

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

III Year B. Pharm I-Sem

T	P	C
3+1*	0	3

(R9401) PHARMACEUTICAL BIOCHEMISTRY

UNIT - I

Bio chemical organization of the cell, molecular constituents of membrane, active & passive transport process, sodium and potassium pumps, osmoregulation and heamostatis.

UNIT - II

Bio-energetics: The concept of free energy, laws of thermodynamics. Determination of change in free energy from equilibrium constant & reduction potential.

UNIT - III

The respiratory chain & its role in energy capture & its control. Oxidative phosphorylation & its energetics & Electron Transport Chain, mechanism of actions. Production of ATP and its biological significance

UNIT - IV

Enzymes & Co-Enzymes: Classification, Structure, mechanism of action, properties, factors affecting enzymes action. Activators & de activators of enzymes, enzyme kinetics & enzyme inhibitions, repressions with reference to drug action.

UNIT - V

Metabolism of Carbohydrates: Biochemistry of carbohydrates, Glycolysis, glycogenesis, glycogenolysis, gluconeogenesis, Kreb's cycle, HMP shunt & uronic acid pathways, anaerobic respiration in muscle.

UNIT - VI

Metabolism of Proteins: Biochemistry of proteins, *Amino acid structure & classifications, de amination, Trans-amination, de-carboxylation, Urea cycle, Metabolism of Valine, cystine, cystein, tryptophan, tyrosine, methionine.*

UNIT - VII

Metabolism of Lipids:

Biochemistry of lipids, Alpha, Beta, Gama & Omega oxidations of fatty acids, bio-synthesis of fatty acids, cholesterol, ketogenesis.

UNIT – VIII

Introduction to xenobiotic metabolism, detoxification mechanisms, Biochemistry and metabolism of nucleic acids and vitamins.

TEXT BOOKS

1. Harper, Biochemistry
2. A.L.Lehninger, Principles of Biochemistry.
3. J.L.Jain, Fundamentals of Biochemistry
4. Satyanarayana, Text Book of Biochemistry
5. Rama Rao, Text Book of Bio Chemistry.
6. Conn, Outlines of biochemistry

REFERENCES

1. L.Stryer, Text Book of Bio Chemistry.
2. E.E Conn & P.K. Stumpf, Outlines of Biochemistry by, Publ, John Wiley & sons, New York.
3. B.Harrow and A. Mazur, Text Book of Biochemistry, WB Saunders Co., Philadelphia.
4. Boyer Rodney, Modern experimental Bio Chemistry.
5. West, Edward Text Book of Biochemistry.
6. Conn, Outlines of Biochemistry.
7. Plummer, Practical Bio Chemistry.
8. Denniston, Topping & Caret; General, Organic, and Biochemistry, McGraw-Hill

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(R9402) PHARMACEUTICAL MICROBIOLOGY

UNIT - I

Introduction to Microbiology : Origin, scope and discovery of spontaneous generations theory, contributions of Antony Von Lewvonhock, Pasteur, Koch and Lister.

UNIT - II

Diversity of Microorganisms : Prokaryotes versus eukaryotes – three domains of life (bacteria, archea and eukaryotics). A detailed study of bacteria, yeasts, molds and viruses. Pharmaceutical significance of protozoa, algae, fungi, bacteria and viruses. Characterisation and identification of microorganisms.

UNIT - III

Nutrition and Growth of Microbes : Nutritional requirements, Types of Nutrient media and growth conditions and Nutritional types based on energy source. Isolation, cultivation (aerobic & anaerobic) and preservation of microorganisms, physiology of growth, bacterial growth curve, influence of various factors (including environmental factors) on microbial growth, Enumeration of bacteria, Exponential growth and generation time, Bacterial growth in batch and continous cutlru (chemostat and turbidostat) synchronous growth.

UNIT - IV

Control of Microorganisms : General Concepts, Inhibition of growth and killing, sterilization and disinfection, antiseptis and sanitation, mode of action application & limitation of physical agents (moist and dry heat, radiation and filtration), chemical agents. Various types of disinfectants, factors affecting sterilization and disinfection, evaluation of antimicrobial activity, Chemotherapantic agents, mode of action and applications, drug resistance.

UNIT - V

Official methods of sterility testing of pharmaceuticals and biosafety measures.

UNIT – VI

Bacterial Genetics : Genetic recombination in bacteria, DNA replication, transcription and translation. Gene regulation (lac operon and tryptophan operon). Mutagenesis, chemical and physical mutagens.

UNIT – VII

Introduction to Microbiology of Air, Water and milk and methods of quantitative evaluation of microbial contamination.

UNIT – VIII

Microbiological Assays : Principles and Methods involved in Assay of Antibiotics, Vitamins, Amino acids & Bio-Sensors in Analysis.

TEXT BOOKS

1. Pelczar and Reid, Text Book of Microbiology
2. Anantha Narayan and Jayram Panikar, Text Book of Microbiology, Orient Longman, Delhi, Hyderabad.
3. Tortora / Funke / Care / Microbiology an introduction.
4. N.K. Jain, Pharmaceutical Microbiology
5. Alcamo, Microbiology.
6. R.C. Dubey, A textbook of Microbiology
7. Indian Pharmacopoeia

REFERENCES

1. Heritage, J Introductory Microbiology
2. Nester, Anderson, Roberts, Pearsall, Microbiology, McGraw-Hill
3. Hugo, W B Pharmaceutical Microbiology.
4. Tortora, Gerard Text Book of Microbiology.
5. E.A Rawlins, Betley's Text Book of Pharmaceutics, 8th ed
6. Garg, F C Experimental Microbiology
7. Gaud, R S Practical Microbiology
8. Harrish M. Baillere, Tindal and Co., London, Pharmaceutical Microbiology.
9. Pharmaceutical Microbiology, Dr. K. N. Jayaveera.

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(R9403) PHARMACOGNOSY – II

UNIT I

Definition, classification, tests and detailed pharmacognostic study of the following glycoside containing drugs.

- | | | | |
|----|--------------------------|---|--|
| a. | Saponin Glycosides | : | Glycyrrhiza, Ginseng, Discorea and Senega. |
| b. | Cardioactive Glycosides | : | Digitalis, Squill, Strophanthus. |
| c. | Anthraquinone Glycosides | : | Aloe, Senna, Rhubarb & Cascara. |
| d. | Bitter Glycosides | : | Psoralea, Gentian, Chirata. |

UNIT II

Definition, classification, general methods of extraction, tests and detailed pharmacognostic study of the following Alkaloid containing drugs.

- | | | | |
|----|-----------------------------------|---|-------------------------------------|
| a. | Pyridine – Piperidine derivatives | : | Tobacco & Lobelia. |
| b. | Tropane | : | Hyoscyamus, Datura & Aswagandha. |
| c. | Quinoline & Isoquinoline | : | Cinchona, Ipecac, Opium. |
| d. | Indole | : | Ergot, Rauwolfia, Vinca, Nux-vomica |
| e. | Steroid | : | Kurchi |
| f. | Alkaloidal amine | : | Ephedra & Colchicum. |

UNIT III

Study of Tannins & Tannin containing drugs : Gambir, Black catechu, Myroblan & Arjuna.

UNIT IV

Defination & study of drugs contining resin & resin combinations : Benzoin, Asafoetida, Balsam of Tolu, Podophyllum.

UNIT-V Biological sources, preparations, identification tests and uses of the following enzymes : Diastase, Papain, Pepsin, Trypsin, Pancreatin.

UNIT-VI

General techniques of biosynthetic studies and basic metabolic pathways. Brief introduction to biogenesis of secondary metabolites of pharmaceutical importance.

UNIT - VII

Natural dyes and their applications in pharmacy.

UNIT -VIII

Study of mineral drugs : Bentonite, Kaolin, Keisulghur and Talc

TEXT BOOKS

1. Kokate C.K., Purohit AP & Gokhale, The Pharmacognosy S.B (Nirali)
2. Trease and Evans, Pharmacognosy, Latest Edition.
3. Tyler, Brady & Robert, Pharmacognosy.
4. Khare C.P. Indian Medicinal plants – An Illustrated dictionary

REFERENCES

1. Atal C.R & Kapur B.M, Cultivation & Utilization of Medicinal Plants.
2. Wallis, Textbook of pharmacognosy, Pub by CBS Publishers and distributors, New Delhi.
3. Ayurvedic Pharmacopoeia of India. Pub by Govt. Of India
4. Herbal Drug Industry Eastern Publishers., New Delhi.
5. J.B.Harbone, Phytochemical Methods: A guide to modern techniques of Plant analysis.

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(R9404) PHARMACEUTICAL TECHNOLOGY – I**UNIT-I****Preformulation :**

- a. Introduction and objectives of preformulation study and development of dosage forms, Physical and Chemical aspects.
- b. Stability and bioavailability study of prodrugs in solving problems related to stability bio-availability in formulations.
- c. Stability testing of finished products as per ICH guidelines.

UNIT-II**Liquid dosage forms:**

- a. Introduction, types of additives used in formulations, vehicles, stabilizers, preservatives, suspending agents, emulsifying agents, solubilizers, colors, flavours and others.
- b. Dry Syrups, Formulation, Preparation, Evaluation and special applications, examples.

UNIT-III**Semisolid dosage forms :**

- a. Definitions, types, mechanisms of drug penetration, factors influencing penetration, semisolid bases and their selection. General formulation of semi solids, clear gels manufacturing procedure, evaluation and packaging.
- b. Dispersed Systems : Suspensions –suspension formation, formulation and evaluation. Emulsions – Formulation, study of mechanical equipment for emulsification, Chemical parameters, stability testing and assessment of shelf life.

UNIT-IV**Pharmaceutical aerosols :**

Definition, propellants general formulation, manufacturing and packaging methods, pharmaceutical applications and evaluation.

UNIT-V

Ophthalmic Preparations : Requirements, formulation, methods of preparation, containers and evaluation.

UNIT-VI

Cosmeticology and Cosmetic Preparations –I : Fundamentals of cosmetic science, structure and functions of skin and hair. Formulation, preparation and packaging of cosmetics for skin, hair.

UNIT-VII

Cosmeticology and Cosmetic Preparations –II : Formulation, preparation & packaging of dentrifices like tooth powders, pastes, gels etc., and manicure preparations like nail polish, lipsticks, eye lashes, baby care products etc.

UNIT-VIII

Suppositories : Ideal requirements of bases, Different types of bases, manufacturing procedure packing and evaluation.

TEXT BOOKS

1. L. Lachman, H.A. Lieberman and J.L. Kanig, Theory & Practice of industrial pharmacy, Lea & Febieger, Philadelphia Latest Edn.
2. CVS. Subramanyam, Pharmaceutical production and management, Vallabh Prakashan, New Delhi 2005.

REFERENCES

1. Shobha Rani, Text of Industrial Pharmacy, Hiremath Orient Longman
2. Sagarian & MS Balsam, Cosmetics Sciences & Technology Vol.1, 2 & 3
3. Lippincott Williams and Wilkins, Remington Pharmaceutical Sciences
4. E.A.Rawlkins, Bentley's Text Book of Pharmaceutics, Elbs publ
5. HC Ansel Introduction to Pharmaceutical Dosage forms
6. S.H. Willing, M.M Tucherman and W.S. Hitchings IV, Good Manufacturing Practices for Pharmaceuticals: A Plan for Total Quality Control, Marcel Dekker, Inc., New York 1998.
7. Gilbert S. Banker and Christopher T Rhodes, Modern Pharmaceutics, IVth ed, Marcel Dekker, USA, 2005.
8. Yiew Chien, novel drug delivery systems, Marcel Dekker 2003.
9. Robert. A. Nash, Pharmaceutical Process Validation, 3rd Ed Marcel Dekker, 2003.
10. Good Manufacturing Practices – Schedule M Read With The Drugs And Cosmetic Rules 1945

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(R9405) PHARMACOLOGY – I**UNIT I**

General Pharmacology : Introduction to pharmacology, sources of drugs, dosage forms and routes of administration, mechanism of action, combined effect of drugs, factors modifying drug action, tolerance and dependence, pharmacogenetics. Absorption, distribution, Metabolism and excretion of drugs, principles of drug discovery and phases of drug development. Adverse drug reactions and Adverse drug events.

UNIT II

Pharmacology of Peripheral Nervous System :

- a. Neurohumoral transmission (autonomic and Somatic)
- b. Parasympathomimetics, parasympatholytics, sympathomimetics & sympatholytics

UNIT III

Adrenergic Receptor and neuron blocking agents, Ganglionic-stimulants and blocking agents.

- a. Neuromuscular blocking agents
- b. Local anesthetic agents.

UNIT IV

Pharmacology of Central Nervous System : I

- a. Neurohumoral transmission in the C.N.S.
- b. General anesthetics.
- c. Alcohols and disulfiram.

UNIT V

Pharmacology of Sedatives, hypnotics, anti anxiety agents and centrally acting muscle relaxants.

UNIT VI

Psychopharmacological agents (antipsychotics) Antidepressants, anti-manics and hallucinogens)

UNIT VII

Pharmacology of Anti epileptic drugs, Anti Parkinsonian Drugs

UNIT VIII

Analgesics, Antipyretics, Anti inflammatory and Anti gout drugs.

- Narcotic analgesics and antagonists.
- C.N.S. stimulants
- Drug Addiction and Drug Abuse.

TEXT BOOKS

- Sathoskar, Pharmacology and pharmaco therapeutics Vol. 1 & 2, Publ by Popular Prakashan, Mumbai.
- Bertram. G. Katzung, Basic and clinical pharmacology, 9th Edn
- Tripathi, Text book of Pharmacology
- Rang & Dale, Text book of Pharmacology.

REFERENCE BOOKS

- J.G. Hardman and Lee E. Limbard, Good Mann & Gilman, The Pharmacological basis of therapeutics, Mc Graw hill, Health Professions Dvn.
- H.P Rang, M. M. dale & J.M. Ritter, Pharmacology, Churchill living stone, 4th Ed.
- J. Crossland, Lewis's Pharmacology, Church living stone.
- Ruth Woodrow, Essentials of Pharmacology for Health Occupations by.

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(R9406) PHARMACEUTICAL BIOCHEMISTRY LAB

Experiments:

- To prepare standard buffers (citrate, phosphate & carbonate) and measure the pH.
- Titration curve for amino acids.
- Separation of amino acids by two dimensional paper chromatography & gel electrophoresis.
- The separation of lipids by T.L.C.
- Identification of carbohydrates
- Identification of amino acid.
- Identification of lipids.
- Estimation of glucose in urine.
- Estimation of creatinine in urine.
- Estimation of urea in blood.
- Estimation of creatinine in blood.
- Estimation of Serum protein.
- Estimation of bile pigments in serum.
- Estimation of alkaline phosphatase in serum
- Effect of temperature on the activity of alpha-amylase.

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III Year B. Pharm I-Sem

T	P	C
0	3	2

(R9407) PHARMACEUTICAL MICROBIOLOGY LAB

1. Introduction to equipment and glassware used in microbiology laboratory.
2. Study of morphology of different microbes
3. Preparation of various culture media and cultivation of microbes and observation of colony characteristics.
4. Sterilization techniques (moist and dry heat) and their validations.
5. Aseptic transfer of culture into different types of media.
6. Characterisation of microbes by staining techniques (simple, gram's, acid fast and negative staining).
7. Study of motility of bacteria by hanging drop method.
8. Characterisation of microbes through Bio chemical reactions:
 - i) Indole test.
 - ii) Methyl red test.
 - iii) Voges proskauer test.
 - iv) Starch hydrolysis test.
 - v) Fermentation of carbohydrates.
9. Enumeration of bacteria by pour plate/spread plate technique.
10. Enumeration of bacteria by direct microscopic count.
11. Isolation of pure cultures by streak plate, spread plate, pour plate.
12. Evaluation of disinfectant by phenol – coefficient test
13. Study of Oligodynamic action (of metals on bacteria)
14. Preservation of microorganisms (slant and stab cultures)
15. Microbiological Analysis of Water.

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III Year B. Pharm I-Sem

T	P	C
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(R9408) PHARMACOGNOSY II LAB

1. Macroscopy, Microscopy and Chemical Evaluation of any four glycoside containing crude drugs and study of their powder characters given in theory.
2. Macroscopy, Microscopy and Chemical Evaluation of any four alkaloid containing crude drugs and study of their powder characters given in theory.
3. Physical and Chemical method of evaluation of any three tannin containing crude drugs and study of their powder characters given in theory.
4. Physical and Chemical method of evaluation of any three resin containing crude drugs and study of their powder characters given in theory.
5. Organoleptic study of crude drugs mentioned in theory.

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T	P	C
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(R9409) PHARMACEUTICAL TECHNOLOGY - I LAB

1. Preparation, evaluation and packaging of solutions, suspensions and emulsions, ointments, Suppositories, aerosols, eye drops and eye ointments. Minimum of two experiments in each category.
2. Formulation of various types of cosmetics for skin, hair, dentrifices and manicure preparations. Minimum of two experiments in each category.