

(R40012) PHARMACEUTICAL UNIT OPERATIONS - II

Objective: The student shall be taught on operations like evaporation, drying, objective of size reduction, size separation and mixing.

UNIT I

Evaporation: Basic concept of phase equilibria, factors affecting the evaporation, evaporators, film evaporators, and single effect evaporators.

UNIT II

Drying: Moisture content and mechanism of drying, rate of drying and time of drying calculations, classification and types of dryers, dryers used in pharmaceutical industries tray dryer, Fluid bed dryer, spray dryer and freeze-dryer.

UNIT III

Size Reduction: Definition, objectives of size reduction, factors affecting size reduction, laws governing energy and power requirements of a mill, types of mills including ball mill, hammer mill and fluid energy mill.

UNIT IV

Size Separation: Official standards for powders, sieves, modes of motion in size separation. Sieve Analysis - Testing of powders. Equipment for size separation.

UNIT V

Mixing: Theory of mixing, solid-solid, solid-liquid and liquid-liquid mixing equipment, double cone, twin-shell, silverson mixer, colloid mill, sigma blade mixer, planetary mixer, propeller mixer and turbine mixer.

Outcome: Student will be familiar with concepts of evaporation, drying, size reduction, mixing and understand the pharmaceutical applications in industry.

TEXT BOOKS

1. S.J. Carter, Cooper and Gunn's Tutorial Pharmacy, 6th ed., CBS publisher, Delhi.
2. CVS Subhramanyam, Pharmaceutical Engineering.
3. K. Samba Murthy, Pharmaceutical Engineering
4. Mc Cabe & Smidth. Unit Operations.

REFERENCE BOOKS

1. W.I. Macebe and J. C. Smith Macro, Unit Operations To Chemical Engineering, Hill Int. Book Co., London.

2. L. Lachman, H. Lieberman & J. L Kaniz, The Theory And Practice Of Industrial Pharmacy, Lee & Febiger Philadelphia, USA.
3. Badzer & Banchoro, Introduction to Chemical Engineering.
4. Perry's Handbook of Chemical Engineering.
5. M.E.Aulton, Pharmaceutics- The science of dosage form design, 2nd ed.
6. E.A. Rawlin's, Bentley's Text Book of Pharmaceutics, 8th ed ELBS.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

II Year B.Pharm - II Sem

L	P	C
4+1	-	4

(R40013) PHARMACEUTICAL BIOCHEMISTRY

Objective: The metabolism of complex biochemical substances are discussed in detail. The Biochemical organization and Bioenergetics which will help the students to understand the concepts of biochemistry.

UNIT I

(a) Biochemical organization of the cell, molecular constituents of membrane, active & passive transport process, sodium and potassium pumps, osmoregulation and homeostasis.

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

(c) 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 II

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 III

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

UNIT IV

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 V

(a) Metabolism of Lipids:

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

(b) Introduction to xenobiotic metabolism, detoxification mechanisms, biochemistry and metabolism of nucleic acids and vitamins.

Outcome: The metabolism of complex biochemical compounds would make the students to gain a good knowledge about biochemical organization in

the human system.

TEXT BOOKS

1. Harper's Biochemistry
2. A.L. Lehninger, Principles of Biochemistry.
3. Satyanarayana, Text Book of Biochemistry.
4. Text book of biochemistry by S.C. Rastogi.
5. Text book of biochemistry by Sindhe and Chatarjee.

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. Plummer, Practical Bio Chemistry.
7. Denniston, Topping & Caret; General, Organic, and Biochemistry, McGraw-Hill.
8. A.V.V.S. Rama Rao, Text Book of Bio Chemistry.
9. Pharmaceutical biochemistry by S.Chand, Dr. K.N. Jayveera, Dr. Subrahmanyam, Dr. K. Yogendra Reddy.
10. Biochemistry atlas by Jan Koolman Klaus - Heinrich Roghm.
11. Panini Biochemistry- an essential text review- thieme publications.

(R40014) PHARMACOGNOSY -I

L	P	C
4-1	-	4

Objective: To know the medicinal and pharmaceutical importance of drugs obtained from the natural sources and to acquire the knowledge on crude drugs by studying them under a suitable pharmacognostic scheme.

UNIT I

Definition, History and Scope of Pharmacognosy.

Crude drugs : Organized and Unorganized crude drugs, Classification of crude drugs. Scheme for pharmacognostic study of crude drugs.

UNIT II

Cultivation, Collection, Processing of Crude drugs:

Merits and demerits of cultivation of crude drugs. Exogenous factors affecting cultivation. A brief account of pests and methods of pest control. A brief introduction to plant growth regulators. Collection and processing of crude drugs.

UNIT III

Quality Control of Crude Drugs: Crude drug adulteration; Types of adulterants, evaluation of a crude drug and methods of evaluation.

UNIT IV

- A general introduction to carbohydrates, proteins and enzymes.
- Systematic pharmacognostic study of Agar, Isapgol and Gelatin.
- Biological source, collection, preparation, chemical constituents, chemical tests and uses of the following crude drugs - Guar gum, Gum acacia.
- Honey, Pectin, Starch, Sterculia, Tragacanth, Papain and Diastase.

UNIT V

- General Introduction to Lipids.
- Biological source, collection, preparation, chemical constituents, chemical tests and uses of the following crude drugs - Castor oil, Olive oil, Linseed oil, Cod liver oil, Shark liver oil, Cocoa butter, Kokum butter, Bees wax, Wool fat, Lard.

Outcome: At the end of the semester the student shall be aware of different sources of crude drugs, cultivation aspects of medicinal and aromatic plants, evaluation methods for crude drugs, the medicinal importance and the role of crude drugs as excipients in various pharmaceutical dosage forms.

TEXT BOOKS

- Kokate C.K, Purohit AP & Gokhale Pharmacognosy S.B (Nirali)
- Tresse and Evans Pharmacognosy, Latest Edition.
- Tyler, Brady & Robert, Pharmacognosy.
- T.E.Wallis, Textbook of Pharmacognosy, Pub by CBS Publishers and distributors, New Delhi.

REFERENCES

- Atal C.R & Kapur B.M, Cultivation & Utilization of Medicinal Plants.
- Ayurvedic Pharmacopoeia of India, Pub by Govt. of India.
- A.A. Farooqi & B.S. Sree Ramu, Cultivation of Medicinal and Aromatic Crops, University Press, Hyderabad.
- CSIR Publications, Wealth of India.
- Handa and Kapoor, Text Book of Pharmacognosy.
- Gokhale, Pharmacognosy.
- Md. Ali, Pharmacognosy.
- Heinrich, Fundamentals of Pharmacognosy and Phytotherapy.
- B.P. Pandey, Economic Botany.
- Pharmacognosy, Phytochemistry, Medicinal Plants by Jean Bruneton.
- Pharmacognosy and Phytochemistry by Vinod Rangari.
- Anatomy of crude drug by M.A.Iyengar.
- Pharmacognosy by C.S. Shah & Qadery.
- Pharmacognosy of powdered crude drugs by M.A.Iyengar.

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(R40015) PHYSICAL PHARMACY - II

Objective: The student shall be taught on industrial phenomenon of liquids, rate & order of reactants, micromeritics, flow of liquids and type of colloids and their properties.

UNIT I

Kinetics: Rates and orders of the reaction. Influence of temperature and other factors on reaction rates. Decomposition and stabilization of medicinal agents, kinetics in the solid state and accelerated stability analysis (relevant numerical problems).

UNIT II

a. Interfacial Phenomena: Liquid interfaces, measurement of surface and interfacial tensions, adsorption at liquid interfaces. Surface-active agents and HLB scale. Adsorption at solid interfaces. Electrical properties of interfaces.

b. Colloids: Introduction, types of colloidal systems, solubilization, Stability of colloids, optical properties, kinetic properties, electrical properties and Donnan Membran equilibrium.

UNIT III

Micromeritics: Particle size and size distribution, methods for determining surface area, methods for determining particle size, pore size, particle shape and surface area, derived properties of powders.

UNIT IV

Rheology: Newtons law of flow, Newtonian systems, non-Newtonian systems, thixotropy, measurement and applications in formulations. Determination of viscosity (study of working of different viscometers like cup and bob, Brookfield, Ostwald's, cone and plate, capillary viscometers) and its applications.

UNIT V

Coarse Dispersions: Suspensions: Types of suspensions, interfacial properties of suspended particles, stability evaluation, settling in suspensions, formulation of suspensions.

Emulsions: Theories of emulsification, physical stability of emulsions, preservation of emulsions, rheological properties of emulsions and suspensions.

Outcome: Student will know about influence of temperature and other factors on rate of reactants, interfacial phenomena, particle size & distribution,

Newtonian and Non-Newtonian flows.

TEXT BOOKS

1. Patrick J. Sinko, Martin's Physical Pharmacy and Pharmaceutical Sciences 5th Edition.
2. CVS Subramanyam, Physical Pharmacy, Vallabh prakashan.
3. L. Lachman, H. Lieberman The Theory And Practice Of Industrial Pharmacy J. L Kaniz Lee & Febiger Philadelphia, USA.

REFERENCE

1. Lippincott Williams and Wilkins, Remington Pharmaceutical Sciences.
2. M.E. Aulton, Pharmaceutics - The science of dosage form design, 2nd edn.
3. Derle D.V., Essentials of Physical Pharmacy.

(R40016) ENVIRONMENTAL STUDIES

Objectives:

1. This course will give the importance of maintenance of ecological balance for sustainable development.
2. Understanding the impacts of developmental activities and mitigation measures.
3. Understanding of environmental policies and regulations

UNIT-I :

Ecosystems: Definition, Scope and Importance of ecosystem. Classification, structure and function of an ecosystem, Food chains, food webs and ecological pyramids. Flow of energy, Biogeochemical cycles, Bioaccumulation, Biomagnification, ecosystem value, services and carrying capacity, Field visits.

UNIT-II:

Natural Resources: Classification of Resources: Living and Non-Living resources, **water resources:** use and over utilization of surface and ground water, floods and droughts, Dams: benefits and problems. **Mineral resources:** use and exploitation, environmental effects of extracting and using mineral resources, **Land resources:** Forest resources, **Energy resources:** growing energy needs, renewable and non renewable energy sources, use of alternate energy source, case studies.

UNIT-III:

Biodiversity and Biotic Resources: Introduction, Definition, genetic, species and ecosystem diversity. Value of biodiversity; consumptive use, productive use, social, ethical, aesthetic and optional values. India as a mega diversity nation, Hot spots of biodiversity. Field visit. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts; conservation of biodiversity: In-Situ and Ex-situ conservation. National Biodiversity act.

UNIT-IV:

Environmental Pollution and Control Technologies: Environmental Pollution & control: Classification of pollution, causes, effects and control technologies. **Air Pollution:** Primary and secondary pollutants, Automobile and Industrial pollution, Ambient air quality standards. **Water pollution:** Sources and types of pollution, drinking water quality standards. **Soil Pollution:** Sources and types, Impacts of modern agriculture, degradation of soil. **Noise Pollution:** Sources and Health hazards, standards, **Pollution**

from Power projects, **Solid waste:** Municipal Solid Waste management, composition and characteristics of e-Waste and its management. **Pollution control technologies:** Wastewater Treatment methods: Primary, secondary and Tertiary, Air: Overview of air pollution control technologies, Concepts of bioremediation. Field visit. **Global Environmental Problems And Global Efforts:** Climate change and impacts on human environment, Ozone depletion and Ozone depleting substances (ODS). Deforestation and desertification. International conventions / Protocols: Earth summit, Kyoto protocol and Montréal Protocol.

UNIT-V:

Environmental Policy, Legislation & EIA: Environmental Protection act, Legal aspects Air Act- 1981, Water Act, Forest Act, Wild life Act, Municipal solid waste management and handling rules, biomedical waste management and handling rules, hazardous waste management and handling rules. EIA: EIA structure, methods of baseline data acquisition. Overview on Impacts of air, water, biological and Socio-economical aspects. Strategies for risk assessment, Concepts of Environmental Management Plan (EMP). **Towards Sustainable Future:** Concept of Sustainable Development, Population and its explosion, Crazy Consumerism, Environmental Education, Urban Sprawl, Human health, Environmental Ethics, Concept of Green Building, Ecological Foot Print, Life Cycle assessment (LCA), Low carbon life style.

SUGGESTED TEXT BOOKS:

1. Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission.
2. Environmental Studies by R. Rajagopalan, Oxford University Press.

REFERENCE BOOKS:

1. Environmental Science: towards a sustainable future by Richard T.Wright. 2008 PHL Learning Private Ltd. New Delhi.
2. Environmental Engineering and science by Gilbert M.Masters and Wendell P. Ela. 2008 PHI Learning Pvt. Ltd.
3. Environmental Science by Daniel B.Botkin & Edward A.Keller, Wiley INDIA edition.
4. Environmental Studies by Anubha Kaushik, 4th Edition, New age international publishers.
5. Text book of Environmental Science and Technology - Dr. M. Anji Reddy 2007, BS Publications.