2013

DDE

M.Sc. Part–I Examination

CHEMISTRY

PAPER—III

Full Marks : 75

Time : 3 Hours

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

Illustrate the answers wherever necessary.

Answer any *five* questions taking at least *two* from each group.

Group—A

1. (a) Discuss the structural features of haemoglobin and myoglobin. What is the role of the globin chain in haemoglobin oxygination? 5+1

(b) Write short notes on : 2+2

(i) Ferritin ;

(ii) Transferrin.

(c) Draw the active site structure of Cytochrome-C. 3

(d) What do you mean by essential and beneficial metal ions ? Cite examples for each. 2

2. (a) Discuss Zeise's salt with respect to : 2+2+2

(i) Synthesis ;

(ii) Structural features ;

(iii) Bonding.

(b) Show the various bonding modes of C_4H_6 with metal ion in organometallic complexer. Show the binding mode of C_4H_6 in $OS(CO)_{10}(C_4H_6)$ and $ep_2Zr(C_4H_6)$ complexes. 2+2

(c) What do you mean by fluxional behaviour ? What type of fluxionality is expected in $R_4(n_4 - C_8H_8)CO_3$ complex ? 3

(d) Distinguish between Fischer Carbene and Schrock Carbene. 2

3. (a) What do you mean by transeffect ? Write down the synthetic route to prepare cis-$[Pt(C_2H_4)(NH_3)Cl_2]$ and trans-$[PtCl_2(NO_2)(NH_3)]$ from $PtCl_4$. 4

(b) Discuss D-mechanism with example. 3

(c) Write notes on macrocyclic and chelate effect. 4

(d) How will you determine the composition of a complex by slope ratio method ? 4

4. (a) Discuss flame less atomic absorption spectroscopy. 4

(b) What do you mean by a "Limiting current" and "polarographic maxima" ? 3

(c) What is the basic difference between colorimeter and spectrophotometer ? 4

(d) What are the applications of cyclic Voltametry ? 2

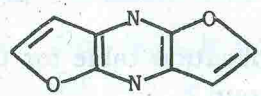
(e) What is the unit of moler absorptivity ? 2

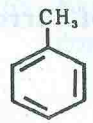
5. (a) Find the matrix representation of all the symmetry elements present in C_{2V} point group, when three Cartesian co-ordinate serve as base vector. 6

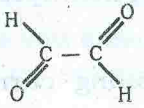
(b) Find all the irreducible representation for C_{3V} point group and assign their Mulliken symbol. For this purpose use the corollaries that are obtained from the GOT. 9

Group—B

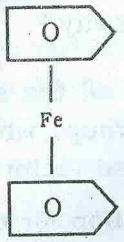
6. (a) Find the point symmetry group in the following molecule :

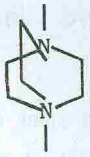
(i) 

(ii) 

(iii) 

(iv) 

(v) 

(vi) 

(b) What do you mean by cyclic group and Abelian group? Give examples. 2

(c) Write down group multiplication table for C_{3v} point group. Is it a Abelian group? 6+1

(d) Write down the properties of irreducible representation. 3

7. (a) Write notes on the following (any *three*) : 5×3

(i) Clathrate compounds ;

(ii) Tetra sulpher tetranitride ;

(iii) Half-wave potential ;

(iv) Silicates.

8. (a) State the principles of E.S.R. spectroscopy. 4

(b) Write down the limitations in using Q band frequency? What type of solvents are used in E.S.R. Study. 2+2

(c) Write notes on the ESR spectra of deuterium $\left({}^{2}_{1}H\right)$ atom. 4

(d) Draw the ESR lines for CH_3 radical comment on the intensity ratio. 3

9. (a) Discuss the isopoly and heteropoly acids of Mo, W and V. 7

(b) Derive the sfyx number for B_5H_9 and B_4H_8 and comment on the probable structure. 6

(c) What are Carborane? 2

10. (a) "Prussian blue" is deeply coloured" — Explain. 3

(b) How S_4N_4 is synthesized? Write down the structure for this. 3

(c) Explain the diamagnetism of 'Ruthenicem red' complex. 2

(d) "The complex ions $\left[Mn(H_2O)_6\right]^{2+}$ and $\left[MnCl_4\right]^{2-}$ have μ_{eff} value very close to μ_s value". — Discuss. 2

(e) Write down the biofunctions of Mg^{2+} and Zn^{2+} ions. 3

(f) Discuss the chemical properties of interhalogen. 2