

- N.B :** 1. All questions are **compulsory**.
 2. **Figures** to the **right** indicate **full** marks.
 3. Please check, whether you have got the right question paper.

1. Attempt any **five** of the following :— **20**
- (a) Draw and explain the resonating structures of NO_3^- and acetyl acetonato ion.
 (b) Describe the abelian point group with an example.
 (c) What is 18 electron rule ? Show that the following complexes satisfy this rule by writing the electron count.
 (i) $[TiCl_2(\eta^5-C_5H_5)_2]$ (ii) $[Pd(PPh_3)_4]$
 (d) Explain the structure of dibenzene chromium on the basis of Valence Bond theory.
 (e) Discuss the precursor method for the preparation of inorganic solids.
 (f) Give the important uses of Tungsten metal.
 (g) What are polyhalide ions ? Give two general methods for their preparation.
 (h) Explain the genetic effect caused by radiation pollution.
2. (a) By applying the concept of hybridisation derive the expression for wave functions of hybrid orbitals for BCl_3 molecule. **7**
- OR**
- (a) On the basis of Valence Bond theory, explain the structure and bonding of **7**
 (i) XeF_6 (ii) PF_5
 (b) Derive the character table for the point group C_{2v} . **7**
 (c) Obtain matrix representation for the following :— **6**
 (i) Rotation operation
 (ii) Identity operation.
- OR**
- (c) Discuss the different types of hydrogen bonding. Explain any one method to detect it. **6**
3. (a) Discuss the tunneling mechanism of ligand substitution reaction in octahedral complexes using a suitable example. **7**
- OR**
- (a) On the basis of Valence Bond theory, explain the structure and bonding in ferrocene. **7**
 (b) Describe the hydroformylation of alkenes using an organometallic compound. **7**
 (c) Explain the polarisation theory of trans-effect in square planar complexes. **6**
- OR**
- (c) Discuss the ligand substitution reactions in octahedral complexes without the breaking of metal - ligand bond. **6**

4. (a) Discuss the sol-gel method for the preparation of inorganic solids. Give its merits and demerits. 7

OR

- (a) Explain the structure and salient features of Cadmium iodide and Calcium fluoride. 7
(b) Discuss the chemistry of Vanadium with reference to 7
(i) Name and chemical composition of two ores
(ii) one method of extraction.
(c) Define an alloy. Explain the various types of solid solutions of alloys. 6

OR

- (c) With respect to iron group metals, explain the following :— 6
(i) variable oxidation states and
(ii) magnetic properties.

5. (a) What are phosphazenes ? Give chemical reactions of Chlorophosphazene with 7
(i) Alkyl lithium
(ii) sodium alkoxide
(iii) Grignard's reagent.

OR

- (a) What are carbides ? Give any two methods for their preparation. Comment on 7
their general properties.
(b) Discuss the sources, toxicity and prevention of lead poisoning. 7
(c) Explain the role of molybdenum and iodine in the biological systems. 6

OR

- (c) Describe the secondary active transport mechanism of metabolites across the cell 6
membrane.
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