Reg.No. \_\_\_\_\_\_\_\_\_\_\_\_



**UNIVERSITY**

(Karunya Institute of Technology & Sciences)

(Declared as Deemed-to-be University under Sec.3 of the UGC Act, 1956)

**End Semester Examination – April / May 2017**

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| **Code :** | **15CH3008** | **Duration :** | **3hrs** |
| **Sub. Name :** | **ORGANOMETALLIC, BIOINORGANIC AND SOLID STATE CHEMISTRY** | **Max. marks :** | **100** |

**ANSWER ALL QUESTIONS (5 x 20 = 100 Marks)**

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| Q. No. | | Sub Div. | Questions | Course  Outcome | Marks |
| 1. | | a. | Write down the number of electrons donated by the ligands in ionic and covalent models. (i) PR3 (ii) Bridging halide | CO1 | 2 |
| b. | Explain the bonding in metal carbonyl complexes using MO theory. | CO1 | 8 |
| c. | Discuss the preparation, structure and relative geometry of metal nitrosyl complexes containing linear and bent nitrosyl ligands. | CO1 | 10 |
| (OR) | | | | | |
| 2. | a. | | Cr(Mes)(CO)3Ir(Pcy3)2H2(H2)2Find out whether the following compounds satisfy the 18 electron rule.   1. (ii) | CO1 | 4 |
| b. | | Discuss the use of IR spectroscopy for the characterization of the metal carbonyl complexes. | CO1 | 6 |
| c. | | Explain the preparation, structure and molecular orbital diagram of metal-alkene complexes. | CO1 | 10 |
| 3. | a. | | Discuss the fluxionality process in organometallic complexes. | CO1 | 8 |
|  | b. | | Write the hydrogenation reaction catalyzed by wilkinson’s catalyst. Draw the catalytic cycle and explain the various steps involved. | CO1 | 12 |
| (OR) | | | | | |
| 4. | | a. | Explain the oxidative addition and reductive elimination reactions. | CO1 | 8 |
|  | | b. | Write the carbonylation reaction. Draw the catalytic cycle and explain the various steps involved. | CO1 | 12 |
| 5. | | a. | Using potential energy diagram, explain the various photophysical processes occuring after the excitation of an octahedral complex. | CO1 | 10 |
|  | | b. | Write a detailed account of ligand photoreactions. | CO1 | 10 |
| (OR) | | | | | |
| 6. | | a. | Explain the following terms (i) Stoke’s shift. (ii) intersystem crossing (iii) Quantum Yield | CO1 | 8 |
|  | | b. | With an example discuss the disproportionation reaction in inorganic photochemistry, | CO1 | 4 |
|  | | c. | Draw the structure of Ru(bpy)32+ complex. Discuss the redox property of Ru(bpy)32+ complex and their application. | CO1 | 8 |

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| 7. | a. | Match the compound with their physiological role.   1. Ferredoxins (i) Oxygen Storage 2. Myoglobin (ii) Iron Storage 3. Cytochrome (iii) Oxygen Transport 4. Ferritin (iv) Electron Transport   (v) Iron Transport | CO1 | 4 |
|  | b. | Write the reaction catalyzed by carbonic anhydrase. Discuss its structure of the enzyme at the active site. | CO1 | 4 |
|  | c. | Write a detailed account on structure and functions of Haemoglobin. | CO1 | 12 |
| (OR) | | | | |
| 8. | a. | Draw the structures of the following compounds. (i) Porphine  (ii) Histidine (iii) cis-platin. | CO1 | 4 |
|  | b. | Write a note on non-heme iron-sulfur proteins. | CO1 | 4 |
|  | c. | Describe the structure of vitamin B12. What are the reactions catalyzed by vitamin B12 coenzymes? Explain. | CO1 | 12 |
|  | | **Compulsory:** |  |  |
| 9. | a. | Explain the various types of defects in Crystals. | CO1 | 10 |
|  | b. | Discuss the structures of ionic crystals with stoichiometry AX. | CO1 | 10 |