Course Code	Course Title	C	H	I	E	T
17P2CME2	BIOCHEMISTRY	4	4	25	75	100

UNIT I BIO-INORGANIC CHEMISTRY I 12 Hrs

Transport proteins, oxygen carriers in various bio systems. Porphyrin system-metalloporphyrins. - hemoglobin- myoglobin – structure and work functions. Bohr effect, cooperativity - Perurtz machanism, synthetic oxygen carriers. Cytochromes and their classification, Structure and work functions in respiration etc. Copper containing proteins and their classification – Blue copper proteins, role of cytochrome C oxidase and Cyt P –450. Non-heme iron proteins-rubredoxin and various ferridoxins.

UNIT II BIO-INORGANIC CHEMISTRY II 12 Hrs

Chlorophyll –structure-photosynthetic sequence – salient features of photosynthetic process. Corrin system, vitamin B_{12} and B_{12} coenzymes and their structures. Role of B_{12} coenzymes. *In-vivo and in-vitro* nitrogen fixation – structure and function of nitrogenase. Zinc enzymes-carbonic anhyhdrase, carboxy peptidase and superoxide dismutase, structure and mechanism of their action, enzyme action – inhibition and poisoning. Essential and trace elements in biological system-metal ion toxicity and detoxification.

UNIT III MEDICINAL CHEMISTRY - BASIC PERCEPTIONS 12 Hrs

Concept of drug, lead compound and lead modification, prodrugs and soft drugs - Structure Activity Relationship (SAR), Quantitative Structure Activity Relationship (QSAR) – isosterism and bio- isosterism – Induced fit theory of drug activity – Concepts of drug receptors – elementary treatment of drug receptor interactions – Physicochemical parameters – lipophilicity, partition coefficient, steric and electronic ionization constants – Factors affecting modes of drug administration, absorption, metabolism and elimination – significance of drug metabolism in medicinal chemistry.

UNIT IV NUCLEIC ACIDS 12 Hrs

Introduction – Definition - Chemical and enzymatic hydrolysis of nucleic acids – Structure and function of mRNA, tRNA, rRNA – Polymorphic nature of DNA, B- and Z- DNA, multi-stranded DNA – DNA sequence determination by chemical and enzymatic methods, Genetic code – origin, salient features, wobble hypothesis – Gene expression – transcription and translation – Gene mutation and carcinogenesis.

UNIT V NANO CHEMISTRY 12 Hrs

Nano material: Introduction – definition- 0D, 1D, 2D, and 3D Nanomaterial and examples. Preparation of simple nanomaterials (nanometal, Metal oxide, semiconductor) – Chemical reduction method – Sputtering coating method – Sol-gel method and chemical vapour deposition method.

Properties: Size effect – Colour – Magnetic properties

Characterization: Principles and applications of Scanning electron microscope (SEM) – Transmission electron microscope (TEM) – Atomic force microscope (AFM).

Carbon nano structures: Preparation, properties and application of Single-walled carbon nanotube and Multi-walled carbon nanotubes.

Text Book(s):

1. Huheey, J.E. Keiter, E.A. and Keiter, R.L. Inorganic Chemistry Principles of Structure and Reactivity (4th edition): Pearson Education Inc.,2006.
2. Shriver, D.F., Atkins, P.W. and Langford, C.H. Inorganic Chemistry, 3rd edition, Oxford Univ. Press, 1999.
3. Lehninger, A.L., "Principles of Biochemistry", Second Edition, CBS Publications, New Delhi, 2002.
4. Faber, K., "Biotransformations in Organic Chemistry", Fifth Edition, Springer, New York, 2008.
5. Burger, A. Medicinal Chemistry, Parts I & II, Wiley, N.Y., 1970.
6. Purcell, K.F. and Kotz, J.C. Inorganic Chemistry, W.B. Saunders Company,(1977
7. Stryer, L. Biochemistry, IV Edn., Freemann and Company, New York (1995).
8. Nelson, D.L. and Cox, M.M. Lehninger Principles of Biochemistry, 5th edition Freemann and Company, New York (2011).
9. Pradeep, T Understanding nanoscience and nanotechnology.

Reference Books:

1. Jain, J.L., "Fundamentals of Biochemistry", Fourth Edition, S. Chand & Company Limited, New Delhi, 2011.
2. Holum, J.R. Introduction to organic and biological chemistry, John Wiley, N.Y. 1969.
3. Charles P. Poole Jr, Frank J. Owens. Introduction to nanotechnology.
4. Taylor, J. B. and Kennewell, P.D. Introduction to Medicinal Chemistry, Ellishorwood, West Sussex, 1981.
5. Chatwal, G.R. Synthetic Drugs, Himalaya Publishing House, Bombay, 1986.
6. Hussain Reddy, K. Bioinorganic chemistry New Age Publishers New Delhi, (2009).