

**DEPARTMENT OF PHARMACEUTICAL SCIENCES
UNIVERSITY OF KASHMIR
SRINAGAR**

COURSE NO: BPH-XVII

PHARMACEUTICS-VI

(Hospital and Clinical Pharmacy Including Drug interaction)

Total No of Lectures: 50

PART I- 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, 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: Medical store management, Organization of Drug store, Location and layout, Inventory and stock control, Procedures for procurement of drugs and supplies from different sources. Inspection and issue of material. Storage of materials (Non- parenterals, Parenterals) , Pricing policy, Utilization of computers in drug store management. Maintenance of records of retail and wholesale.,
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.

RT II- Clinical Pharmacy and Drug Interaction:

11. Introduction to clinical pharmacy practice
 - Definition and scope
 - Terminologies commonly 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 with 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 Hypoglycaemic drugs.

BOOKS RECOMMENDED:

1. Remington's Pharmaceutical sciences
2. Hassan W.E., Hospital Pharmacy
3. Herifindal et. al. Clinical Pharmacy and Therapeutics .
4. Allwood and Fell, Hospital Pharmacy
5. Dandiya P.C, Khar Roop K. & Gurbani N., Pharmacist year book, CBS publishers.
6. Young L.Y. applied Therapeutics for Clinical Pharmacists.
7. Pratibha Nand, R.K.Khar, Hospital and Clinical Pharmacy

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COURSE NO: BPH-XVIII

**PHARMACEUTICS-VII
(Drug Regulatory Affairs)
Total teaching hours: 50**

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 Against 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) Poisons Act
 - i) Indian Patents Act, 1970 with recent amendments.
 - j) The Drug (prices control) order, 1995.
 - j) The Insecticides Act
 - k) Prevention of Food Adulteration, Act and Rules thereunder.

BOOKS RECOMMENDED:

1. M.L.Mehra, Handbook of Drug Laws (Legal Classics, UBA Publication)
2. Bare Acts
3. S.N. Katju, Handbook of Laws of Drugs
4. N.K.Jain, Textbook of Forensic Pharmacy
5. B.M. Mithal, Textbook of Forensic Pharmacy
6. Thomas R. Brown, Mickey C. Smith, Handbook of Institutional Pharmacy Practice, 2nd Edn., Williams and Williams Publications, London , Handbook of Institutional Pharmacy practice 11nd edition.
7. Dutta P.K, Drug control, Desk reference , Eastern Law House, Delhi,1990.
8. S.P. Agarwal and Rajesh Khanna, Pharmaceutical juris prudence and Ethics, Birla Publishers, Delhi.
9. Handbook of Drug Laws by M.L.Mehra (Legal classics, UBA publication)

**DEPARTMENT OF PHARMACEUTICAL SCIENCES
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COURSE NO: BPH - XIX

**PHARMACEUTICS-VIII
(Industrial Pharmacy & Cosmeticology)
Total teaching hours-50**

- 1. Preformulation studies:**
Physical properties- Polymorphism, Solubility, Rheology, Salt formation and partitioning effects.
Chemical properties- Hydrolytic degradation, Oxidation, Drug substance-Excipient interaction, other changes. Biological and Pharmacologic properties of dosage forms
- 2. Monophasic and Biphasic dosage forms:**
Interfacial phenomena, forces and energetic in disperse phases. Industrial formulation of Emulsions and Suspension preparations.
- 3. Blood products:**
Classification and preparation on large scale, preparation of Plasma expanders, preservation and storage of blood products, Official in IP.
- 4. Radio Pharmaceuticals:**
Radioactivity, production of Radionuclides, Radiation hazards, Radiological safety, Medical applications of Radio Pharmaceuticals.
- 5. Raw materials used for Cosmetic preparations:**
Surfactants, Humectants, Cream bases, Aerosol propellents, perfumes and 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 and acne products.
- 8. Color cosmetics:**
Introduction, lip colors, nail polish, face make up and eye make up.
- 9. Dental products:**
Dentifrices, Oral rinses, tooth powder, tooth paste.
- 10. Personal hygiene products:**

Toilet soaps, shaving soaps, antiperspirants, deodorants.

PRACTICALS

Total hours: 75

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 and 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.

BOOKS RECOMMENDED:

1. Michael E. Aulton, *Pharmaceutics, The science of Dosage form design.*
2. E.A. Rawlins, *Bentley's textbook of Pharmaceutics* \
3. *Remington's Pharmaceutical sciences*
4. B.M. Mittal, *textbook of Pharmaceutical formulation.*
5. D.F. Williams and W.H Schmitt, *Chemistry and Technology of the cosmetics and Toiletries industry.*
6. *Harry's Cosmetology.*
7. W.A. Pourcher, *Perfumes, Cosmetics and Soaps, Vol. I,II and III, Chapman and Hall, London.*
8. F.V. Wells and H. Lubove" *Cosmetics and the Skin*", Reinhold, pub., New York.

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COURSE NO: BPH-XX

**PHARMACEUTICAL ANALYSIS (Physical)
(Physical chemistry & Principles of Instrumental Analysis)
Total hours: 50**

SECTION-A

- 1. Ionisation and Ionic equilibria:** Arrhenius theory, degree of ionization and Ostwald dilution law, common ion effect, Buffer solutions and preparation of Pharmaceutical buffer solution, approximate calculation 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 coloring matters, theories of indicators.
- 3. Solutions:** Lowering of vapour pressure and Rault's Law, Osmosis and Osmotic pressure, Measurement of Osmotic pressure, Isotonic solutions, Pharmaceutical applications of Osmosis, theories of semipermeable membranes, Colligative properties, Evaluation of boiling point and its experimental determination, depression of freezing point and its determination, distribution law and solvent extraction method, Electrolytes and Non-electrolytes.
- 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, Karl Fischer method of moisture determination.
- 10. Polarimetry:** Its principles and applications; polarization types of molecule analysed; optical rotation; effects of concentration, wave length, solvent, temperature on optical rotation; polarimeter, light source, sample cells.

PRACTICALS Total hours: 100

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

BOOKS RECOMMENDED

1. J.R.Barrante, Physical chemistry of Life sciences, Printell.
2. KJ.Laidler, Physical chemistry with Biological applications, Benjamin.
3. S.C. Wallwork, Physical chemistry for students of Pharmacy and Biology, Longman.
4. LM.Atherden, Bentley and Oliver's - Textbook of Pharmaceutical chemistry, Oxford University press, Delhi.
5. AJ.Mee, Physical chemistry, E.L.B.S., London.
6. H.H.Willard, LL.Merritt and J.A.Dean, Instrumental methods of analysis, Van Nostrand Reinhold, NewYork.
7. Samuel Glasstone and David Lewis, Elements of Physical chemistry, Macmillan press, London.
8. A.H.Beckett and J.B. Stenlake, Practical Pharmaceutical chemistry, Vol. I and//. The Athlone Press of the University of London.
9. K.A.Connors, A textbook of Pharmaceutical analysis Wiley Interscience, New York.

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COURSE NO: BPH-XXI

MEDICINAL CHEMISTRY- II

Total hours-50

1. **Steroids:** Nomenclature, Stereochemistry, Classification, Isolation methods, Chemistry of Cholesterol (Excluding Synthesis), Diosgenin, Stigmasterol and Ergosterol.
2. Steroids and related drugs: Androgens & Anabolic agents, Oestrogens and Progestational agents (Oral contraceptives) & Adrenocorticoids.
3. **Cardiac Glycosides, Digoxin, Digitoxin**
Coronary dilators:- i.)Glyceryl trinitrate, ii)Isosorbide dinitrate iii) Dipyridamole, iv) Strophanthin, v) Bufotoxin.
Antilipidemic agents: Theofibrate, Clofibrate, Probucol, Gemfibrozil, Lovastatin.
Anti fibrillatory agents:- Quinidine SO_4 , Oisopyramide.
Antiarrhythmic agents:- Procainamide, Mexiletine, Flecainide, amiodarone, Verapamil.
Hypotensive agents:- Methyl dopa, Clonidine, Guanidine, Propranolol, Minoxidil, Nitroprusside, Reserpine, Captopril, Nifedipine.
4. Prostaglandins.
5. The following topics shall be treated covering the outline of synthetic procedures selected drugs, classification, uses, structure, activity relationship:-
 - A) **Antibiotics :** i) Penicillin ii) Aminoglycosides- Streptomycin, Gentamycin, Neomycin, Kanamycin, Chloramphenicol, Tetracyclines, Cephalosporines
 - B) **Antimalarials:-** Chloroquine phosphate Hcl; Pamaquine, Primaquine, Pentaquine phosphate, Mepacrine Hcl, Proguanil Hcl, Pyrimethamine, Trimethoprim, Quinine sulphate.
 - C) **Antiaemobiotic:** Metronidazole, Diloxanide furcate, Paramomycin, Phanquone.
 - D) **Anthelminthes:** Albendazole, Mebendazole, Praziquantel, Piperazine citrate.
 - E) **Antifungal agents:** Propionic acid, Ketoconazole, Griseofulvin, Natamycin.
 - F) **Anti-Tubercular Drugs:** P-Amino salicylic acid, Isoniazide, Pyrazinamide, Ethambutol, Ethionamide.
 - G) **Medicinal Dyes:** Crystal Violet, Brilliant green, Acriflavin, Methylene blue, Malachite green.
 - H) **Anti-Viral agents:** Amantadine Hcl, Idoxuolidine, Acyclovir, Vidarabine, Ribavirin, Methisazone.
 - I) **Antineoplastic:** Mechlorethamine Hcl, Mephalan, Chlormambucil, Busulfan, Triethylene, Melanin, Carmustine, Methotrexate, Mercaptopurine, Flurouracil, Cytarabine, Azaserine, Daunorubicin, Cisplatin, Mitotane.
6. **Vitamins.**

PRACTICALS: Total hours: 100

Two step synthesis of some compounds of medicinal interest.

BOOKS RECOMMENDED:

1. M.E.Wolff, Burger's Medicinal Chemistry, Jhon Wiley and Sons, New York.
2. R.F. Doerge, Wilson & Gisvold's textbook of Organic Medicinal and Pharmaceutical Chemistry, J.Lippincott Co., Philadelphia.
3. W.O. Foye, Principles of Medicinal Chemistry, Lee & Febiger, Philadelphia.
4. A. Kar, Medicinal Chemistry, Wiley Eastern Publishers, New Delhi.
5. D. Lednicer and LA.Mitschlar, The Organic Chemistry of Drug Synthesis, Vol I,II and III Jhon Wiley & Sons, New York.
6. Vogel's, Textbook of Practical Organic Chemistry, ELBS & Longman, London and New York.
7. F.G.Menn and B.C.Saunders, Practical Organic Chemistry, ELBS & Longman, London & New York.

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COURSE NO: BPH-XXII

PHARMACEUTICAL CHEMISTRY- II
(Chemistry of Natural products)
Number of lectures: 60

UNIT-I

1. Terpenoids: Introduction, Occurrence, Isolation, classification, general methods of determining structure with reference to Citral, Citronalol, Carvone, Limonene, Thymol, Menthol and structural features of terpenoids (isoprene rule).

UNIT-II

1. Alkaloids:- Introduction, Occurrence, functions of Alkaloids. Classification, isolation, properties. General methods of determining structure of alkaloids with reference to Ephedrine, Atropine, Quinine, Papaverine and Morphine.

2. Glycosides:- Introduction, Natural glycosides, Classification and methods of isolation and determination of structure, Arbutin, Salicin, Amygdalin, Sinigrin and Indican.

UNIT-III

1. Carbohydrates:- Introduction, Nomenclature and Classification. General reactions of Monosaccharides, Configuration of Monosaccharides, Structure and properties of disaccharides, Maltose, Lactose and Sucrose. Structure and properties of **Polysaccharides:** Starch, Glycogen and Cellulose. Structure and conformation of Sugars. Isomerism in sugars. Mucopolysaccharides.

2. Lipids:- Introduction, Classification of lipids. **Fatty acids-** Nomenclature and Physio-chemical properties. **Phospholipids-** Their properties and functions. Glycolipids and Sphingo lipids. Lipo proteins.

3. Amino acids and proteins:- Introduction, Classification of amino acids. General physical and chemical properties of amino acids. **Polypeptides-** Synthesis of polypeptides. Proteins and uses of proteins. Classification and structure of proteins.

UNIT-IV

1. Purines:- Introduction, Synthesis and Classification of Purines. Methods of determining structure with reference to Caffeine, Theobromine and Theophylline.

2. Flavones and Iso flavones :- A preliminary study .

PRACTICALS:

1. Qualitative analysis of Carbohydrates- Color tests.
2. Qualitative analysis of fats and acids. Acid value, Peroxide value, Saponification value and Iodine value of fats.
3. Qualitative analysis of amino acids- Color tests.
4. Separation of Natural products by TLC.
5. Isolation of naturally occurring compounds such as Caffeine from tea leaves.

REFERENCE BOOKS

1. Organic Chemistry Vol I and II by I.L.Finar
2. Organic Natural products by O.P. Agarwal and Chatwal (Vol I and II)

3. Remington's textbook of Pharmaceutics
4. Textbook of Organic, Medicinal and Pharmaceutical Chemistry by Wilson and Gisvold.
5. Pharmacopoeia of India, 1985, Govt of India, Ministry of Health, Delhi.

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COURSE NO: XXIII

PHARMACOGNOSY-III

Total hours: 50

1. Study of volatile oil containing following drugs with regard to the nature, occurrence, chemistry and biogenesis. Pharmacognostic study of drugs in italics:-
Hydrocarbons: *Pepper*, turpentine, **Alcohol:-** *Mentha*, Coriander, Cardamom
Aldehyde:-*Cinnamon*, Lemon peel, Lemon grass, Citronella, Cumin **Ketone:-** Caraway, Dill, spearmint **Phenol:-** Clove **Phenolic** ethers:-Anise, Star anise, *Fennel*, Nutmeg **Oxides:-** Eucalyptus , Chenopodium.
2. Commercial production, Export potential and world trade in oil of menthe, Eucalyptus oil and oleoresins from pinus species and lemon grass oil.
3. Nature, occurrence, chemistry, collection and preparation of drugs containing :-
a. Bolsams- (Tolu balsam, Peru balsam, *Benzoin*),
b. Acid Resins:- Colopltony
c. Gum Resins:- Myrth, *Asaofetida*
d. Resins:- Colocynth, *Ginger*, *Turmeric*, Capsicum, Cannabis, Podophyllum
(Pharmacognostic study of drugs in italics)
4. Biological source, preparation and uses of the following enzymes:- Diastase, Papain, Maltese, Bromalein, Ficin.
5. Quantitative Microscopy
6. Factors affecting plant drug constituents.
7. Drug adulteration and authentication.

PRACTICALS

Total hours: 75

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.

BOOKS RECOMMENDED

1. Tayller & Brandy, textbook of Pharmacognosy.
2. I.E. Wallis, textbook of Pharmacognosy.
3. C.K.Attal, B.K. Kapoor, Cultivation and Utilization of Medicinal and Aromatic plants, R.R.L.Jamrnu.
4. T.C. Denston, textbook of Pharmacognosy, 5th edition, London Medical publishing company Ltd.
5. I.PGovtof India publication.

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COURSE NO: XXIV

**PHARMACOLOGY - II
Total hours: 50**

- 1. DRUGS ACTING ON CENTRAL NERVOUS SYSTEM:**
 1. Synaptic transmission in CNS.
 2. General Anesthesia.
 3. Hypnotic and Sedatives.
 4. Alcohol.
 5. Anti-convulsants.
 6. Psychopharmacological agents –Antipsychotics, Anxiolytics, Antidepressants.
 7. Antiparkinsonian drugs.
 8. Non-steroidal Analgesics, anti-inflammatory and anti-pyretic agents, drugs used in gout, DMARDs.

- 2. DRUGS ACTING ON CARDIOVASCULAR SYSTEM**
 1. Cardiac glycosides and inotropic agents used in CHF.
 2. Anti-arrhythmic agents
 3. Anti-hypertensive agents.
 4. Coronary vasodilators and drugs used in angina.
 5. Hypolipidemic drugs.
 6. Fibrinolytic agents.

- 3. DRUGS ACTING ON THE BLOOD AND BLOOD FORMING AGENTS**
 1. Coagulants.
 2. Anticoagulants.
 3. Hematinics (Iron, vitamin B2 and Folic acid).
 4. Plasma Expanders.

- 4. DIURETICS**

- 5. DRUGS ACTING ON GASTROINTESTINAL SYSTEM**
 1. Purgatives.
 2. Antidiarrhoeal drugs.
 3. Antiacids and antiemetics.
 4. Digestants.

- 6. DRUGS ACTING ON RESPIRATORY SYSTEM**
 1. Expectorants.
 2. Antitussives.
 3. Drugs used for cough and bronchial asthma

PRACTICALS: Total Hours: 100.

1. Stages of chloroform and ether anesthesia with and without premedication.
2. Study of phenobarbitone induced hypnosis.
3. Determination of analgesic activity.
4. Study of anticonvulsants.
5. Study of local anesthetic activity using:
 - i) Surface anesthesia on rabbits.
 - ii) Infiltration anesthesia using guinea pigs
 - iii) Nerve block anesthesia using frogs.
6. Study of drugs on perfused frog heart.
7. Study of drugs on isolated frog heart.
8. Identification of unknown drugs using frog heart.
9. Study of effect of purgatives in frogs/mice/rats.
10. Study of drugs on blood vessels in frogs.
11. Study of effect of drugs on ciliary movements
12. Study of anti-inflammatory activity in rats
13. Study of anxiolytic activity in mice
14. Study of Muscle relaxant activity in mice
15. Study of Locomotor activity

BOOKS RECOMMENDED:**Theory:**

1. Modern Pharmacology by C.R. Craig and R. E. Stitzel
2. Goodman Oilman's: The Pharmacological Basis of Therapeutics by Alfred Goodman Gilman, Theodore W. Rail, Mies and Taylor
3. Clinical Pharmacology by D.R. Laurence and P.M. Bennett
4. Essentials of Medical Pharmacology by K.D. Tripathi.
5. Pharmacology and Pharmacotherapeutics by R.S. Satoskarand S.D. Bhandarkar.
6. Essentials of Pharmacotherapeutics by F.S.K. Barar
7. Pharmacology by H.P. Rang and M.M. Dale
8. Lewis's Pharmacology, revised by James Crosland

Practicals:

1. Pharmacological experiments on isolated preparations, Edinburgh University Publication, 1968.
2. Selected topics in Experimental Pharmacology by U.K. Seth, N.K. Dadkar and Usha G. Kamat
3. Handbook of Experimental Pharmacology by S.K. Kulkarni
4. Fundamentals of Experimental Pharmacology by M.N. Ghosh
5. Textbook of In-vitro Pharmacology by Ian Kitchen
6. Screening methods in Pharmacology by Robert A. Turner
7. Selected topics in Experimental Pharmacology by U.K. Seth, N.K. Dadkar, Usha G. Kamat

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COURSE NO: XXV

**APPLIED BIOCHEMISTRY
Total hours-50**

1. ENZYMES

- a. Classification of enzymes
- b. General mechanisms of enzyme action
- c. Factors affecting the velocity of enzymes catalyzed reactions.
- d. Activators and inactivators of enzymatic reactions.
- e. Application of metabolic antagonism.

2. BIOLOGICAL OXIDATIONS

- a. Oxidation-reduction chains in nature
- b. Oxidative Phosphorylation

3. METABOLISM OF CARBOHYDRATES

- a. Anaerobic metabolism of Glucose
- b. Aerobic metabolism (Kreb's cycle)
- c. HMP pathway
- d. Regulation of blood glucose concentration
- e. Glycogenesis
- f. Glycogenolysis
- g. Gluconeogenesis

4. METABOLISM OF LIPIDS

- a. Fatty acid metabolism
- b. Oxidation of fatty acids
- c. Biosynthesis of fatty acids
- d. Synthesis and degradation of Triglycerides
- e. Hormonal influence on the mobilization of fat in adipose tissue.
- f. Ketosis

5. METABOLISM OF PROTEINS

- a. Amino acid degradation and urea cycle
- b. Metabolism of tyrosine and Tryptophan

6. PROTEIN SYNTHESIS

- a. Transmission and expression of genetic information
- b. DNA genetic role
- c. DNA structure and replication
- d. RNA and transcription
- e. Gene-protein relationship
- f. Control of protein synthesis.

7. METABOLISM OF NUCLEIC ACIDS Metabolism of purines and pyrimidines

8. METABOLISM OF INORGANIC ELEMENTS Calcium, Phosphorus, Magnesium,
Trace elements.

9. BASIC PRINCIPLES OF MOLECULAR BIOLOGY PRACTICAL

PRACTICAL: Total hours: 100

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 SCOT 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.

BOOKS RECOMMENDED

(Theory)

1. Bio-chemistry by Lubert Stryer
2. Textbook of Bio-chemistry by Abraham Mazur and Benjamin Harrow
3. Principles of Bio-chemistry by Albert L. Lehninger
4. Biochemistry- A functional approach by R.W. McGilvery and Gerald Goldstein
5. Bio-chemistry for medical students by M.V. Thorpe, H.G. Bray and Sybil P. James
6. Introduction to Bio-chemistry by Jhon W. Suttie
7. Harper's review of bio-chemistry by David W. Martin, Peter A. Mayes, Victor, W. Rodwell and associate authors.
8. Introduction to Modern Bio-chemistry by Karlson P.

(Practical)

1. Practical Bio-chemistry for students by Varun K. Malhotra
2. Practical Clinical Bio-chemistry by Harold Varley
3. An introduction to practical Bio-chemistry by David T. Plummer