Q.P. Code : 36297

[Time: 2½ 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.

Q.1 a) Attempt **any two** of the following :-

i) Discuss the following methods used for the determination of rate of reaction in octahedral complexes. **04**
1) Spectrophotometric and 2) Electrochemical

ii) Define trans effect. Explain the π – bonding theory of trans effect. **04**

iii) Describe the outer sphere mechanism of redox reaction. **04**

iv) Explain the mechanism of cis-trans racemization reaction of octahedral complexes using a suitable example. **04**

b) Attempt **any one** of the following :-

i) Discuss the mechanism of ligand substitution reaction in octahedral complexes without breaking of metal-ligand bond. **04**

ii) Explain the following factors affecting the rate of reaction. **04**
1. Charge of the complex
2. Steric strain.

Q.2 a) Attempt **any two** of the following :-

i) State 16 electron rule. With the help of electron count, show which of the following complexes obey the rule? **04**
1) $[Rh\ Cl\ (PPh_3)_3]$ 2) $[(\eta^5\text{-}C_5H_5)Cr\ (\eta^6 - C_6H_6)]$
3) $[Ir\ (CO)\ (Cl)\ (PPh_3)_2]$

ii) What are metal carbenes? With reference to carbene complexes of chromium, write: 1) one method of preparation 2) two chemical properties. **04**

iii) Write any one method of preparation for alkene complexes of palladium. Give its two chemical properties. **04**

iv) Discuss the structure and bonding in diallyl nickel (0) **04**

b) Attempt **any one** of the following :-

i) Write any one method of preparation for alkyne complexes of platinum. Give its two chemical properties. **04**

ii) Draw the structure of ferrocene. Discuss the bonding on the basis of molecular orbital theory. **04**

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Q.3 a) Attempt **any two** the following :-

i) Explain the sources, distribution and biochemical effects of arsenic poisoning. **04**

ii) Discuss the hazardous effect of radioactive radiation on human cells. **04**

iii) Describe the case study of itai-itai disease. **04**

iv) Elaborate on the sources and speciation of mercury. **04**

b) Attempt **any one** the following :-

i) Discuss the biochemical effects, control and treatment of copper poisoning. **04**

ii) Explain "Hexavalent chromium is more toxic than trivalent chromium. **04**

Q.4 a) Attempt **any two** of the following :-

i) Discuss the pH dependence of oxygen affinity in haemoglobin and myoglobin molecules. **04**

ii) Explain the mechanism of catalytic reaction of Superoxide Dismutase. **04**

iii) Discuss the conversion of atmospheric nitrogen into ammonia by Nitrogenase enzyme. **04**

iv) What are ionophores? Draw the structure of nonactin and explain its function. **04**

b) Attempt **any one** of the following :-

i) Discuss the cooperative binding of O_2 to the haemoglobin molecule. **04**

ii) Explain the mechanism of the action of cis- $[Pt(NH_3)_2Cl_2]$ as an anti-cancer drug. **04**

Q.5 Attempt **any four** of the following :- **12**

a] Explain the mechanism of trans effect in square planar complexes using a suitable example.

b] Discuss the complementary and non-complementary reactions.

c] Write a short note on half sandwich compounds.

d] Draw the structure of Zeise's salt and discuss its salient features.

e] Explain use of Co^{57} and I^{123} as radio diagnostic aids.

f] Explain the control and treatment of lead poisoning.

g] Write a note on the enzyme laccase.

h] Explain the composition and the function of ferretin.

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