

[Time: Three Hours]**[Marks: 75]**

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.
 3. Please check whether you have got the right question paper.

- Q.1** Attempt **any five** of the following: **15**
- a) Mention the rules to be followed for drawing the resonating structures of molecules.
 - b) What is irreducible representation? Write it's characteristics.
 - c) Define complementary and non-complementary reactions with one example for each.
 - d) Discuss the structure and bonding in dibenzene chromium complex.
 - e) Give the disadvantages of the precursor method of preparation of inorganic solids.
 - f) With respect to bronze alloy, give i) it's composition ii) any two applications.
 - g) What are polyhalide ions? Draw the structure of I_3^- and IF_5^- ions.
 - h) Write a note on the somatic effect caused due to radiation.
- Q.2** a) Using the concept of hybridization, derive the wave function of hybrid orbitals involved in sp^3 hybridization. **06**
- OR**
- a) Explain the structure and bonding of the following on the basis of Valence bond theory **06**
(i) $[TeF_5]^-$ (ii) XeF_4
 - b) What is a character table? Derive the character table of C_{3v} point group. **05**
 - c) Explain the formation of odd electron bond by giving suitable examples. What are the characteristics of odd electron molecule? **04**
- OR**
- c) Discuss the various types of hydrogen bonding using suitable examples for each type. **04**
- Q.3** a) Discuss the tunneling mechanism for the ligand substitution reactions in octahedral complexes with a suitable example. **06**
- OR**
- a) Discuss hydrogenation of alkenes using an organometallic compound. **06**
 - b) State 18 electron rule. With the help of electron count, show which of these complexes obey the rule **05**
i) $[Cr(\eta^6-C_6H_6)_2]$
ii) $[Co(CH_3)(\eta^6-C_6H_6)]$
 - c) Give one method for the preparation of Zeise's salt and discuss it's structure and bonding. **04**
- OR**
- c) Explain the structure and bonding in ferrocene on the basis of valence bond theory. **04**

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Q.4 a) Discuss the chemical vapour deposition method for the synthesis of inorganic materials. **06**
Mention its demerits.

OR

a) Describe the structure and salient features of **06**

i) Nickel arsenide.

ii) Calcium fluoride.

b) With reference to Titanium metal, discuss **05**

i) One method of extraction.

ii) Two important applications.

c) What are special steels? Give the composition and application of **04**

i) Babbit metal

ii) Gun metal

OR

c) Explain the variable oxidation states and magnetic properties of iron group metals. **04**

Q.5 a) Write a note on Carboranes with respect to their preparation and conformational changes. **06**

OR

a) Discuss the sources, toxicology and toxicity of Cadmium. **06**

b) What are carbides? Give the classification and preparation of carbides. **05**

c) Write a note on wind energy. **04**

OR

c) Explain the passive transport of metabolites across the cell membrane. **04**
