



MANIPAL
ACADEMY of HIGHER EDUCATION
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**DEPARTMENT OF SCIENCES, II SEMESTER M.Sc. CHEMISTRY
END SEMESTER EXAMINATIONS, JUNE 2022**

**Inorganic Chemistry-II [CHM 5201]
(CHOICE BASED CREDIT SYSTEM - 2021)**

Time: 3 Hours

Date:

MAX. MARKS: 50

Note: (i) Answer all the questions.

(ii) Draw diagrams, and write equations wherever necessary.

- 1.A. (i) Draw and explain the oxygen saturation curves of hemoglobin and myoglobin.
(ii) Mention any two similarities and differences between myoglobin and hemoglobin.
- 1.B. Explain the structure and function of carbonic anhydrase. What is the importance of zinc ion in it?
- 1.C. What are PS-I and PS-II in photosynthesis? Explain their roles during the above process. [4+3+3]
- 2.A. (i) How does space group contrast from point group? Write an explanatory note on screw axis symmetry.
(ii) The first order diffraction angle of (220) plane of a cubic system is 23° . The wavelength of X ray used is 150.4 pm. Calculate the inter planar distance of (220) plane and the edge length of the cube.
- 2.B. Explain the principle and working of tunneling electron microscope. Why is it called tunneling microscope?
- 2.C. What is the principle of X ray photoelectron spectroscopy? How is it used to study elemental analysis? [4+3+3]
- 3.A. (i) What is coenzyme B12? Explain its role in the conversion of diol to an aldehyde.
(ii) Mention the importances of any four metals in bioinorganic system.

- 3.B** Draw all the possible isomers of a square-planar complex of $[Ma_2b_2]$, $[Mabcd]$, $[Ma_2bc]$ give an example for each.
- 3.C** What is Nephelauxeric effect? Why is it called so? [4+3+3]
- 4.A.** Explain the following with appropriate reasoning
- (a) $[CoF_6]^{3-}$ ion is a high spin complex ion whereas $[Co(CN)_6]^{3-}$ ion is a low spin complex ion.
 - (b) $[Sc(H_2O)_6]^{3+}$ ion is colourless while $[Ti(H_2O)_6]^{3+}$ ion is coloured.
 - (c) In an octahedral system, if the origin of J.T. distortion lies in the e_g -set, then the extent of distortion is more severe compared to the case lies in the t_{2g} -set.
 - (d) Stability and lability characterize the different properties of a complex.
- 4.B.** Describe the instrumentation of thermogravimetry.
- 4.C.** Why Cu^{2+} ($3d^9$) is more stable than Cu^+ ($3d^{10}$)? Explain your answer [4+3+3]
- 5.A.** (i) What is the principle of electrogravimetry?
 (ii) Discuss the spinel and inverse spinel structures of the mixed oxides in terms of CFT.
- 5.B** With a schematic illustration describe the instrumentation and working of gas chromatography.
- 5.C.** A solution of 6.0 g of substance A in 50 mL of aqueous solution is in equilibrium at $20^\circ C$, with a solution of A in ether containing 108 g. of A in 100 mL. Calculate the amount of A extracted by shaking 100 mL of an aqueous solution containing 10 g. of A with (a) 100 mL of ether (b) 50 mL of ether twice [4+3+3]
