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: **[15 Hours]**

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 ans 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 B_{12} coenzyme.

References:

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

AC H 502: SYNTHETIC REAGENTS AND HETEROCYCLIC CHEMISTRY

COURSE OUTCOME:

- Students will learn the preparation, properties, reactions and uses of organometallic reagents such as organolithium, organomagnesium, organozinc, organocadmium, organomercury, organoindium, organosilicon, organoborane, organotin and organopalladium reagents.
- Students will know the uses of Gillman's reagent, LDA, DCC, 1,3-dithiane, TMSI, DDQ, SeO_2, Wikinson's catalyst, PTCs, Baker's yeast, PPA, TMS-CN, hydrosilane, chloramines-T, Woodward-Prevost hydroxylation, and crown ethers in organic synthesis and functional group transformation.
- Students will understand the systematic nomenclature of various types of heterocyclic compounds with multiple examples.
- Students will get the sound knowledge on the structure, synthesis and reactions of various three, four, five, six and seven membered simple and fused heterocyclic compounds.

UNIT- I: Reagents in Organic Synthesis-I **[15 Hours]**

Organometallic Reagents: Preparation and properties of Organolithium and organomagnesium compounds. Their uses in organic synthesis and in the preparation of Organometallic

compounds. Methods of preparation, properties, reactivity and reactions of Organozinc, Organocadmium, Organomercury and Organoindium reagents.

Silicon containing Reagents: Introduction, preparation reactions & stereochemistry, Peterson reaction.

Boron containing Reagents: Introduction, preparations, Hydroborations, reactions of Organoboranes- Isomerization, oxidation, protonolysis, carbonylation, cyanidation. Synthesis of esters, E and Z alkenes, conjugated dienes and alkynes.

Organotin Compounds: Synthesis of Organostannanes and their utility in C-C bond forming reactions. Barton decarboxylation reaction, Barton deoxygenation, Stelly-Kelly coupling reaction.

Palladium reagents: Heck and Negishi reaction.

UNIT- II: Reagents in Organic Synthesis-II **[15 Hours]**

Use of the following reagents in Organic synthesis and functional group transformation:

Gillman's reagent, Lithium diisopropylamide (LDA), Dicyclohexylcarbodiimide (DCC), 1,3-dithiane (reactivity-umpolong), Trimethylsilyliodide, DDQ, Selenium dioxide, Wilkinsons catalyst, Phase transfer catalysts, Baker's yeast, polyphosphoric acid. Trimethyl silyl cyanide, hydrosilanes, Chloramine-T. Woodward and provost hydroxylation, Phase transfer catalyst and Crown ethers.

UNIT- II: Heterocyclic Chemistry **[15 Hours]**

Nomenclature of Heterocycles, Hantzsch-Widman system for monocyclic, fused and bridged heterocycles. Structure, synthesis and reactions of three membered heterocycles (aziridines, episulfides, diaziridines, oxazirines), four membered heterocycles (azetidines and thietanes), five membered heterocycles (furan, pyrrole, thiophene, oxazoles, imidazoles, thiazoles), six membered heterocycles (pyridine, Pyrimidine, α- and γ-Pyrones), seven membered heterocycles (Azepines, Oxepines, Thiepines) and fused hetercycles (Indoles, benzofurans, Quinolines, Isoquinolines, Coumarins, Purines).

References :-

10. Advanced Organic chemistry 5th edition -J. March (John Wiley and sons).
11. Organic Chemistry- J. Clayden, N. Greeves, S. Warren and P. Wothers (Oxford University Press).
12. E. Eliel and S.H. Wilen, Stereochemistry of Organic compounds, John Wiley.
13. Organic Spectroscopy- William Kemp(Palgrave)2005.
14. Advanced Organic Chemistry – Part A& B, 3rd edition- F.A. Carey and Sundberg, (Plenum Press) 1990.
15. Advanced General Organic Chemistry-S.K. Ghosh (Book and Alleied (P) Ltd) 1998.
16. Organic Synthesis, special Techniques -V.K. Ahluwalia and Renu Agrawal (Narosa Publications).
17. An Introduction to the Chemistry of Heterocyclic Compounds-Acheson (Wiley–Eastern) 1987.
18. Heterocyclic Chemistry-J. Joule & G. Smith (Van-Nostrand) 1978.
19. Heterocyclic Chemistry, 3rd Edition-Raj K. Bansal (New Age International) 2005.
20. Organic Chemistry-P.Y. Bruice (Pearson Education, New Delhi) 2002.

Comprehensive Heterocyclic Chemistry Vol-I-VI Ed. Katritzky& Rees (Pergamon), 1984