoskeletal

1. Orthopaedic Assessment
 - i) Patient History
 - ii) Observation
 - iii) Examination-Active and Passive Movements, Functional Assessment, Special Tests, Reflexes and Cutaneous Distribution, Joint Play Movements, Palpation
 - iv) Posture-Normal and Abnormal, Spinal Deformities
 - v) Disability Evaluation
 - vi) Assessment of Amputee
 - vii) Examination and assessment of geriatric patient
 - viii) Examination and assessment of upper limb & lower limb
 - ix) Examination & assessment of spinal injuries
2. Regional Examination with Special Emphasis on Special Tests:
 - i) Head and Face
 - ii) Cervical spine
 - iii) Shoulder
 - iv) Elbow
 - v) Forearm, Wrist and Hand
 - vi) Thoracic Spine
 - vii) Lumbar Spine
 - viii) Pelvis
 - ix) Hip
 - x) Knee
 - xi) Lower Leg, Ankle and Foot
3. Orthopaedic Diagnosis (for practical purposes only)
 - i) Biomechanical measurements-Limbs and Spine
 - ii) Hematology and Serology
 - iii) Biopsy
 - iv) Plain Radiography
 - v) Contrast Radiography
 - vi) Myelography
 - vii) Radioactive Scanning
 - viii) Discography
 - ix) Tomography
 - x) Magnetic Resonance Imaging
 - xi) Arthroscopy
 - xii) Electromyography, Nerve Conduction Velocity, Strength Duration Curve
 - xiii) BMD- Bone Densitometry-Ultrasound densitometer and Dual Energy X-Ray Absorptiometry(DEXA)
4. Differential Diagnosis of Common Orthopaedic Conditions

SECOND M.P.T EXAMINATION

Paper-1: Assessment and Diagnosis in Sports Injuries for M.P.T Sports.

1. Assessment

- i) Patient History
- ii) Observation
- iii) Examination-Active and Passive Movements, Functional Assessment, Special Tests, Reflexes and Cutaneous Distribution, Joint Play Movements, Palpation
- iv) Immediately after injury
- v) Acute stage
- vi) Chronic stage
- vii) Rehabilitation stage
- viii) Emergency Sports Evaluation
- ix) Biomechanics of running, jumping

2. Regional Examination with Special Emphasis on Special Tests:

- i) Head and Face
- ii) Cervical spine
- iii) Shoulder
- iv) Elbow
- v) Forearm, Wrist and Hand
- vi) Thoracic Spine
- vii) Lumbar Spine
- viii) Pelvis
- ix) Hip
- x) Knee
- xi) Lower Leg, Ankle and Foot

3. Sports Medicine Diagnosis (for practical purposes only)

- i) Biomechanics measurements-Limbs and Spine
- ii) Serology
- iii) Biopsy
- iv) Plain Radiography
- v) Contrast Radiography
- vi) Myelography
- vii) Radioactive Scanning
- viii) Discography
- ix) Tomography
- x) Magnetic Resonance Imaging
- xi) Arthroscopy
- xii) Electromyography, Nerve Conduction Velocity, Strength Duration Curve

- xiii) BMD- Bone Densitometry-Ultrasound densitometry and Dual Energy X-Ray Absorptiometry (DEXA)
4. Differential Diagnosis of Common Sports Injuries Conditions

SECOND M.P.T EXAMINATION

Paper-1: Assessment and Diagnosis in Neurological Conditions for M.P.T
Neurology

This course will enable the students to understand the basic assessment and diagnostic techniques in Neurological conditions and this will be used by the students in planning and tailoring effective, specific and safe Physiotherapy treatment program

1. Neurological assessment
 - i) Neurological History
 - ii) General observation and order of procedure.
 - iii) Mental function Examination, Mental status examination
 - iv) Language and motor speech
 - v) Central nerves examination
 - vi) Tone, Coordination abnormal involuntary movement, Gait and station, Muscles eyes, Response to muscle percussion, reflexes (superficial and deep developmental) posture
 - vii) Sensory examination
 - viii) Autonomic functions.
 - ix) Cerebellar function tests.
 - x) Clinical examination of all neurological problems
2. Neuro diagnosis (for practical purposes only)
 - i) Plain roentgenography.
 - ii) Myelography.

- iii) Cerebral angiography.
 - iv) Computer tomography.
 - v) M.R.I (Magnetic resonance imaging)
 - vi) MRI angiography
 - vii) Radio nucleide imaging
 - viii) Neurophysiology-Electro encephalography electromyography, nerve conduction studies
 - ix) Examination of CSF
 - x) Other special techniques in Neuro diagnosis.
3. Differential diagnosis in neurological conditions

SECOND M.P.T EXAMINATION

**Paper-1: Assessment and Diagnosis in Cardiopulmonary Conditions for M.P.T
Cardiopulmonary**

This course provides the students with information on assessment procedures and relevant diagnostic tests in cardio-pulmonary conditions, which the students will use in planning and tailoring effective specific safe physiotherapy treatment programs.

1. Cardio-pulmonary assessment
 - i) History taking
 - ii) Observation
 - iii) Palpation
 - iv) Auscultation
 - v) Percussion
 - vi) Functional ability
2. Relevant diagnosis tests (for practical purposes only)
 - i) Hematology
 - ii) ABG Analysis
 - iii) Spirometry
 - iv) Invasive and Non-invasive techniques
 - v) ECG
 - vi) Echocardiography
 - vii) Imaging
 - Plain X-ray
 - Computed Tomography
 - Magnetic resonance imaging
 - viii) Cardiac catheterization
 - ix) Radio nuclide scanning
 - x) Stress testing
 - xi) Lung function Testing
 - xii) Biofeedback
 - xiii) Humidification and Aerosol Therapy
3. Differential Diagnosis in different cardiopulmonary conditions

**Paper-2: Physiotherapy Management –I in Musculoskeletal Conditions for M.P.T
Musculoskeletal**

This course will enable the student to have an understanding of the various orthopaedic disorders and their physiotherapy management encountered in clinical practice and the limitations imposed by the same.

- Introduction
- Congenital deformities
 - Upper limb congenital anomalies
 - Lower limb congenital anomalies
 - Spine
- Developmental disorders of the bones
 - Cartilage dysplasia
 - Bony dysplasia
- Metabolic Conditions affecting bones and joints:
 - Parathyroid bone diseases (osteoporosis, algodystrophy, heterotopic ossification)
 - Osteomalacia and Rickets
 - Scurvy
- Infections of the bones and joints:
 - Osteomyelitis
 - Infective Arthritis
 - Tuberculosis
- Connective tissue disorders:
 - Rheumatoid Arthritis

- Ankylosing Spondylitis
- Psoriatic arthritis
- Scleroderma
- Dermato-myositis
- Geriatric Care
 - Theories of ageing
 - Examination and assessment of geriatric patient
 - Pathological and physiological changes of ageing
 - Disorders specific to ageing
- Regional Orthopaedics: Classification, Clinical features, pathogenesis, complications and management of-
 - Shoulder
 - Elbow
 - Wrist & hand
 - Spine
 - Hip
 - Knee
 - Ankle & foot.
- Proprioceptive Neuro-Muscular Facilitation (P.N.F)

Paper-2: Physiotherapy management –I in Sports Injuries for M.P.T Sports

This course provides the student with information on the sports psychology, sports injuries related miscellaneous issues. This will enable the students to use this information in planning and tailoring effective, specific, safe Physiotherapy treatment programmes.

Sports Psychology:

1. Definitions and terminologies

1. Role of sports psychology in sports performance
2. Instincts: killer instincts, drives and motives
3. Attention, interests and motivation
4. Personality of sports person: types, dynamic nature, factors affecting personality development, characteristics.
5. Role of Sports in Development in Personality.
6. Learning relation to sports
 - i) Nature and meaning of learning and maturation
 - ii) Characteristics of learning
 - iii) Laws of learning maturation
 - iv) Transfer of training
7. Emotions in Sports:
 - i) Characteristics of emotion
 - ii) Controlling and training of emotion
 - iii) Sentiments: types, importance and formation
8. Mental Health
 - i) Concepts, meaning and importance
 - ii) Characteristics of mentally healthy person / athlete
9. Role of Physical education in promotion of Mental Health
10. Factors affecting Growth and Development
 - i) Role of heredity
 - ii) Character of growth
 - iii) Heredity in relation to environment
11. Different stages of Physical, Mental, Social and Emotional Development.

12. Group behaviors and leadership in sports
 - (i) Nature of group behaviors
 - (ii) Types, quality, training and functioning of leadership
13. Anxiety, model stress and its implication on sports performance
 - (i) Isolated training
 - (ii) Sudden change in opponent
 - (iii) Audience stresses
 - (iv) Strategy changes
 - (v) Cognitive stress modeling
14. Contemporary stress reduction strategies
 - i) Biofeedback

- ii) Mental coping strategies
- iii) Visual imagery
- iv) Meditation and Yoga
- 15. Performance factors
 - i) Stress and performance
 - ii) Motivation and performance
- 16. Anthropometry
- 17. Protective Equipment Considerations
- 18. Emergency care.
- 19. Sports Techniques.
 - a) Sports Massage and Soft Tissue manipulations
 - b) Splinting, Taping and Bandaging: techniques, indications and contraindications
 - c) Balance, Coordination and P.N.F Techniques
 - d) Hydrotherapy
 - e) Jacuzzi
 - f) Sauna baths and spas
 - g) Moist Heat chambers
 - h) Hot showers
- 20. Health Club and Fitness centers: use and misuse of equipment
- 21. Instrumentation in Sports training and rehabilitation:
 - Isokinetics Exerciser
 - Treadmill
 - Ergo meter: upper and lower limb
 - Body fat analyzer
 - Force Platform
 - Motion Analyzer
 - Cardio-Respiratory Evaluation apparatus
- 22. Prevention and Rehabilitation of Heart attack
- 23. Role of Physiotherapy exercises in High Blood Pressure athlete
- 24. Role of Physiotherapy exercises in Diabetic athlete.
- 25. Role of Physiotherapy in different medical conditions
- 26. Physiology of sports rehabilitation.
- 27. Special Exercise programme for sports person

Paper-2: Physiotherapy management –I in Neurological Conditions for M.P.T
Neurology

This course provides students with the epidemiology, pathomechanics, clinical feature presentation, relevant diagnostic tests, medical management and principles of physiotherapy management of disorder of the nervous system. Through lectures, clinical presentation, case conferences, journal discussion and class discussion students will be able to set up a treatment program tailored to the patient's need. Following are the topics to be included but not limited to:

1. Congenital and hereditary disorders.
2. Disorders of spinal cord and cauda equina.
 - Haematomyelia and acute central cervical cord injuries
 - Slow progressive compression of the spinal cord
 - Syringomyelia
 - Ischaemia and infarction of the spinal cord and cauda equina
 - Spina bifida
3. Disorders of cranial nerves
4. Disorders of peripheral nerves
 - Peripheral neuropathies
 - Causalgia
 - Reflex sympathetic dystrophy
 - Irradiation neuropathy
 - Compressive and ischaemic neuropathy
 - Spinal radiculitis and radiculopathy
 - Hereditary motor and sensory neuropathy
 - Acute idiopathic polyneuritis/ chronic
 - Neuropathy due to infections
 - Vasculomoor neuropathy
 - Neuropathy due to systemic medical disorders
 - Drug induced neuropathy
 - Metal poisoning chemical neuropathies
5. Disorders of muscle
 - The myotonic disorders
 - Inflammatory disorders of the muscle
 - Myasthenia gravis
 - Endocrine and metabolic myopathies
 - Muscular dystrophy
6. Cerebellar disorders
 - Ataxia
 - Motor neuron disease
7. Demyelinating disorders
 - Multiple sclerosis

- Diffuse sclerosis
8. Deficiency and nutritional disorders
 - Deficiency of vitamins and related disorders
 - Other nutritional neuropathies
 9. Disorders of cerebral circulation- Stroke
 10. Infectious disorders
 - Meningitis
 - Encephalitis
 - Brain abscess
 - Syphilis
 - Herpes simplex
 - Chorea
 - Poliomyelitis
 - Tuberculosis
 - Transverse myelitis
 11. Disorders of the vestibular system
 12. Extra pyramidal disorders
 - Parkinsonism
 - Balance disorders
 13. Epilepsy, dementia, Alzheimer's
 14. Development of child-Weight, height, circumference measurement related to age in normal child, developmental milestones, neonatal reflexes, factors influencing growth and development, types of body built, physical examination of the child, growth patterns
 15. Nutrition and immunization of a normal child- normal nutritional requirement of a child, infant feeding, prevention of nutritional disorders, immunization
 16. Neuro-developmental techniques
 17. Principles and techniques of MRP
 18. Principles and techniques of PNF
 19. Motor control and learning
 20. Balance and coordination
 21. Assessment and management of pain
 22. Group exercises
 23. Physiotherapy in home setting.
 24. Biofeedback
 25. Usage and critical analysis of exercises and electro-therapeutic modalities
 26. Disability evaluation.

Paper-2: Physiotherapy Management-I in Cardiopulmonary Conditions for M.P.T
Cardiopulmonary.

This course provides students with information on the management of the following conditions using the principles of management

CARDIOLOGY

1. Assessment of system of heart disease
2. Disorders of cardiac rate rhythm and conduction
3. Cardiac Arrest
4. Cardiac Failure
5. Shock
6. Rheumatic fever
7. Congenital Heart Diseases
8. Disease of Heart Valves
9. Infective endocarditis
10. Ischemic heart disease
11. Hypertension
12. Orthostatic hypertension
13. C.P.R
14. Pericarditis
15. Heart disease in pregnancy
16. Degenerative arterial Disease
17. Inflammatory arterial disease
18. Raynaud's Disease
19. Venous Thrombosis
20. Peripheral Vascular Disease
21. Cardiomyopathy
22. Diseases of the pericardium

Pulmonology

1. Obstructive Pulmonary Diseases
2. Infections of the respiratory System
3. Interstitial and Infiltrative Pulmonary Diseases
4. Pulmonary Diseases due to Exposure to Organic and Inorganic Pollutants
5. Pulmonary Disorders due to Systemic Inflammatory disease
6. Pulmonary Vascular disease
7. Diseases of The Pleura
8. Respiratory Failure
9. Supplementary Oxygen and Oxygen Delivery Devices in chronic Respiratory disease
10. Neuromuscular and Skeletal disorders leading to Global alveolar Hypoventilation, Myopathies, Spinal muscular Atrophies, Poliomyelitis, Motor Neuron Diseases, Kyphoscoliosis, Pectus carinatum, Pectus Excavatum
11. Pathophysiology of Paralytic-Restrictive Pulmonary Syndromes
12. Conventional Approaches to Managing Neuromuscular Ventilatory Failure
13. Mechanical Ventilation: Concepts, Physiological effects and Complications

Paper-3: Physiotherapy management –II in Musculoskeletal Conditions for M.P.T Musculoskeletal

This course will enable the student to have an understanding of the various orthopaedic disorders and their physiotherapy management encountered in clinical practice and the limitations imposed by the same.

- Bone Tumors
 - Benign neoplasms
 - Malignant neoplasms
 - Metastatic neoplasms
- Traumatology:
 - Types of fractures, subluxations and dislocations; symptoms, principles of management; prevention and treatment of complications; healing process, functional bracing
 - Soft tissue injuries
 - Upper limb, lower limb and spine fracture
 - Polytrauma (nerve and vascular injuries)
- Amputations
 - Classification
 - Pre-operative, operative and prosthetic management
 - Prevention and treatment of complications
- Peripheral Nerve Injuries:clinical features and management including reconstructive surgeries
 - Radial nerve palsy
 - Median nerve palsy
 - Ulnar nerve palsy
 - Sciatic nerve lesion
 - Lateral popliteal lesion
 - Brachial plexus injuries- Erb's, Klumpke's and Crutch Palsy
- Neuromuscular diseases:
 - Cerbral palsy

- Poliomyelitis
- Muscular Dystrophies
- Leprosy
- Special surgical techniques:
 - Osteotomy
 - Arthrodesis
 - Arthroplasty
 - Tendon transfers, repairs and grafting
 - Nerve Suturing
 - Soft-tissue release
 - Spinal stabilization,
 - Spinal Fusion
 - Discectomy
 - Laminectomy
 - Re-attachment of limbs
 - Illizarov's techniques
- Advanced Manual Therapy: Demonstration and use of the following Manual Therapy
 - i) Cyriax
 - ii) Maitland
 - iii) Mulligan
 - iv) Butler
 - v) Keltenborn
 - vi) Nerve mobilization.
 - vii) Muscle Energy techniques
 - viii) Positional stretch
 - ix) Myofascial release.
 - x) Positional Release Therapy

Paper-3: Physiotherapy Management –II in Sports Injuries for M.P.T Sports

This course will enable the students to get the information and tailor make the aims, objectives, safe, effective and efficient treatment and rehabilitation program using the biomechanical principles for all the sports injuries as mentioned but not limited to:

1. Bio Mechanics & injuries related to Cricket
2. Bio Mechanics & injuries related to Judo
3. Bio Mechanics & injuries related to Throw Ball
4. Bio Mechanics & injuries related to Basket Ball
5. Bio Mechanics & injuries related to Discus Throw
6. Bio Mechanics & injuries related to Foot Ball
7. Bio Mechanics & injuries related to Base Ball
8. Bio Mechanics & injuries related to Bad Minton
9. Bio Mechanics & injuries related to Tennis
10. Bio Mechanics & injuries related to Gymnastics
11. Bio Mechanics & injuries related to Javelin
12. Bio-mechanics & injuries related to swimming
13. Bio-mechanics & injuries related to jumping sports
14. Bio-mechanics & injuries related to track & field sports (athletics, soccer, hockey, etc)
15. Sports Injuries of Upper limb
16. Sports Injuries of Lower limb
17. Sports Injuries of the thorax, spine
18. Sports Injuries of head and neck
19. Advanced Manual Therapy: Demonstration and use of the following Manual Therapy

 Cyriax

 Maitland

 Mulligan

 Butler

 Keltenborn

 Nerve mobilization.

 Muscle Energy techniques

 Positional stretch

 Myofascial release.

 Positional Release Therapy

Paper-3: Physiotherapy Management-II in Neurological Conditions for M.P.T
Neurology

This course provides the student with the information of the Neuro-surgical conditions, indications, contra-indications for surgery, precautions after surgery, surgical management and planning, tailoring effective, safe physiotherapy treatment of the following topics but not limited to:

1. General principles
2. Tumors
 - Tumors of cranial bones
 - Meningiomas
 - Tumors in spinal cord
 - Intra-cranial tumors
 - Other space-occupying lesions
3. Head injury.
 - Comatose patient
 - Closed skull fractures
 - Haematomas, subdural, epidural and intracerebral
 - Open cranio-cerebral injuries
 - Reconstruction operations in head injuries
4. Disorders of spinal cord and cauda equina.
 - Acute traumatic injuries
5. Disorders of peripheral nerves
 - Peripheral nerves tumors
 - Traumatic neuropathy
6. Intracranial abscess
7. Hydrocephalus
8. Vascular disease of the brain
 - Aneurysms
 - Thrombosis
9. Spinal Surgeries
 - Disc operations-cervical, thoracic, lumbar and sacro-coccygeal
 - Stenosis
 - Edema, abscess
 - Lumbar puncture
10. Neuromuscular Disorders (surgical management)
 - Cerebral Palsy
 - Poliomyelitis
 - Surgeries in leprosy
11. Stereo tactic surgery
12. Cerebral malformations
13. Operations o the discs-cervical and lumbar disc operations
14. Malformations of the spine and spinal cord
15. Lumbar and cisternal punctures technique and complication
16. General rules of surgical repair of the peripheral nerves
17. Muscle lengthening / release operations
18. Spasticity reductions

19. Intensive Care Unit management of the neurologically Impaired Patient

**Paper-3: Physiotherapy Management-II in Cardiopulmonary Conditions for M.P.T
Cardiopulmonary**

Cardiothoracic Surgeries

- (ii) Closed versus Open Heart Surgeries
- (iii) Incisions
- (iv) Preoperative Assessment of Patients
- (v) Pre and Post Operative Blood Gas Exchange
- (vi) Haemodynamics Performance Of CTVS Patient
- (vii) Emergencies in CTVS
- (viii) AV Shunts
- (ix) Heart Transplant
- (x) Left Ventricular Assistive Devices
- (xi) Procedure on Sternum, Chest Wall, Diaphragm, Mediastinum and
Oesophagus
- (xii) Cardiopulmonary Bypass
- (xiii) Maintaining and Removing Artificial Airways
- (xiv) All Pulmonary Surgeries like Lobectomy, Pneumectomy, Pleurectomy,
Thoracotomy etc.

Paper-4 Professional Development

This course will provide students information on improving their teaching skills in the classroom and clinical settings, basic issues of management to assist the practitioner in efficiently addressing issues related to the organization and administration of the physiotherapy department.

1. Concepts of Teaching And Learning
 - i) Meaning and Scope of Educational Psychology
 - ii) Meaning and Relationship between Teaching and Learning
 - iii) Learning Theories
 - iv) Dynamics of Behavior
 - v) Individual Differences

2. Curriculum
 - i) Meaning and Concepts
 - ii) Basis of Curriculum Formulation Development
 - iii) Framing Objectives for Curriculum
 - iv) Process of Curriculum Development and Factors Affecting Curriculum Development
 - v) Evaluation of Curriculum

3. Method and Techniques of Teaching
 - i) Lecture, Demonstration, Discussion, Seminar, Assignment, Project and Case Study.

4. Planning for Teaching
 - i) Bloom's Taxonomy of Instructional Objectives, Writing Instructional Objectives in Behavioral terms.
 - ii) Unit planning and Lesson planning.

5. Teaching Aides
 - i) Types of Teaching Aides
 - ii) Principles of Selection, Preparation, & Use of Audio-Visual aides.

6. Measurement and Evaluation
 - i) Nature of Educational Measurement: Meaning, Process, and Types of Tests.

- ii) Construction of an Achievement Test and its Analysis Standardized Test
 - iii) Introduction of some Standardized tools, Important Tests of Intelligence, Aptitude, Personality.
 - iv) Continuous and Comprehensive Evaluation
7. Guidance and Counseling
- i) Meaning and Concepts of Guidance and Counseling
 - ii) Principles
 - iii) Guidance and Counseling Services for Students and Faculty members
 - iv) Faculty Development and Development of Personnel for Physiotherapy Services
8. Clinical education
- i) Awareness and guidance to the common people about health diseases and available professional services.
 - ii) Patient education
 - iii) Education of the practitioners
9. Functions of management
10. Management process: planning, organization, direction, controlling, and decision-making.
11. Personnel management: staffing, recruitment selection, performance appraisal, collective bargaining, discipline, and job satisfaction.
12. Quantitative methods of management: relevance of statistical and / or techniques in management.
13. Marketing: marketing segmentation, marketing research production, planning pricing, and channels of distribution, promotion, consumer behavior and licenser.
14. Total Quality Management: basis of quality management, quality assurance program in hospitals, medical audit and international quality systems.
15. Hospital as an organization: functions and types of hospitals selected, clinical supportive and ancillary staff of the hospital, emergency department, nursing, physical medicine and rehabilitation, clinical laboratory, pharmacy and dietary department.
16. Roles of physiotherapist, physiotherapy director, physiotherapy supervisor, physiotherapy assistant, physiotherapy aide, occupational therapist, home health aide and volunteer.
17. Direct care and referral relationships and confidentiality.
18. Physiotherapy: definition and development
19. Implications and conformation to the rules of professional conduct.
20. Legal responsibility for their actions in the professional context and understanding the physiotherapist's liability and obligations in the case of medico-legal action.
21. Code of Ethics: wider knowledge of ethics relating to current social and medical policy in the provisions of health care.
22. Functions of relevant professional associations education body and trade union.

23. Role of the international health agencies such as the world health organizations
24. Standards of practice for physiotherapy
25. Current Issues.
26. Basics of Computers- Hardware and Software
27. Basic Computer Applications- Windows, MS Word, Excel, Power Point, etc.

Paper-5 Practicals

Students will be judged on one elective and one non-elective case. They will be expected to assess, diagnose and plan effective treatment plan for both the cases

Dissertation

As part of their requirement for the Master Degree the student is required to undertake a research study under the guidance of Guide and Co-guide. Research study must be selected only from the chosen specialization i.e. Musculoskeletal Conditions or Sports Injuries or Neurological Conditions or Cardio thoracic Conditions and to be studied on patients or normal individuals. Students have to undergo a dissertation viva-voce by examining committee.

Paper-6 Seminars on Clinical Issues

These will serve as platform for students to integrate various components of patient management and debate contentious issues on the efficacy of physiotherapy techniques. Students will give presentations on topic provided to them.

Clinical Practice

Students will engage in clinical practice in hospital based medical and physiotherapy departments/ settings to enhance their clinical skills and apply contemporary knowledge gained during teaching sessions.

DEPARTMENT OF PARAMEDICALS

DIPLOMA IN MEDICAL LABORATORY TECHNOLOGY (DMLT)

SYLLABUS

Basic knowledge of Anatomy, Physiology and Forensic medicine.
Training in Laboratory method,
Technique and management in the following subjects-

1) Laboratory management and Ethics, General laboratory techniques and use of apparatus, quality control, Basic Electricity & Electronics,

Lecture 50 hrs; practical 50 hrs

2) Anatomy, Physiology and Forensic medicine

Lecture 30 hrs; practical 30 hrs

3) Clinical Biochemistry

Lecture 141 hrs; practical 282 hrs

4) Microbiology

A) General microbiology - lecture 10 hrs; practical 20 hrs

B) Medical Microbiology- lecture 60 hrs; practical 123 hrs

c) Parasitology lecture 30 hrs; practical 60 hrs

d) Mycology lecture 10 hrs; practical 20 hrs

e) Virology lecture 10 hrs; practical 20 hrs

F) Immunology lecture 20 hrs; practical 40 hrs

5) Pathology

A) Haematology, lecture 30 hrs; practical 72 hrs

B) Clinical pathology lecture 35 hrs; practical 70 hrs

C) Blood banking lecture 35 hrs; practical 70 hrs

D) Histotechnology and cytology lecture 36 hrs; practical 70 hrs

6) In addition to the theory and practical classes, laboratory assignments in the different laboratories of the Medical college hospitals attached as follows

Biochemistry lab postings : 285 hrs

Microbiology lab postings : 285 hrs

Pathology lab postings : 285 hrs

Evaluation

i) At the end of Laboratory Assignment, each student brings a completion certificate and attendance percentage report from the medical officers concerned from the different laboratories of Medical college Hospital/Institute's Hospital

ii) Three Average Examinations (theory and practical) will be conducted in due course.

iii) Final examination at the end of IInd year.

Scheme of Examination:-

Number of Papers - Three (one each in Biochemistry, Pathology and Microbiology)

Duration of written examination - 3 hrs

Maximum marks - 100

Viva voc – maximum marks - 50

Practical - maximum marks - 150

Duration of examination

Biochemistry - 2 days

Microbiology - 3 days

Pathology - 2 days

Criteria for a pass in the subject

Minimum marks in theory - 45

Minimum marks in practical - 75

Minimum marks in average exam. - 20

Minimum marks for the subject - 200

Question paper

Biochemistry Section A§ion B

Microbiology including Parasitology Section A&B

Haematology,Clinical Pathology,Histopathology including Blood Banking Section A§ion B

Awarding of certificate

Second Class/Pass 50% or above

First class - 65% or above

Distinction - 75% or above

Supplementary examination

A supplementary examination will be conducted after 3 months for those failed in the subject/subjects.

Separate internal assessment examination will be conducted in theory and practical before the supplementary examination.

Eligibility criteria for appearing in the in the final examination

Minimum Attendance - 80%

Minimum Internal Assessment marks - 40%

Examiners

External Examiner 1

Internal Examiner 1

DEPARTMENT OF PARAMEDICALS

**DETAILED SYLLABUS
FOR
BMLT**

Under Graduate Degree Program

**BACHELOR OF SCIENCE
MEDICAL LABORATORY
TECHNOLOGY
(BMLT)**

(SEMESTER SYSTEM)

COURSE TITLE : BMLT

DURATION : 3 YEARS

TOTAL DEGREE MARKS : 4900

FIRST SEMESTER

COURSE TITLE	PAPER CODE	MARKS		
		Theory	Practical	Total
ANATOMY	BMLT –110	100	50	150
PATHOLOGY	BMLT – 120	100	100	200
BIOCEMISTRY	BMLT – 130	100	100	200
MICROBIOLOGY	BMLT –140	100	100	200
COMMUNICATION SKILLS	BMLT – 150	50	0	50
TOTAL				800

SECOND SEMESTER

COURSE TITLE	PAPER CODE	MARKS		
		Theory	Practical	Total
PHYSIOLOGY	BMLT – 210	100	50	150
PATHOLOGY	BMLT – 220	100	100	200
BIOCHEMISTRY	BMLT – 230	100	100	200
MICROBIOLOGY	BMLT – 240	100	100	200
COMPUTER SKILLS	BMLT – 250	50	0	50
TOTAL				800

THIRD SEMESTER

COURSE TITLE	PAPER CODE	MARKS		
		Theory	Practical	Total
ANATOMY	BMLT – 310	100	50	150
PATHOLOGY	BMLT – 320	100	100	200
BIOCHEMISTRY	BMLT – 330	100	100	200
MICROBIOLOGY	BMLT – 340	100	100	200
COMMUNICATION SKILLS	BMLT – 350	50	0	50
TOTAL				800

FOURTH SEMESTER

COURSE TITLE	PAPER CODE	MARKS		
		Theory	Practical	Total
PHYSIOLOGY	BMTL – 410	100	50	150
PATHOLOGY	BMTL – 420	100	100	200
BIOCHEMISTRY	BMTL – 430	100	100	200
MICROBIOLOGY	BMTL – 440	100	100	200
COMPUTER SKILLS	BMTL – 450	50	0	50
				TOTAL 800

FIFTH SEMESTER

COURSE TITLE	PAPER CODE	MARKS		
		Theory	Practical	Total
P.S.M.	BMLT – 510	100	50	150
PATHOLOGY	BMLT- 520	100	100	200
BIOCHEMISTRY	BMLT- 530	100	100	200
MICROBIOLOGY	BMLT – 540	100	100	200
COMMUNICATION SKILLS	BMLT – 550	100	0	100
				TOTAL 850

SIXTH SEMESTER

COURSE TITLE	PAPER CODE	MARKS		
		Theory	Practical	Total
LAB MANAGEMENT	BMLT – 610	100	50	150
PATHOLOGY	BMLT – 620	100	100	200
BIOCHEMISTRY	BMLT- 630	100	100	200
MICROBIOLOGY	BMLT – 640	100	100	200
COMPUTER SKILL	BMLT – 650	100	50	150
				TOTAL 900

6 month internship in any Hospital or Nursing Home

FIRST SEMESTER

BMLT – 110 ANATOMY

COURSE CONTENTS – THEORY

1) Introduction of Bones of the Human Body of :

- Upper Limb : clavicle, scapula, humerus, radius, ulna, carpus, metacarpus & phalanges
- Lower Limb : hipbone, femur, tibia, fibula, tarsus, metatarsus & phalanges
- Skull : name the bone of skull and sutures between them.
- Thorax : ribs and their articulations
- Vertebral Column : cervical, thoracic, lumbar, sacral and coccygeal vertebrae

2) Surface Markings of the Body :

- Nine regions of the abdomen
- Four quadrants of the Hip

3) Introduction of different Vital Organs :

A) Respiratory Organs :

- Nasopharynx
- Oropharynx
- Larynx
- Trachea
- Bronchi
- Lungs (and their lobular segments)
- Thoracic cavity
- Pleura and Pleural cavity

B) Circulatory Organs

- Anatomical position of the heart
- Pericardium of the heart
- Chambers of the heart
- Great vessels of the heart
- Valves of the heart

C) Digestive Organs :

- Tongue
- Teeth
- Oral cavity
- Pharynx
- Oesophagus
- Stomach
- Small intestine
- Stomach
- Small intestine
- Large intestine and its colons

PRACTICAL :

Labeled Diagrams of different organs and bones

Vivo

BMLT – 120 PATHOLOGY

COURSE CONTENTS –

1. The Cell in health and disease

- a. Introduction of pathology
- b. Cellular structure and metabolism
- c. Inflammation – Acute and Chronic
- d. Derangement of Body Fluids and Electrolytes
 - Types of shocks
 - Ischaemia
 - Infection
- e. Neoplasia – Etiology and Pathogenesis

2. Introduction of hematology

- a. Formation of Blood
- b. Erythropoiesis
- c. Leucopoiesis
- d. Thrombopoiesis
- e. Collection of Blood
- f. Anticoagulants
- g. Red cell count – Haemocytometer, Methods and Calculation
- h. WBC Count – Methods
- i. Differential Leucocytes Count (DLC) –
Morphology of White Cells, Normal Values
Romanowsky Stains : Staining procedures
Counting Methods, Principle of staining
- j. Hb estimation - Method
Colorimetric Method
Chemical Method
Gasometric Method
S. G. Method
Clinical Importance

Practical :

I.

- Collection of Sample
- Hb estimation
- TLC and DLC
- RBC Count
- Peripheral blood film – staining and study of Malarial Parasite

II. Laboratory management – Sample Collection, Labeling, Transport, Screening, Reporting and Dispatch of Reports.

BMLT – 130 BIOCHEMISTRY

COURSE CONTENTS :

1. Introduction of Biochemistry
2. Elementary knowledge of inorganic chemistry : - Atomic weight, molecular weight, equivalent weight, acid, bases.
3. Definition and preparation of solutions : - Percent solution, Molar solution, Normal solution and Buffer Solution etc.
4. Definition and preparation of Regent.
5. Unit of measurement
6. Elementary knowledge of organic chemistry
 - Organic compounds
 - Aliphatic and Aromatic
 - Alcohols, Aldehydes, Ketones, Amines, Esters, Phenol etc
7. pH indicators : pH paper, universal and other indicators, pH measurement : different methods.

Practical

Introduction and usage of Glassware and Instruments

Glassware :

- Composition of Glass
- General glass wares

Instruments :

- Balance
- Hot plate and Magnetic stirrer
- Centrifuges
- Incubators
- Constant temperature bath
- Colorimeter : Principle, Function
- Photometer
- Flame Photometry

BMLT – 140 MICROBIOLOGY

COURSE CONTENTS :

- I. Introduction and brief history of Microbiology
 - Historical Aspect
 - Relationship of Micro-organism to men
 - Micro-organism in Disease and Health
- II. Requirement and uses of common Laboratory Equipments
 - Incubator, Hot Air Oven, Water Bath

- Anaerobic Jar, Centrifuge, Autoclave
- Microscope

- Glassware – Description of Glassware, its use, handling and care

III. Sterilization :

- Definition
- Classification and General Principle of Sterilization
- Autoclave – its structure, functioning, control and indicator

IV. Antiseptics & Disinfectants

- Definition
- Types
- Mode of Action
- Uses

V. Collection, Transportation and processing of clinical samples for Microbiological investigations

Practical :

Demonstration of washing of instruments

BMLT-150 COMMUNICATION SKILL –I

(A) Instructions for the Paper setter:

The question paper will consist of five sections: A, B, C, D and E. Sections A, B, C and D will have

two questions from the respective sections of the syllabus and will carry 15% of the total marks (12

marks) each. Section E will consist of 10 short answer type questions, which will cover the entire syllabus uniformly and will carry 40% of the total marks (32 marks) in all.

(B) Instructions for the Candidates:

1. Candidates are required to attempt one question each from the section A, B, C and D of the question paper and the entire section E.

2. Use of non-programmable scientific calculator is allowed.

SECTION A

Basic Skills :- Listening, Speaking, Reading & Writing.

A Practical study of Grammatical Rules (Noun, Pronoun, Adjectives, Verb, Adverb)

Tenses :- Types of Tenses

SECTION B

Idioms & Phrases,

Confused words :- Paronyms, Homonyms

Synonyms, General Abbreviations,

One word Substitution

SECTION C

Simple present, progressive & present perfect, Simple past, progressive & Past perfect, Indication of

Futurity, the passive (Present & Past, Present & Past Perfect).

Reported Speech :-

(I) Declarative Sentences (II) Imperative

(III) Interrogative (Question) (IV) Active, Passive

(V) Preposition (VI) Articles

SECTION D

Writing Skills :-

Paragraph Writing, Composition Writing, Report Writing, Application & Letter Writing, Essay Writing.

Reference:

1. Tandon, R.C. Seth, R.R. Agarwal

2. V.K. Maheshwari - “English Grammar and Composition” Ratan Prakashan Mandir.

3. Sidhu, Prem & Kapoor “Collegiate English Grammar Composition & Translation” Khosla Publishing House.

SECOND SEMESTER

BMLT – 210 PHYSIOLOGY

COURSE CONTENTS

1. Cell :

- Definition
- Structure and functions the cytoplasmic Organelles
- Reproduction : Miosis, Mitosis

2. The important physico-chemical laws applied to physiology

- Diffusion
- Osmosis
- Bonding
- Filtration
- Dialysis
- Surface Tension
- Adsorption
- Colloid

3. Fundamentals of different Organ Systems

- Cardiovascular System
- Respiratory System
- Digestive System
- Excretory System
- Reproduction System
- Endocrine System
- Lymphatic System
- Practital

- Viva and diagrams of different Vital Organs

PRACTICAL

Viva and diagrams of different Vital Organs

BMLT – 220 PATHOLOGY

COURSE CONTENTS

I. Hematology :

- ESR
- Methods
- Factors – Affecting ESR
- Normal Values
- Importance
- RBC – Indices
- Platelets

II. Body Fluids :

- a) Urine :
 - Method of Collection
 - Normal Constituents
 - Physical Examination
 - Chemical Examination
- b) Stool Examination :
 - Method of Collection
 - Normal Constituents and appearance
 - Abnormal Constituents (Ova, Cyst)
- c) C.S.F. Examination
 - Physical Examination
 - Chemical Examination
 - Microscopy
 - Cell Count
 - Staining
- d) Semen Analysis
 - Collection
 - Examination
 - Special Tests

PRACTICAL :

- a) Urine, Stool, Semen and C.S.F. – Collection, Handling, Examinations
- b) Absolute Eosinophil Count, PCV, RBC indices, ESR Estimation, Platelet Count

BMLT – 230 BIOCHEMISTRY

COURSE CONTENTS

1. Aim and Scope of Biochemistry
2. Collection and Recording of Biochemical Specimen, separation of serum/plasma preservation and disposal of Biological material.
3. Chemical examination of urine : Qualitative, Sugar, Protein, Bile Salt, Bile Pigment, Ketones Bodies
4. chemical examination of Stool : Occult Blood.
5. Chemical examination of other Body Fluids : CSF, Pleural Fluid, Ascitic Fluid etc.
6. Laboratory management and Maintenance of Records.

PRACTICAL :

- Urine Examination Physical, Chemical, Microscopic, Biochemistry
- Stool Examination
- Body Fluids : Physical and chemical examination CSF, Pleural Fluid, and Ascitic fluid

BMLT – 240 MICROBIOLOGY

COURSE CONTENTS

Bacteriology

- Definition
- Bacteria – General characteristics of Bacteria
- Classification and morphology of Bacteria
- Structure of Cell, Capsule, Flagella, and Spore
- Growth of Bacteria
- Nutrition of Bacteria

Virology :

- Definition
- General Introduction of Virus
- Physiochemical characteristic of Viruses
- Diseases caused by different Virus and mode of infection

Parasitology :

- Definition
- General characteristics of Parasite
- Classification of Parasite
- Mode of transmission

Fungus

- Definition
- Structure

- Classification

PRACTICAL :

Staining – Type of Staining, Principal, Procedure and Interpretation

BMLT – 250 COMPUTER SKILL – A

A) Instructions for paper-setter

The question paper will consist of five sections A, B, C and D. Sections A, B and C will have two questions from the respective sections of the syllabus and will carry 15% marks

each. Section D will have 10-20 short answer type questions which will cover the entire syllabus uniformly and will carry 40% marks in all.

B) Instructions for candidates

1. Candidates are required to attempt one question each from sections A, B and C of the question paper and the entire section D.
2. Use of non-programmable scientific calculator is allowed.

SECTION A

Definition of Information Technology, Use of IT, Definition of information system, need of information system, definition of knowledge, Range of application : Scientific, business, educational, whether forecasting, and remote sensing, planning, e-commerce, web publishing, Management Information System, Decision Support System, inventory control, medical, industrial control, banks, railways, etc.

SECTION B

Computer Fundamentals: Block structure of computer, Characteristics of computers, Problem solving with computers, Generation of computers, Classification of computers.

SECTION C

Number System: Bit, Byte, Binary, Decimal, Hexadecimal, and Octal system, Conversion

from one system to the other, Error detecting codes, Representation of characters, Integers and fractions.

Binary Arithmetic: Addition, Subtraction and Multiplication.

Reference:-

1. D.H.Sanders, "Computers Today", McGraw Hill, 1988.
2. T.N. Trainer, "Computers" (4th Edition) McGraw Hill, 1994.
3. Kenneth C.Laudon, Jane P. Laudon "Management Information System"(7th Edition),
4. V. Rajaraman, "Fundamentals of Computers" (2nd Edition), Prentice Hall of India, New Delhi, 1996.
5. B. Ram, "Computer Fundamentals", Wiley, 1997.

THIRD SEMESTER

BMLT –310 ANATOMY

COURSE CONTENTS

A) Reproductive Organs :

- Male and Female Gonads : Testes, Epididymis, Ovary, Fallopian Tube, Uterus, Vagina etc.
- Introduction of male Genital Organs
- Introduction of female Genital Organs

B) Liver and Spleen :

- Introduction
- Anatomical position
- Gall bladder

C) Excretory Organs ;

- Cortex and medulla of Kidney
- Ureter
- Urinary Bladder
- Urethra (male and female)

D) Muscles :

- Introduction, Origin and Insertion, Function

PRACTICAL

Labeled Diagrams of different organs and bones

Vivo

BMLT –320 PATHOLOGY

COURSE CONTENTS

a) Human blood group antigens and antibodies

b) ABO Blood group systems

- Sub. – group
- Source of antigens and types of antibodies

c) Rh Blood group System

- Types of Antigen
- Mode of Inheritance
- Types of Antibodies

d) Other Blood group Antigens

e) Blood Collection

- Selection and screening of donor
- Collection of blood

- Various anticoagulants
- Storage of Blood.
- Changes in Blood on Storage

PRACTICAL :

Blood grouping
 Tube Method
 Slide Method

BMLT –330 BIOCHEMISTRY

COURSE CONTENTS

1. Carbohydrates : -

- Introduction
- Importance
- Classification
- Properties
- Estimation of Glucose
- Clinical Significance

2. Protein : -

- Introduction and Physiological importance
- Amino acids
- Essential amino acids
- Classification
- Denaturation of Proteins
- Estimation of Total protein, Albumin, Globulin, A/G Ratio

3. Introduction, Properties and function of important hormones

4. Enzymes and Co-enzymes

- Introduction and difference
- Functions
- Estimation of important enzymes
- i) SGOT (AST)
- ii) SGPT (ALT)
- iii) Alkaline Phosphatase
- iv) Acid Phosphatase
- v) Amylase, lactate dehydrogenase.
- vi) CPK, CPK-MB

PRACTICAL :

Method of estimation of glucose : Benedicts Reaction, Glucose oxidase Method
 Method of estimation of Protein, Albumin.

BMLT –340 MICROBIOLOGY

COURSE CONTENTS

Staining of Bacteria :

1. Composition and preparation of Staining
2. Principle and Procedure of Bacteriological stain
 - Gram's Stain
 - Ziehl-Neelsen Stain
 - Albert Stain
 - Spore and Negative Stain

Cultivation of Micro-organism :

- Introduction and uses of culture
- Classification of culture media
- Composition of common of Laboratory culture media
- Special media and preparations
- Techniques of inoculation and isolation
- Antimicrobial sensitivity
- Anaerobic cultivation techniques

Isolation of Viruses in Laboratory by tissue culture

- Cell and tissue culture technology
- Embryonated Egg
- Principles of animal cell culture and their use in Virology

Different staining techniques used in Virology

Principle of different serological test used in Virology

Mode of Transmission of Viral agents

Prevention of Viral disease

Immunity in Viral infection

PRACTICAL

1. Staining : ZN Staining of M. T. B. and M. Lepra, Albert Staining
2. Culture
 - Type of Media
 - Preparation
 - Inoculation
 - Colony Characteristic
 - Staining and Antibiotic Sensitivity

BMLT-350 COMMUNICATION SKILLS-II

A) Instructions for paper-setter

1. The question paper will consist five sections namely A, B, C, D and E.
2. Each of the sections A, B, C and D will contain two questions and candidates have to attempt at least one question compulsorily from each section. Each section carry 15% of the total marks
3. Section E will comprise of 10-15 short answers type questions, which will cover the entire syllabus and will carry 40% of the total marks.

B) Instructions for candidates

1. Candidates are required to attempt one question each from sections A, B, C and D of the question paper and the entire section E.
2. Use of non-programmable scientific calculator is allowed

SECTION A

1. Corresponding : (Official, Business And Personal)

One Letter from each category (Official, Business and Personal) may be set in the examination paper and the students be asked to write one of them.

SECTION B

2. Grammar

A brief review of easy form of tenses. Conversion of direct narration into indirect form of narration and vice versa (only simple sentences). Punctuation.

SECTION C

3. Essay

Preferably on scientific topic from the given outlines. The paper setter may be instructed to give a choice of attempting one out of three topics. The question paper may provide the outlines. The essay will be of 250 to 300 words. The examiner may select three topics one from each of the following.

- (i) Science
- (ii) Technology
- (iii) General.

SECTION D

Written Communication

report, notices, agenda notes, business correspondence preparation of summery & prices.

FOURTH SEMESTER

BMLT –410 PHYSIOLOGY

COURSE CONTENTS

1. Blood
 - Definition
 - Composition
 - Function

2. Formation of different type of blood Cells

- Erythrocytes
- Leucocytes
- Thrombocytes

3. Mechanism of Blood Clotting

4. Cerebrospinal Fluid

- Formation
- Composition
- Function

5. Special Senses

- Hearing
- Taste
- Smell
- Touch
- Sight

PRACTICAL :

Viva and diagrams of Corpuscles

BMLT – 420 PATHOLOGY

COURSE CONTENTS : IMMUNOLOGY AND SEROLOGY

Hormones -

- Thyroid Hormones
- Growth Mhormone
- Isulin

Glycosylated Hemoglobin

COOMB'S Test

- Direct and Indirect Test
- Titration of Antibody

HISTOPATHOLOGY (Theory and Practical)

a) Fixation of tissues

- Classification of Fixatives

b) Tissue Processing

- Collection
- Steps of fixation

c) Section Cutting

- Microtome and Knives
- Techniques of Section Cutting
- Mounting of Sections
- Frozen Sections

d) Decalcification

- Fixation
- Declearification
- End Point

e) Staining Dyes and their properties, H & E Stain, Special Stains

PRACTICAL :

- COOMB'S Test
- Anti D Titre

BMLT – 430 BIOCHEMISTRY**COURSE CONTENTS :**

1. Lipids : -

- Introduction and functions
- Classification
- Steroids
- Metabolism
- Estimation : Total lipids, HDL, LDL, VLDL, Total cholesterol, Triglyceride
- Clinical significance

2. Principal of Assay procedures for biological material and estimation of kidney function tests.

- Urea
 - Uric acid
 - Creatinine
3. Electrolytes :
- Function
 - Properties
 - Estimation of Essential electrolytes : Sodium, potassium, calcium, chloride and phosphorus etc.
 - Clinical Importance

4. Genetics

- DNA, RNA Structure
- Gene coding
- Transcription & Translation
- Genetic Disorders

PRACTICAL :

Method of estimation of urea

Method of estimation of Creatinine

Method of estimation of Cholesterol

BMLT – 440 MICROBIOLOGY**COURSE CONTENTS :**

I) Immunology

- Definition
- Immunity : Definition and Classification
- Antigen
- Antibodies – Immunoglobulin
- Antigen and antibody reaction and clinical importance
- Structure and function of immune system

- Immune response
- Hypersensitivity
- 2) i. Principle & procedure of Serological Tests.
 - BIDAL, CRP, Brucella, Agglutination, ASO
 - Cold agglutination, VDRL, TPHA
 - i) Advanced techniques in Microbiology ELISA, RIA etc
 - ii) Epidemiological Markers of Micro-organism serotyping
 - iii) Preparation & Standardization of Antigen and Antisera
 - iv) Preparation & Standardization of vaccine and immunization
- 3) i) General introduction, life cycle, mode of transmission, pathogenicity, and lab diagnosis of various Protozoa.
 - ii) Entamoeba Histolytica
 - iii) Entamoeba coli
 - iv) Giardia lamblia
 - v) Trichomonas Vaginalis
 - vi) Leishmania donovani
- 4) i) Sprozoa
 - Malaria Parasite
 - Toxoplasma Gondii
 - ii) Balatidium Coli
- 5) General introduction life cycle, mode of transmission, pathogenicity and lab diagnosis of various Helminths :
 - i) Cestodes or Tapeworms :
 - Taenia solium
 - Taenia sagnata
 - Hymenolepis nana
 - Echinococcus granulosus
 - ii) Trematodes of Flukes :
 - Fasciola hepatica
 - Fasciola gigantica
 - Gestrodiscoides hominis
 - iii) Nematodes :
 - Trichinella spiralis
 - Trichuris trichiura
 - Ancylostoma duodenale
 - Enterobjus vermicularis
 - Ascaris lumbricoides

PRACTICAL :

Demonstration :

Slide Agglutination

- VDRL
- VIDAL
- ASO
- CRP
- Stool Examination

- Physical
- Microscopic Demonstration of Ova, Cyst, Pus Cells
- Hanging Drop Examination

BMLT – 450 COMPUTER SKILL – B

A) Instructions for paper-setter

The question paper will consist of five sections A, B, C and D. Sections A, B and C will have two questions from the respective sections of the syllabus and will carry 15% marks each. Section D will have 10-20 short answer type questions which will cover the entire syllabus uniformly and will carry 40% marks in all.

B) Instructions for candidates

1. Candidates are required to attempt one question each from sections A, B and C of the question paper and the entire section D.
2. Use of non-programmable scientific calculator is allowed.

SECTION A

Internet - Evolution, Protocols, Interface Concepts, Internet Vs Intranet, Growth of Internet, ISP. Connectivity- Dial-up, Leased line, VSAT etc., URLs, Domain names, Portals. E-MAIL - Concepts, POP and WEB Based E-mail ,merits, address, Basics of Sending & Receiving, E-mail Protocols, Mailing List, Free Email services.

SECTION B

E-Commerce- An introductions, Concepts, Advantages and disadvantages, Technology in E- Commerce, Internet & E-business, Applications, Feasibility & various constraints. Etransition, challenges for Indian corporate.

SECTION C

Electronic Payment Systems: Introduction, Types of Electronic Payment Systems, Digital Token-Based, Electronic Payment Systems, Smart Cards and Electronic Payment Systems, Credit Card-Based Electronic Payment Systems, Risk and Electronic Payment Systems.

Internet Protocols- Data Transmission Protocols, Client/Server Architecture & its Characteristics, FTP & its usages. Telnet Concept, Remote Logging, Protocols, Terminal Emulation, Massage Board.

Reference:

1. A. Mansoor, "Internet and Web Design Made Easier", Pragya Publications.
2. V.K.Jain, "level Module - M 1.2 - Internet & web page designing" BPB Publications.
3. P.T. Joseph, S.J., "E-Commerce An Indian Perspective (Second Edition)", Prentice Hall of India
4. Alexis Leon and Mathews Leon, "Internet for Everyone", Vikas Publishing House Pvt. Ltd., New Delhi.
5. "Internet for Dummies", Pustak Mahal, New Delhi.

FIFTH SEMESTER

BMLT – 510 PREVENTIVE & SOCIAL MEDICINE

COURSE CONTENTS :

1. Concept of Health and Disease
 - Definition of Health
 - Positive Health
 - Concept of Well – being
 - Concep of Disease
 - Natural Hisotry of Disease
 - Concept of Prevention
2. Health Programs in India
 - National Vector Born Disease Program
 - National Anti Malaria Program
 - National Eradication Program
 - Revised National T. B. control Program
3. Brief information of national Rural Health Mission
4. Nutrition and Health
 - Carbohydrate
 - Vitamins
 - Protein
 - Minerals
 - Other trace elements
5. Environmental Health
6. Hospital Waste Mangement
 - Definition
 - Sources of healthcare waste
 - Healthcare waste generation
 - Health hazards of Healthcare Wastes
 - Treatment of Disposal Technologies for Healthcare Waste
7. Communication for Health Education
 - Definition
 - The communicate rocess
 - Type of Communication
 - Health Communication
 - Health Education

BMLT – 520 PATHOLOGY

COURSE CONTENTS :

I. Anaemias :

a) Definition and classification of Anemia

c) Laboratory Diagnosis of

- Iron Deficiency Anemia
- Megaloblastic Anemia
- Post Hemorrhagic Anemia
- Thalessemia Syndrome

II. Hemorrhagic Disorders – Definition and Classification

- Haemostasis and Coagulation Factors
- Investigations and Lab Diagnosis

III. Leukemia Disorders -

- Definition and Classification
- Lab Diagnosis

IV. Hormones - Techniques

- ELISA
- RIA

V. Cytology

- Fine Needle Aspiration Technique
- Staining
- Papanicaloav Staining Technique

PRACTICAL :

1. Bleeding Time, Clotting Time, PT, APTT, TT, Platelet Count & Platelet Function Test
2. Sickle Cell preparation
3. Reticulocyte Count
4. Osmotic Fragility Test
5. Brie Marrow Smears Preparation
6. ELISA Demonstration
7. LE Cell Preparation

BMLT – 530 BIOCHEMISTRY

COURSE CONTENTS :

1. Liver Function Test
 - Introduction
 - Type of Jaundice
 - Detection of Bilirubin
2. heamoglobin Metabolism
3. Water and Minerals Metabolism :
 - Deydration
 - Calcium
 - Phosphorus
 - Sodium
 - Potassium
 - Cloride

- Iron
- Iodine
- And their physiological function and diseased state.

4. Gastric juice.

- Importance
- Constituents
- Collection

PRACTICAL :

- Method of estimation of Bilirubin
- Method of estimation of SGOT, GPT, Alk Po4 Acid Po4

BMLT – 540 MICROBIOLOGY

COURSE CONTENTS :

1) Study of systematic Bacteriology :

- Streptococci
- Staphylogocci
- Pneumococci
- Corynebacteria
- Escherichia
- Klebsiella
- Enterobacter
- Proteus
- Salmonella
- Shigella
- Pseudomonas
- Vibrio
- Haemophilus
- Mycobacterium
- Brucella
- Clostridia
- Treponema
- Niesseria
- Leptospira
- Microlasma
- Ricketessia
- Clamydia

PRACTICAL :

Staining characters of different type of Bacteria Identification of type colony growth
Biochemical character of Organism

BMLT-550 COMMUNICATION SKILLS-III

A) Instructions for paper-setter

1. The question paper will consist five sections namely A, B, C, D and E.
2. Each of the sections A, B, C and D will contain two questions and candidates have to attempt at least one question compulsorily from each section. Each section carry 15% of the total marks
3. Section E will comprise of 10-15 short answers type questions, which will cover the entire syllabus and will carry 40% of the total marks.

B) Instructions for candidates

1. Candidates are required to attempt one question each from sections A, B, C and D of the question paper and the entire section E.
2. Use of non-programmable scientific calculator is allowed

SECTION A

1. Precis and Comprehension

Precis writing of simple passages from the prescribes text book. The passage selected should be from the textbook. The passage selected should be such as easily lends to surrounding. The passage should be of 100 to 150 words. In order to test comprehension a few questions on the passage may be set

SECTION B

2. Communication Techniques

Importance of communication

One way and two way communication

Essentials of good communication

Methods of communication, oral, written and non-verbal

Barriers to communication

Techniques of overcoming barriers

Concept of effective communication

All forms of written communications including drafting reports, notices, agenda notes, business correspondences, preparation of summaries and précis, telegrams, circulars, representations.

Press release and advertisements

Telephonic communications

SECTION C

4. Technical Report Writing

Technical report writing from the given outlines, a choice to attempt one out three to be given in the examination. The question paper shall provide the required outlines

SECTION D

5. Equivalent Terminology

150 popular administrative and technical terms in English with their equivalent words in regional language or in Hindi.. These terms shall be officially prescribed and sent to the paper as well.

Practice of writing personal resume and writing application for job/ employment

SIXTH SEMESTER

BMLT – 610 LABORATORY MANAGEMENT

COURSE CONTENTS :

8. Laboratory Planning

- General Principles
- Planning at different levels
- Planning for Hospital Lab Services
- Section fo a Hospital Laboratory
- Space requirement

2. Laboratory management Technique

- General Principle
- Component and function of Laboratory
- Staffing theLaboratory
- Job Specification
- Work Schedule

3. Care of Laboratory Glassware, Equipments, Instruments and Chemical etc

- General Principle
- Care and Cleaning of Glassware
- Care of equipments and instruments
- Lab chemicals, their proper use and care
- Labeling

4. Laboratory Safety

- General principle
- Laboratory hazards
- Safety programs
- First Aid

5. Quality Control of Laboratory

6. Stores Organisation

- Introduction
- Function
- Organisation and Structure
- Duteis
- Type of store
- Goods inwards Store
- Main Store
- Store Records

7. Relationship with other function values analysis

8. Store/Offie usestationary

- Material Receipts Advice Form

- Goods inwards Note Form
- Material requisition Form
- Bin Card

BMLT – 620 PATHOLOGY

COURSE CONTENTS :

Blood Banking

1. Component Preparations
 - Packed Cells
 - Fresh Frozen Plasma
 - Platelets
2. Blood Storage
 - Anticoagulant Preparation
 - Recording the details and storage of blood
 - Maintenance and changing of various equipments
3. Transfusion Reaction and Mismatch Transfusion – Lab Diagnosis

Autopsy technique :

1. Assisting in Autopsy
2. Preservation of Organs and Tissue Processing

Laboratory management & Quality Control :

1. Laboratory Goals
2. Market Potential
3. Care of Laboratory equipments
 - Sterilization and Autoclave Technique
 - Maintenance of Equipments log books
4. Internal and external Quality Check
5. Disinfection Techniques and Waste disposal

AIDS Updates :

1. Brief Pathophysiology
2. Diagnostic Technique – Screening
3. Safety in Laboratory
4. Sterilization of AIDS sample and disposal

Automation in pathology :

1. Semi – Automatic and Fully Automatic Analyzer – working and methodology
2. Maintenance of Instruments
3. Handling and Quality Check

PRACTICAL :

- Electrophoresis Technique – Protein & Hemoglobin
- High performance liquid Chromatography
- Micro column technique

BMLT – 630 BIOCHEMISTRY

COURSE CONTENTS :

Special Profiles :

- Glucose Tolerance Test
 - Insulin Tolerance Test
 - Gastric analysis
 - Xylose absorption Test
 - Clearance Test for Renal Function
2. Analysis of Calculat
 3. Introduction of
 - Chromatography
 - Electrophoresis
 - Radio immunoassay (RIA)
 - ELISA
 4. Electrometric determination of sodium (Na⁺) and potassium (K⁺)
 5. Quality control of clinical investigation and Automation in clinical biochemistry.
 6. Cardiac enzymes CPK, CPK MB, LDH, Troponin

PRACTICAL :

- Revision of all Biochemical Tests
- Demonstration of Chromatography and Electrophoresis
- ELISA and RIA

BMLT – 640 MICROBIOLOGY

COURSE CONTENTS :

- 1) Interdiction of Anaerobic culture media name of
- 2) Identification of Fungi
 - Growth
 - Characteristics
 - Diseases caused by Fungi
- 3) Laboratorial Management and Stock Maintenance of Microbiology Laboratory

PRACTICAL :

- Biochemical Test used for identification of bacteria
- Lab diagnosis of Fungi
- Smear preparations
- KOH Solution
- Fungus Culture :-

- a. Media
- b. B. Colony Characters of various fungi

BMLT – 650 COMPUTER SKILL – C

A) Instructions for paper-setter

The question paper will consist of five sections A, B, C and D. Sections A, B and C will have two questions from the respective sections of the syllabus and will carry 15% marks each. Section D will have 10-20 short answer type questions which will cover the entire syllabus uniformly and will carry 40% marks in all.

B) Instructions for candidates

1. Candidates are required to attempt one question each from sections A, B and C of the question paper and the entire section D.
2. Use of non-programmable scientific calculator is allowed.

SECTION A

Input and Output units: Their functional characteristics, main memory, cache memory read only memory, overview of storage devices – floppy disk, hard disk, compact disk, tape. Computer Networks and Communication: Network types, Network topologies, Network communication devices, Physical communication media, TCP/IP. Internet and its Applications: E-mail, Telnet, FTP, WWW, Internet chatting

SECTION B

World Wide Web (www) - History, Working, Web Browsers, Its functions, Concept of Search Engines, Searching the Web, HTTP, URLs, Web Servers, Web Protocols. Web Publishing - Concepts, Domain name Registration, Space on Host Server for Web site, HTML, Design tools, HTML editors, and Image editors, Issues in Web site creations & Maintenance

SECTION C

Html - Concepts of Hypertext, Versions of HTML, Elements of HTML syntax, Head & Body Sections, Building HTML documents, Inserting texts, Images, Hyperlinks, Backgrounds and Color controls, Different HTML tags, Table layout and presentation, Use of font size & Attributes, List types and its tags, Use of Frames and Forms in web pages. Overview of MS FrontPage, Macromedia Dream weaver, and other popular HTML editors, designing web sites using MS FrontPage (using at least FrontPage 2000)

Reference:-

1. D. H. Sanders , “Computers Today” , McGraw Hill, 1988.
2. T.N. Trainer, “Computers” (4th Edition) McGraw Hill, 1994.

3. P.T. Joseph, S.J., "E-Commerce An Indian Perspective (Second Edition)", Prentice Hall of India.

SINGHANIA UNIVERSITY

SYLLABUS FOR MPH

1 Anatomy, Physiology, Microbiology, Health and Hygiene, General care of sick, Behavioural Science.

2 Introduction to public health and nutrition, health problems in India, Nutritional health, factor affecting health of individual family & community, environmental sanitation.

3 Primary health care & national health programme and planning, family health and community health, communicable diseases and non communicable diseases.

4 MCH & immunization, family planning & family welfare including population education.

5 Communication skills, Audio-visual Aids. Health education, health statistics. Records and reports (M.I.S.)

6 Basics medicines and treatment of minor ailments recommended by W.H.O., first aid and emergency care , mental health, indian system of medicines (ayurvedic and homeopathic)and unani and sidha .

7 Practical and internal assesment

8 Six months training in reputed hospitals.

PAPER-I

Anatomy & physiology:- Elementary cells and tissues of the body, epithelial tissue, muscular tissue, nervous tissue, Skeletal system, Cardiovascular system, Respiratory system, Digestive system, Urinary system, Central nervous system, Lymphatic system, Endocrine system, Special sense:- Taste, smell, hearing, sight and touch, Nutrition & metabolism and Reproductive system.

Practicals:- Suitable to the above topics with the help of chart and models.

MICROBIOLOGY:- Introduction, microorganisms, collection of samples for bacteriological examination, pathogenic microorganism, path of infections, health hazards in the rural community, role of health workers in control and prevention of health problems.

Hygiene:- Care of the skin, nails and hair, clothing and , care of the mouth and use of comfort devices.

General care of the sick : Needs of patients and principles of care, safe and healthful environment, economy and care of equipments, preparation of the sick unit, personal care of the patient. Admission and discharge of the patient. Pressure areas, nutrition needs and feeding the patients. Dietary needs of the patients,

Medical and Surgical asepsis : Masks, gloves and gowns for surgical use, sterilisation, aseptic technique, preparing the patient for surgery, post .operative care of patients

Behavioural Science:- Self understanding and growth, increasing knowledge and skill, motions and defence mechanism, mental hygiene and health in various stages of life, helping in times of stress, groups team and leadership.

PAPER-II

Introduction to public health:- Concepts of health, nursing , community, community health and development. Responsibilities of health workers. Ethics and behaviour of health worker. Health team. Organisation of health and nursing services , principles of organizing care , in the home , health agencies , clinics , schools and hospitals. , principles of organising care according to the needs and priorities, health and medical problems

Public health and problems in India:- Factors related to family health ,Integrating family services (MCH services),Family life education for parents, nutrition of the family ,introduction of nutrition relation of nutrition to health, foods nutrients and functions of food ,vitamins minerals , vitamins minerals deficiencies ,applied nutrition programme, nutrition education, ,

Nutrition needs and feeding the patients.,
Dietary needs of the patient , healthful environment in the home care of sick, aged person handicapped, home visiting and domiciliary health services , in home Understanding and learning about community, Family structure and activities, urban and rural administrative pattern, social processes, social control(traditions, customs and habits).

Factors affecting health of the individual family and community:- Rural community.s characteristics, major rural problems, development of rural communities, urban community and characteristics, social and economical changes in community, How changes affects the community development and health, gathering information about our communities, approach to the community by a student group and making use of information statistics and local resources.

Community environmental sanitation:- Safe water supply, the problems of impure water, protection of water supply and purification methods, use of water in prevention and treatment of

illness, disposal of refuse and excreta, methods of disposal of dry refuse, purification of sewage, community education and joint planning for refuse and sewage disposal, food and milk sanitation, diseases caused by contaminated food and milk and specific preventive measures, housing regulation in the community and control of the insects rats and stray dogs.

PAPER-III

Primary health care:- Introduction, management and care of the sick in the community, conditions affecting the ear, eye, respiratory tract, cardiovascular system, digestive system, urinary, endocrine system, neuromuscular system and reproductive system.

Health planning and programmes : Planning for effective health care services, organisation and structure of the health services and related welfare services , supplemental health services and voluntary agencies international health agencies, community development and health programme, health planning and national health programme ,health workers responsibilities in the national programme.

Communicable diseases: introduction to communicable diseases , control and prevention of communicable diseases , care and treatment of patient with infections and communicable diseases , specific communicable diseases and infections (diseases spread from faeces to mouth, diseases spread faeces to skin, droplet or air borne infections, contact infections , insects and animals bites infections, mixed infections and STD.

PAPER-IV

MCH & Immunisation: Child health, growth and development of a child, stages of child life and basic needs, teaching mother about child health needs and priorities, assessment of growth and development, new born observation and assessment, care of the normal new born at home, management of minor disorders, care of premature baby at home, feeding of infants and children prevention and treatment of common childhood diseases and ailments, agencies for child care and welfare.

Health of the mother: principles of care during the maternity cycle, ante-natal care, action in

case of abnormalities of pregnancy, intra-natal care , post .natal care ,health education: diet, exercise,

hygiene and family planning, organisation of maternal health care services , training of dais.

Immunisation: Immunity immunisation, care and storage of vaccines ,immunisation schedule, methods of

immunisation, immunisation reaction, treatment, and prevention, responsibilities of health workers in immunisation campaigns.

Family planning & family welfare including population education : introduction importance of family planing to the family and community ,aspects of family health and welfare services, contraception and family planing methods, methods requirng medical atention and supervision, national family welfare programme, organising family welfare work, records and reports, supervision of dais and community level workers.

PAPER- V

Communication skills, Audio-Visual Aids, Health Education, Health Statistics:-

Communicating with the community(Introduction to communication, what are the barriers to communication, traditional and modern channels of communication), types of communication, motivation in communication, basic skills for communication, evaluating the effects of communication, health education-communication in health work, principles of teaching, teaching methods, audio-visual and other teaching aids, preparation of low cost A.V.Aids and their use, planning health education activities, identifying community resources for health education, the process of planning and implementing health education, community resources and organisation for health education. Assessing needs and priorities, referral maintenance of supplies, equipments and other facilities, records and reports, patient retained records,admission and discharge of a patient , vital statistics and events, gathering information about our communities, registration of vital statistics and making use of information statistics and local resources.

PAPER-VI

Basic medicines and treatment of minor ailments:- Introduction to pharmacology,

administration of drugs, injections and infusions, inhalation and oxygen therapy, local applications and treatments, Eye and ENT treatments, Naso-gastric treatments, Rectal treatments, vaginal Douche and Catheterisation.

First aid and emergency care:- Life saving measures, management of emergency situation, general rules for first aid, observations, examinations, tests, temperature, pulse, respiration, blood pressure, weight and height, history taking physical examination, urine analysis, collection of specimens, X-ray and special tests, dressing and bandages. First aid in the injuries of the skin(wounds, burns and scalds, bites and stings), first aid in injuries to bones, joints and muscles(fractures), transport of casualties, first aid in loss of consciousness, first aid in convulsions and hysteria, first aid in shock, first aid for foreign bodies in the ear, eye, nose and throat, artificial respiration, first aid in asphyxia, first aid in poison.

Mental Health:- Introduction to psychology, mental hygiene and health, self understanding and growth, mental hygiene and health in various stages of life. Mental illness: normal and abnormal behaviour, education

for mental hygiene and health, observations of persons with deviate behaviour pattern, early detection of mental disorder. Treatment of the mentally ill and psychiatric emergencies.

Indian system of medicines(Ayurvedic, homeopathy, Unani and sidha).

Practical:

Six month training

SINGHANIA UNIVERSITY

SYLLABUS FOR THE DIPLOMA COURSE IN YOGA TEACHER TRAINING

(One year Duration in TWO SEMESTER)

1. Duration

The duration of the course leading to the Diploma in Yoga Teacher Training shall be one year and. This course of study would be completed in TWO SEMESTERS. The examination shall held for First Semester in December and for second semester in the month of May or on such other dates as may be fixed by the university authority.

2. Eligibility

A person who has passed Higher Secondary exam (+2) with any stream from any recognized state education board, whose examination has been recognized as equivalent to the corresponding examination (under 10+2+3 system of education) of the University shall be eligible to join the Diploma Course:

3. Admission

Admission to the course will be on the basis of merit as per the decision of the University.

4. Interviews

All the candidates where names appear in the merit list shall have to appear for interview prior to the admission. In candidates who do not appear for the interview will not be considered for admission. The candidates must produce all the relevant certificates in original for verification at the time of interview failing which they will not be considered for admission.

5. Grace marks

Grace marks shall be given @ one per cent of the aggregate marks of the University examination. A candidate may avail of the grace marks either in the aggregate or in one or more papers as may be to his advantage. Grace marks shall, however, be given only for passing the examination or for earning the higher division and not for passing the examination with distinction.

6. Re-appear

If a candidate is required to reappear in a paper, he will be given one more opportunity to qualify in that paper without attending a fresh course. This work assignment may be determined by the Head of the University Department/Principal of the College.

7. Exam. Form & Fee

The last dates by which examination admission forms and fees must reach the Controller of Examinations shall be four weeks before the dates fixed for commencement of the examinations of the semesters concerned, provided that an admission form and fee may be entertained after that with a late fee as prescribed by the university from time to time, but not later than two weeks before the commencement of the examination.

8. Gradation: Successful candidates shall be classified as under;

(i) Those who obtain 75% or more of the total. First Division with Distinction

(ii) Those who obtain 60% or more of the aggregate . First Division marks but less than 75% marks in the examinations

(iii) Those who obtain 50% or more of the aggregate Second Division marks but less than 60% marks in the examinations

(iv) Those who obtain 40% or more of the aggregate Third Division marks but less than 50% marks in the examinations

GUIDELINES AND SYLLABUS FOR PG DIPLOMA COURSE IN YOGA THERAPY

1. Name of the Course Diploma in Yoga Teacher Training.

2. Duration One year (Two Semesters of 6 months each)

3. Objectives The course aims at

i) Promoting positive health, prevention of stress related problems and rehabilitation through yoga.

ii) Integral approach of Yoga Therapy to common ailments.

iii) Imparting skills to the students enabling them to introduce Yoga to improve & maintain health to general public, and Yoga for total personality development of students in schools, colleges and universities.

iv) Invoking scientific attitude and team spirit in the students to channelize their energies in creative and constructive endeavors.

v) Creating global awareness regarding beneficial aspects of Yoga Teaching.

Syllabus

1. Theory Paper Marks

1.1. Foundation of Yoga (100)

1.2 Elementary Knowledge of Human body (100)

1.3 Physiology of Yogic Practices (100)

1.4 Yoga Therapy for Health & Diseases (100)

1.5 Yoga Teaching Education (100)

TOTAL (500)

2. Practicals

2.1 Asanas Performance (100)

2.2 Kriyas and Pranayamas (100)

2.3 Mudras-Bandhas, Mantras and Meditation (100)

TOTAL (300)

GRAND TOTAL (800)

For the setting of theory question papers the following rules should be observed.

Each question paper will be of 100 marks. The paper shall be set by the external examiner. Each paper should be of three hours duration.

Each question papers for theory will comprise of FIVE UNITS as per syllabus. Two questions will be set from each unit. The candidates will be required to attempt ONE question from each unit. Each question will be of 20 marks.

Each question paper will be of 100 marks. The paper shall be set by the external examiner. Each paper should be of three hours duration.

Paper- 1.1 (Foundations of Yoga)

Unit - I

Introduction to YOGA

- i) Introduction, Meaning and Definitions of Yoga. Classification of Yoga. Purposes and aim of Yoga.
- ii) Historical development of Yoga in ancient time with special reference to Vedas, Upanishadas, Ramayana, Geeta, Buddha, Jain, Patanjali and Hathyoga and Guru Nanak period.
- iii) Historical development of Yoga in post classical time to modern time with special reference to Swami Vivekananda, Maharsihi Raman, Aurobindo, Yogananda, Swami Rama, Swami Dhirender Brahmchari, Osho, Swami Mahesh Yogi and Swami Ramadev.

Unit - II

Introduction to Yogic Texts

- iv) Patanjali's Yoga Sutras : Introduction of Four Padas, Nature of Chitta Virities and method to control them. Detail of Ashtang-yoga.
- v) Hathyoga Pradipika and Gherand Samihta : Introduction of Four Updeshas and their brief description of contents.
- vi) Shri Madh-Bhagwat Geeta : Nature and types of Yoga and symptoms of a Yogi.

Unit - III

Philosophy of Yoga

- vii) Indian Philosophy : Meaning, aims and objectives, Shankhya philosophy and its 25 elements, Ignorance and method for liberation.
- viii) Yoga Philosophy : Nature of Chitta, Method of chitta control, Types of Samadhies, Concept of Ishwara.

Unit - IV

Ancient Yoga Masters

- ix) Brief life sketch and their contribution in yoga science : Maharsihi Patanjali and Swami Gorakhnath.

x) Life history and contribution in the development of yoga by Swami Vivekananda and Shri Aurbindo.

Unit – V

Modern Yoga Masters

xi) Brief life sketch and their contribution in yoga science: Swami Dhirender Brahmchari and Osho.

xii) Brief life history and contribution in the development of yoga by Swami Mahesh Yogi and Swami Ramadev.

REFERENCE BOOKS:

1. Rajayoga – Swam Vivekananda – Ramakrishna Ashrama Publications.
2. Hathayoga Pradipika of Swatmarama – Kaivalyadhama, Lonavala.
3. The Science of Yoga – Taimini – Theosophical Publishing House. Adyar Madras.
4. Yogasutras of Patanjali – Hariharananda Aranya, University of Calcutta Press, Calcutta.
5. Patanjali Yoga Pradeepa Omananda Tirtha – Geeta Press, Gorakhpur.
6. Gherandasamhita – Bihar School of Yoga, Munger, Bihar.
7. Shivayogadipika – Sadashivabrahmendra. Ananda Ashramagranthavali, Choukhamba Press.
8. Yoga Darshan: Swami Niranjananada-Sri Panchadashanam Paramahansa Alakh Bara, Deoghar.
9. Four chapters on freedom (commentary on the Yoga sutras of Patanjali), Swami Satyananda (1983). Bihar school of Yoga Munger.

Paper- 1.2 (Elementary Knowledge of Human Body)

Unit - I

i) Concept of Human cell, tissue, organ and system.

ii) Skeletal System: Composition of Bone. Joints and their types, Structure and functions of Skelton system and name of all the bones.

Unit-II

iii) Muscular System: Structure and functions, Types of muscles, muscular contraction and Fatigue.

iv) Circulatory System: Composition and function of Blood. Structure and functions of heart, veins and arteries.

Unit-III

v) Respiratory System: Structure and Functions of Respiratory organs. Mechanism of respiration.

vi) Digestive System: Structure and functions of Digestive organs and digestive juices.

Unit-IV

vii) Excretory System: Functions of excretory organs.

viii) Endocrinal Glands: Situation and Functions of all the Endocrinal Glands.

Unit-V

ix) Nervous System: Structure, Types and functions.

x) Basic Metabolic Rate: Meaning, nature and coordination with yogic practices.

REFERENCE BOOKS:

1. Human Physiology, C.C. Chatterjee (1992) Alaknanda Press, Kolkata.
2. Anatomy and Physiology for Nurses.
3. Illustrated Physiology by Ann B Menaught
4. Human Anatomy, B. D. Chaurasia (1993) C B S Publishers, Shahdra, Delhi.
5. Human Anatomy: Inderbir Singh (1984). Macmillan India Ltd., New Delhi.
6. A text book of Medical Physiology – Guyton.

Paper- 1.3 (Physiology of Yogic Practices)

Unit - I

- i) Shatkarma: Meaning, types, technique, aim – objectives and physiological basis.
- ii) Yoga – Asanas : Meaning, definition, aims and objectives, Classifications, rule-regulations, precautions and their Psycho-somatic effects.

Unit-II

- iii) Pranayamas : Meaning, definition, types, aims and objectives, Classifications, rule-regulations, precautions and their Psycho-somatic effects.
- iv) Bandhas and Mudras : Meaning, definition, types, aims and objectives, Classifications, rule-regulations, precautions and their Psycho-somatic effects.

Unit-III

- v) Yogic and Non-yogic exercises: comparative study and benefits of both on human body.
- vi) Meditation and Yoga Nidra : Meaning, classification, techniques, preparations, effects on human body, mind and soul.

Unit-IV

- vii) Yoga Therapy: Meaning, Principles, Main feature and tools, scopes and limitations.
- viii) Concept of Tridosha and Malas. Their sites, properties and functions in the body.

Unit-V

- ix) Concept of Nadies, Chakras, Kundalini and Prana in Yoga practices.
- x) Yogic Diet, behavior and counselling, special reference with Yama, Niyama, Pratyahara and Yogic way of living style. Importance of yoga practices in modern era.

REFERENCE BOOKS:-

1. Anatomy and Physiology of Yogic Practices – M. M. Ghore, Kaivalyadhama, Lonavala, Pune.
2. A systemic course in the ancient tantric techniques of yoga and kriya – Bihar School of Yoga, Munger.

3. Yoga therapy by Swami Kuvalayanand, Kaivalaya dhama, Lonavala.
4. Yogic therapy: Swami Shivananda, Umachal Yoga Ashram, Kamakhya, Assam.
5. Light on Pranayama – B.K.S. Iyengar. Harper Collins Publishers, New Delhi.
6. Asana, Pranayama, Mudra, Bandha – Swami Satyananda Saraswati, Bihar School of Yoga, Munger Bandhas & Mudras – by Swami Geetananda, Anandashrama, Pondicherry

Paper- 1.4 (Yoga Therapy for Health & Diseases)

Unit - I

- i) Health and Disease: Meaning, concept, causes, Healthy habits special reference with yogic view.
- ii) Meaning, Causes, Symptoms and Yoga therapy for : Obesity, Indigestion, Constipation & Acidity.

Unit-II

- iii) Meaning, Causes, Symptoms and Yoga therapy for : Cold/cough, Asthma, Diabetes, High and low blood pressure.
- iv) Meaning, Causes, Symptoms and Yoga therapy for : Arthrities, Sciatica, Backache, Cervical spondylosis.

Unit-III

- v) Meaning, Causes, Symptoms and Yoga therapy for : Thyroid (Hyper and Hypo), Migraine, General Eye's weakness and General Heart Problems.
- vi) Meaning, Causes, Symptoms and Yoga therapy for : Piles, Gastric problem, Epilepsy and disorders of neural system.

Unit-IV

- vii) Mental Disorders: Stress, Tension and their meaning, causes, symptoms and related physical disorders.
- viii) Meaning, Causes, Symptoms and Yoga therapy for : Anxiety and depression.

Unit-V

- ix) Awareness about adverse effects of Drugs, Alcohol and smoking, their Yogic management.

x) Food: Main constituents of Balanced diet, Deficiency of diseases due to Vitamins and minerals.

REFERENCE BOOKS:-

1. Anatomy and Physiology of Yogic Practices – M. M. Ghore, Kaivalyadhama, Lonavala, Pune.
2. Yoga for different ailments – series published by SVYASA, Bangalore and Bihar Yoga Bharati.
3. Yoga for common ailments. Robin Monro, Nagarathna & Nagendra – Guia Publication, U.K.
4. Yoga therapy by Swami Kuvalayanand, Kaivalaya dhama, Lonavala.
5. Yogic therapy: Swami Shivananda, Umachal Yoga Ashram, Kamakhya, Assam.
6. Light on Pranayama – B.K.S. Iyengar. Harper Collins Publishers, New Delhi.
7. Asana, Pranayama, Mudra, Bandha – Swami Satyananda Saraswati, Bihar School of Yoga, Munger Bandhas & Mudras – by Swami Geetananda, Anandashrama, Pondicherry

Paper- 1.5 (Yoga Teaching Education)

Unit - I

- i) Concept of Education: Meaning and Nature of Formal, Informal and Non formal education.
- ii) Teaching: Concept, principles of Good Teaching.

Unit-II

- iii) Methods of Yoga Teaching: Lecture, Demonstration and Discussion methods.
- iv) Educational Technology: Role of Mass-Media and other modern technical teaching aids.

Unit-III

- v) Yoga Lesson Planning: Planning of lesson on any Kriya, Asana, Prnayama and Meditaiton.

vi) Learning: Its meaning, factors affecting learning ability, effect of yoga on learning power.

Unit-IV

vii) Yoga educational programmes: Yoga training camps, Exhibition, conference and Mass demonstration.

viii) Effects of Yoga Practices on Student, Teacher and Institute special reference with discipline, health, personality development and moral conducts.

Unit-V

ix) Acquaintance with important Yoga Educational Centers in India.

x) Yoga Education : Meaning, Scope in teaching, courses and other professions.

2. Practicals

2.1 Asanas Performance (100)

2.2 Kriyas and Pranayamas (100)

2.3 Mudras-Bandhas, Mantras and Meditation (100)

TOTAL (300)

Practical – I

ASANAS: Compulsory Asanas

A. STANDING POSE

1.Suryanamaskar,

2. Tadasana,

3.Vrikasasana

4.Garudasana,

5.Janusirasana

6.Trikonasana,

7. Chakrasana,

8. Padhastasana,

9.Konasana,

10.Dhruvasana.

B. SITTING POSE

1.Vajrasana

2.Shashangasana

3.Vakraasana

4.Ardhmatsyendrasana

5.Padamasana

6.Yogmudrasana

7.Parvalasana

8.Akaranadhanurasana

9.Ardhpaschimotasana

10.Paschimotan asana

11.Bhadrasana

12.Gomukhasana

13.Bakasana

14.Badhgomukhasana

15.Sukhasana

16.Smastikasana

C. LYING POSE (SPINE FACING GROUND)

1.Sarvangasana

2.Ardhmatsyasana

3.Matsyasana

- 4.Malasana
- 5.Chakrasana
6. Pawanmukta Series,
- 7.Pawanmuktasana
- 8.Karanpeedasana
- 9.Shavasana
- 10.Halāsana

D. LYING POSE (STOMACH FACING GROUND)

- 1.Bhujangāsana
- 2.Ardhshalabhasana
- 3.Shalabhasana
- 4.Dhanurasana
- 5.Makarasana
- 6.Naukasana
- 7.Uttanpadasana
- 8.Nabhyāsana
- 9.Ushtrasana
- 10.Suptarajasana

OPTIONAL ASANA

- 1.Telangularāsana
- 2.Kukutasana
- 3.Mayurasana
- 4.Shirshāsana
- 5.Vatayāsana

6.Ekpadsikandasana

7.Rajkapotasana

8.Natarajasana

9.Garbhasana

10.Puranbhujangasana

PRANAYAMAS (COMPULSORY)

1.Nadishoudhan

2.Ujjai

3.Sitali/shitkari

4.Suryabhedan

5.Chanderbhedan

6.Bhramari

7.Bhastrika

OPTIONAL

1.Ujjai

2.Bhastrika

3.Bhramari

MUDRAS

1.Vatmudra

2.Braham mudra

3.Gyanmudra

4.Chinmudra

BANDHAS (COMPULSORY)

1.Jalandar Bandhu

2.Jihwa Bandha

OPTIONAL

1.Uddiyana Bandha

2.Mula Bandha

Practical – II

KRIYAS (COMPULSORY)

1.Jalaneti

2.Agnisara

3.Kapalabhati

4.Trataka

5.Sutraneti

6.Gajakarani

7.Vastradhauti

8. Madhyamanauli

9.Shankha Prakshalana

10.Kunjali

KRIYAS (OPTIONAL)

1.Nauli

2.Dhand Dhauti

3.Vastra Dhauti

4.Shankhprakshalan

MEDITATION:

1. Traditional Meditation Techniques
2. Trataka Bahiranga and Antaranga
3. Ajapajapa
4. Antarmauna
5. Akashadharanas: Chidakasha, Hridayakasha, Daharakasha
6. Transcendental Meditation
7. Preksha Dhyana
8. Yog Nidra

Mantras:

1. Om Chanting
2. Gaytri
3. Mahamrityujaye
4. Swasth (Sarvey Bhwantu Sukhina.....)
5. Tamso ma jyotir ganya.....)

REFERENCE BOOKS:

1. Hathayoga Pradeepika – Swami Satyananda saraswati and Swami Muktibodhananda Sarasati, (1993), Bihar School of Yoga, Munger.
2. Asana, Paranayama, Mudra, Bandha – Swami Satyananda Saraswati, Bihar School of Yoga, Munger.
3. Gheranda Samhita
4. Patanjala Yoga Sutra
5. New perspectives in Stress Management published by SVYASA, Bangalore.
5. Transcendental Meditation: Maharashi Mahesh Yogi.

SINGHANIA UNIVERSITY

DETAILED SYLLABUS OF

DIPLOMA IN VETERINARY & LIVESTOCK DEVELOPMENT ASSISTANT (VLDA)

FIRST YEAR

- 1 Pharmacy
- 2 Structure & function of Body
- 3 Live Stock, Poultry Production & Management
- 4 Animal Breeding
- 5 Animal Nutrition
- 6 English (Applied Grammar & précis Writing)
- 7 Hindi (Vayavahrik Hindi & Sampraeshan)

SECOND YEAR

- 1 Elementary Medicine
- 2 Surgery
- 3 Gynecology (Reproductive Disorders)
- 4 Ext. Education
- 5 Clinical Practice
- 6 Reproduction Artificial Insemination & Storage of Semen
- 7 Animal Products Technology

FIRST YEAR

PAPER – I PHARMACY

Theory

Definitions of the terms: Pharmacology, Pharmacy, Chemotherapy, Therapeutics, Toxicology, Phonology and motrology etc.

Sources and nature of drugs, Routing, Pharma processes, various dosage form with suitable examples principles of compounding and dispensing of drug preparations different methods for the administration of drugs, pharmacy weights and measures Apothecary's and metric system, household measures.

Prescription reading- parts of prescription and commonly used Latin abbreviations in prescription writing.

Broad therapeutic classification of drugs employed in Veterinary Practice- Definitions, examples and therapeutic uses in animals.

Practicals

Identification of common drugs labelling and storage of common drugs. Compounding and dispensing of pharmacy preparations.

PAPER – II INTRODUCTION TO STRUCTURE AND FUNCTIONS OF BODY

Identification of organs of different systems of domestic animals through charts, models and other audio-visual aids. Elementary knowledge regarding physiological functions of various organs

PAPER – III INTRODUCTION TO LIVESTOCK AND POULTRY MANAGEMENT

Theory

Important definitions related to animal management care of animals (Cattle, Sheep's, goat and swine) during and after parturition, housing of animals. Routine management practices life grooming, washing , dipping, casting, sherring and exercising; Raising and feeding of farm animals.

Signs of health in different animals; care of sick animals, milking management. Control of vices of animals; introduction to feeding and Management of horses and camels. Importance of poultry farming, elementary knowledge of incubation and hatchery management; management of chicks, growers and layers; poultry housing and feeding; vaccination against poultry diseases.

Practical

External body parts of different animals. Methods of approaching and handling animals; milking farm animals. Methods of ageing; growing; identification, casting and restraining of farm animals

Feeding of dairy animals; methods of recording temperature; pulse, respiration, debudding and drenching of animals. Record keeping.

Routine farm operations like incubation and hatching, fumigation, candling, wingbanding, legbanding, brooding of chicks. Litter Management, feed mixing, vaccination, debeaking and record keeping.

PAPER – IV ANIMAL BREEDING

Theory

- General terms used in animal breeding
- Important breeds of livestock (cattle, buffalo, sheep, goat and swine) and poultry, their origin, distribution and breed characteristics.
- Economic utility characters of different species of livestock and poultry.
- Importance of livestock record keeping and various types of records.
- Elementary knowledge of breeding systems

Practical

- Identification of various breeds of livestock and poultry.
- As cording of breeding date.

PAPER – V ANIMAL NUTRITION

Elementary description of nutrients and their requirements for maintenance, growth reproduction, lactation, egg production, wool production and work, General principles of feeding and common principle for different categories of introduction to reproduction artificial insemination and storage of semen production of common fodder crops including and knowledge about common ...Preparation, preservation and storage of hay and silage. Common feed and fodder their classification, identification.

Practicals

Elementary knowledge of computation of ration for different types of livestock and poultry. silage and hay making.

PAPER – VI APPLIED GRAMMAR & PRÉCIS WRITING (COURSES IN ENGLISH)

Parts of speech, narration, voice, corrections, idioms verbal. Phrases, rhymes, Precis writing, paragraph writing, letter writing translation from Hindi to English, Text (Grammar based prepared by CIFEL, Hyderabad).

ESSAY WRITING AND SPEECH

Use of articles, punctuation, Transformation of sentences; one word substitution; Precis writing, Essay writing, Report writing, Translation/Retranslation, Soaking of an announced topic, comprehensive reading, text (Grammar based prepared by CIFEL, Hyderabad).

ELEMENTARY EXTENSION EDUCATION

Meaning, importance and role of Extension Education in Livestock Development, Philosophy and principle of Extension Education, Extension Methods for promotion of animal husbandry practices, arrangement of extension activities at village level, understanding the needs and interest of rural masses.

Practical

Handling of Audio-Visual equipments under Village conditions and preparation of simple Visual aids.

PAPER – VII

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SECOND YEAR

PAPER – I ELEMENTARY MEDICINE

Preliminary knowledge about signs of disease, clinical methods of examination and detection of abnormalities :

- (1) Abnormal body discharge.
- (2) Body temperature, pulse, respiration
- (3) Methods of injecting drugs, sera, vaccine etc. Use of canola, Passing stomach tube, probang heat symbol and other instruments for treatment.
- (4) General agents responsible for causing disease bacteria, Viruses, Fungi and Parasites.
- (5) General principles of prevention and control of disease.
- (6) Utilization and disposal of carcasses.
- (7) Elementary clinical diagnostic methods, history & general examination.
- (8) Non – infectious diseases-symptoms and first aid of follow diseases:Stomatitis, choke, upper resp, tract infections, tympany, impaction, constipation, diarrhea and dysentery, indigestion pneumonia, haemoglobinuria, milk fever, ketosis, pica in camels, retention of urine.

Infectious diseases:

Symptoms and first aid in the following disease.

1. Bacterial & Viral

I. Johnne's diseases, mastitis, haemorrhagic Septicemia

II. Anthrax, Black quarter, tetanus, enterotoxemia

III. Rinderpest, F.M.D. Rabies, Swine fever.

2. Parasitic diseases

Sabiesiosis, Theileriosis, Trypanosomiasis, Coccidiosis, Ascariasis, control of Flies,

Lice, ticks and mites and mange.

3. Poultry diseases

Ranikhet diseases, fowl pox, salmonellosis

4. Common camel diseases.

Practicals

Cleaning of slides, glasswares and other laboratory equipments, techniques of staining and preparation of blood smears, care and use of microscopes, collection, processing for examination of blood, urine, faeces, collection, preservation, fixation and dispatch of morbid material for laboratory examination.

PAPER – II SURGERY

Theory

(I) Introduction and common terms used in Surgery.

(II) Sterilization in surgical practice

(III) Introduction to superficial surgical ailments (Abscess, fistula, sinus, wounds, gangrene, cyst)

(IV) Introduction to dental care.

(V) Introduction to hoof management.

(VI) First aid management of fracture, blood, hemorrhage.

(VII) Introduction to post operative management

(VIII) Application and uses of various antiseptics lotions ointments and tinctures in surgical practice.

Practical

(I) Preparation of pack for auto calving

(II) Surgical attires and their uses by the Surgeon

(III) Operation room discipline

(IV) Dressing of wounds and bandages

(V) Identification of various surgical instruments

(VI) Physical restraint or animals for surgery

(VII) Various injections

(VIII) Burdize castration

(IX) Preparing animal for surgery

(X) Application of counter irritants, heat, cold fermentation

PAPER – III GYNECOLOGY (REPRODUCTIVE DISORDERS)

Introduction to reproductive patterns of livestock Genital organs of male and female
Transportation of materials from abortions. Assistance in holding obstetrical cases
Preparation of packs for obstetrical operations sterilization of instruments, preparation of animals, untrauterive medication. Assistance to parturient animals Care of new born.
Nomenclature gynecological and obstetrical conditions

Practicals

Intrauterine medication, use of Vagino scope, Preparation of packs for obstetrical cases, Preparation of different stains for semen evaluation and cytology. Assistance I obstetrical cases.

PAPER – V CLINICAL PRACTICE

Recording of temp., pulse and respiration.... drug administration, practice of compounding and dispensing various drugs, use of trocar & canula, stomach tube, probang : intreammammary infusions, dressing of wounds, preparation of commonly used of ointments, tinctures, lotions/solutions etc. acquaintance with various gynaecological and surgical instruments with their uses, sterilization of instruments etc. demonstration of gynecological and surgical problems preparation and handling of surgical pack, introduction to X-ray procedure, collection of clinical material for laboratory examination, Burdizzo castration of calf, sheep and goat.

PAPER – VI REPRODUCTION ARTIFICIAL INSEMINATION AND STORAGE OF SEMEN

Structure and function of reproductive organs of cow, horse, dog, pig and poultry. Estruscycles of domestic animals. Signs of heat in domestic animals on periods of domestic animals. Samprames gestation of partarition in cattle, buffaloes, sheep, goat and pigs. Advantages and limitation of the technique of Artificial insemination.

Practical

- (1) Rectal palpation of reproductive organs.
- (2) Training of bulls.
- (3) Preparation of Artificial vagina for semen collection
- (4) Semen collection and evaluation.
- (5) Preparation of diluters and extension of semen.
- (6) Demonstration of semen freezing techniques.
- (7) Artificial insemination technique with liquid/frozen semen
- (8) Sterilization off glassware /laboratory were used in A.I. work

PAPER – VII ANIMAL PRODUCTS TECHNOLOGY

Handling, storage and distribution of meat, poultry and eggs.
Milk definition and its composition. Factors affecting composition and quality of milk.

Elementary knowledge about nutritive value, sources of bacterial contamination of milk and clean milk production; milk collection, legal standards of milk; processing, packaging and distribution of milk.

Practical

Candling and grading of eggs. Samples, C.C.B. and alcohol tests, pH by indicator paper, specific gravity test, estimation of fat, S.N.F and T.S in milk, determination of adulterants and preservations.

SINGHANIA UNIVERSITY

G.N.M (Revised General Nursing & Midwifery)

Course Description

Today's modern nursing is a dynamic, the therapeutic, professional & formal educative process, in meeting the health needs of the individual in the hospital, the family & society.

Eligibility

Minimum Qualification: XII

Syllabus

FIRST YEAR

I Biological Sciences

- Anatomy and Physiology
- Microbiology

II Behavioural Sciences

- Psychology
- Sociology

III Fundamentals of Nursing

- Fundamentals of Nursing
- First Aid
- Personal Hygiene

IV Community Health Nursing

- Community Health Nursing
- Environmental Hygiene
- Health education and Communication Skills
- Nutrition

v. English

Total Theory Hours of 1st year 575hrs.
Total Practical / Clinical Hours : 900 hrs.

SECOND YEAR

- Medical Surgical Nursing I (Including Pharmacology)
- Medical Surgical II (Specialities)
- Mental Health & Psychiatric Nursing
- Computer Education

Total Theory hours of 2nd Year : 360 hrs.
Total Practical / Clinical Hours : 1116 hrs.

THIRD YEAR

- Midwifery & Gynaecology
- Community Health – Nursing II
- Paediatric Nursing

Total Theory hours of 3rd Year: 290 hrs.
Total Practical / Clinical Hours : 1260 hrs.

INTERNSHIP

- Education methods and media for Teaching in practices of Nursing
- Introduction to Research
- Professional trends and adjustment
- Administration and Ward Management
- Health Economics

Total Hours for theory Internship: 190 hrs.
Total Practical / Clinical Internship Hours: 924 hrs.

Diploma will be honoured by the singhania university after successfully completion of 3 ½ Years training period.

Course Duration: 3.5 Years

Hostel Facility: Hostel facility is available with this course.