



MANGALORE UNIVERSITY

DEPARTMENT OF CHEMISTRY

M.Sc. APPLIED CHEMISTRY

AC H 501: COORDINATION CHEMISTRY

COURSE OUTCOME:

- In this course, students will learn metal and non metal ions in biological systems,
- Biological nitrogen fixation, Photocatalysis, Transport and storage of dioxygen,
- Metal storage and Transport, Metalloproteins as enzymes, Therapeutic uses of metals,
- Metal complexes as drugs, Treatment of toxicity due to inorganics.

UNIT – I

[15Hours]

Therapeutic uses of Metals - Metals in medicine: Metals and human biochemistry, general requirements. Disease due to metal deficiency and treatment: Iron, zinc, copper, sodium, potassium, magnesium, calcium and selenium. Metal complexes as drugs and therapeutic agents: Antibacterial agents, antiviral agents, metal complexes in cancer therapy, metal complexes for the treatment of rheumatoid arthritis, vanadium in diabetes, metal complexes as radio diagnostic agents Treatment of toxicity due to inorganics: General aspects of mechanism of metal ion toxicity, (i) Mechanism of antidote complex with poison, rendering it inert: arsenic, lead, mercury, iron, copper (ii) Antidote accelerated metabolic conversion of poison to non-toxic product: cyanide and carbon monoxide

UNIT -II:

[15Hours]

Metal ions in biological systems-essential and trace metals, ion transport across membranes, active transport of ions across biological membranes, ionophores. Biological nitrogen fixation, Molybdenum nitrogenase Model compounds, in vitro fixation of nitrogen through dinitrogen complexes. Metal complexes in transmission of energy-chlorophylls. photosystems I and II in cleavage of water, model systems.

UNIT-III:

[15Hours]

Transport and storage of dioxygen- heme proteins, oxygen uptake, functions of haemoglobin, myoglobin, hemerythrin and hemocyanins, synthetic oxygen carriers. Metal storage and transport – ferritin, transferrin and ceruloplasmin. Electron transfer proteins-cytochromes, iron-sulphur proteins. Metalloproteins as enzymes – carboxy peptidase, carbonic anhydrase, alcohol dehydrogenase, catalases, peroxidases, cytochrome P 450, superoxide dismutase, copper oxidases, vitamin B₁₂ coenzyme.

References:

1. M.N. Hughes: Inorganic Chemistry of Biological Processes, (2ndedn.) Wiley, 1988.
2. I. Bertini. H.B. Gray, S.J. Lippard and J.S. Valentine: Bioinorganic Chemistry, Viva Books, 1998.
3. J.E Huheey, R.L. Keiter and A.L. Keiter: Inorganic Chemistry(4thedn), Addison Wesley, 2000.
4. K. Hussain Reddy, Bioinorganic Chemistry - New Age International Ltd. (2003).
5. R.W. Hay, Bioinorganic Chemistry - Ellis Horwood Ltd., (1984)
6. Asim K Das, Bioinorganic chemistry, Books & Allied (P) Ltd.