

[Time: 2 ½ Hours]

[Marks: 60]

Please check whether you have got the right question paper.

- N.B: 1. All questions are compulsory.
2. Figures to the right indicate full marks.

1. a) Attempt **any two** of the following.

- i) Discuss the mechanism of substitution reaction of octahedral complexes without breaking of metal-ligand bond. **4**
- ii) With respect to Trans effect, explain the effect of the following factors:
i) Nature of the entering group. **4**
ii) Nature of leaving group. **4**
- iii) Explain use of flow methods for determination of rate of very fast reactions. **4**
- iv) Discuss the cis-trans isomerization reaction in a co-ordinate complex. **4**

1. b) Attempt **any one** of the following:

- i) Explain the direct chemical analysis used for the determination of the rate of reaction. **4**
- ii) Explain the mechanism of trans effect in square planar complexes using a suitable example. **4**

2. a) Attempt **any two** of the following.

- i) Assuming that the following complexes obey 16 electron rule, with the help of electron count, identify metal M belonging to 1st transition series. **4**
- 1) $M(\eta^5-C_5H_5)(CO)Cl_2$ 2) $M(CH_3Br)(PPh_3)_3$
- 3) $M(\eta^2-C_2H_2)(CO)_4$ 4) $M(\eta^6-C_6H_6)(CO)_3$
- ii) With reference to Schrock Carbene complexes give **4**
1. Any two characteristics 2. One method of preparation 3. One chemical reaction.
- iii) What is an organometallic compound? Give the synthesis of cyclopentadiene complex of Iron. **4**
- iv) Explain the structure of bis (triphenyl phosphine) diphenylacetylene Platinum(0) complex. **4**

2. b) Attempt **any one** of the following.

- i) How is dibenzene chromium is prepared? Discuss its structure and bonding on the basis of valence bond theory. **4**
- ii) Write any one method of preparation of Zeise's salt. Draw its structure and discuss the bonding. **4**

3. a) Attempt **any two** of the following.

- i) Explain cell proliferation & cancer. **4**
- ii) How mercury enters in water? Give distribution & speciation scheme of mercury in water. **4**
- iii) Explain the sources and toxic effects of cadmium. **4**
- iv) Explain the sources, biochemical effects & toxicity of arsenic. **4**

3. b) Attempt **any one** of the following.
- Explain the sources of lead in the environment. 4
 - Explain the control and treatment of mercury poisoning. 4
4. a) Attempt **any two** of the following.
- Explain structural details of haemoglobin molecule. 4
 - Schematically represent cooperative binding mechanism of oxygen with haemoglobin using suitable diagram. 4
 - What is hemocyanin? State important features of structure of hemocyanin. 4
 - Which are the metal ion carriers in biological system? Discuss the role of Valinomycin as metal ion carrier. 4
4. b) Attempt **any one** of the following.
- What is Superoxide dismutase (SOD)? Give stepwise mechanism of activity of SOD, 4
 - Distinguish between haemoglobin and myoglobin. 4
5. Attempt **any four** of the following: **12**
- Based on Taube's classification, Identify Labile and Inert complexes from the following complexes.
 - $[\text{Ti}(\text{H}_2\text{O})_6]^{3+}$
 - $[\text{V}(\text{H}_2\text{O})_6]^{2+}$
 - $[\text{Cr}(\text{H}_2\text{O})_6]^{2+}$
 - Identify the products in the following reaction:
 - $$[\text{PtCl}_4]^{2-} \xrightarrow{\text{PPh}_3} \text{A} \xrightarrow{\text{Py}} \text{B}$$
 - $$[\text{PtCl}_4]^{2-} \xrightarrow{\text{Py}} \text{A} \xrightarrow{\text{PPh}_3} \text{B}$$
 - Write a note on half sandwich compounds.
 - How is diallyl nickel complex is prepared? Explain its structure.
 - Explain why hexavalent chromium is more toxic than trivalent chromium.
 - Explain biochemical effects of lead poisoning.
 - What is nitrogen fixation? Discuss in brief the role of nitrogenase in nitrogen fixation
 - Write a short note on oxy & deoxy forms of haemoglobin.
