BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION)

CLASS: IMSC/MSC **SEMESTER : IX/III**
BRANCH: CHEMISTRY **SESSION : MO/18**

SUBJECT: SAC3001-BIOINORGANIC AND ORGANOMETALLIC CHEMISTRY

TIME: 03:00 HRS. **FULL MARKS: 60**

INSTRUCTIONS:
1. The question paper contains 7 questions each of 12 marks and total 84 marks.
2. Candidates may attempt any 5 questions maximum of 60 marks.
3. The missing data, if any, may be assumed suitably.
***4*. Before attempting the question paper, be sure that you have got the correct question paper.**
5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.

Q.1(a) Draw a Dose-Response curve for the essential elements of life. [2]
(b) Discuss one catalytic cycle responsible to remove Reactive Oxygen Species (ROS) form physiological system. [4]
(c) A and B are two oxygen transport non heme proteins with different metal ions at the active site. The deoxy form of both of them is colorless whereas the oxy form of A and B are deep blue and pink-violet respectively. Identify A and B and show the equillibrium between oxy and deoxy form with the oxidation sate of the metal ion. [6]

Q.2(a) Draw the structure of Ferrichrome. [2]
(b) Discuss the kinetic inertness of O_2. [4]
(c) Compare Hydrogenase-I and Hydrogenase-II in terms of their catalytic activity, Fe centers and redox behavior. [6]

Q.3(a) Draw the structure of M Cluster in fe-Mo Protein in Nitrogenase. [2]
(b) Draw the structure of Fe_2S_2 cluster and discuss the electronic structure in different oxidation states. [4]
(c) Give mechanism for the hydroxylation of alkane by Cytochrome P450. [6]

Q.4(a) Draw the structure of one accessory pigment in photosynthetic cell. [2]
(b) Draw the active site structure of Cu-Zn SOD and mention the role of each metal in the enzyme. [4]
(c) Show the integration of Photosystem-I and Photosystem-II in chloroplast. [6]

Q.5(a) Using the Ionic and covalent model count the electron for the following compounds: [2]
$[PdCl_4]^{-2}$, $HMn(CO)_5$
(b) Give example of following processes to synthesise main group organometallics compound: Transmetallation, Carbene Insertion. [4]
(c) Describe the heptotropic shift of ring proton for Cp ring in Cp_2Hg with the help of ^1H nmr spectrum. [6]

Q.6(a) How the exchange between the *syn*- and *anti*- substituents of an allyl group in the metal- allyl complex takes place? [2]
(b) Draw the active site structure of a Cobalt containing Isomerase enzyme. [4]
(c) With orbital overlap picture discuss the Dewar-Chat-Duncanson model for Zeise's Salt. [6]

Q.7(a) Give example of the following: Agostic species, Half sandwitch complexes. [2]
(b) Explain the synergic bonding in Metal-H_2 bond by Molecular Orbital Theory. [4]
(c) Number of valence electrons in Cp_2Mn and Cp_2Co are other than 18, still both the complexes are stable- Explain by MO theory. [6]

********28.11.18******M**