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



**End Semester Examination – Nov/Dec – 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. | Explain the preparation of metal alkyl complexes | CO1 | 4 |
| b. | Find out the total number of M-M bonds and bonds per each metal for the following molecule. Predict the basic geometry. i. Rh4(CO)12  ii. Co2(CO)8 | CO1 | 6 |
| c. | Describe the preparation, structure and the applications of metal carbonyl hydride complexes. | CO1 | 10 |
| (OR) | | | | |
| 2. | a. | Count the electrons in the following metal complexes.  i. Co(5-C5H5)2 ii. Cr(PF3)6 iii. [Mn(CO)5]- iv. Co(CO)4 | CO1 | 4 |
| b. | How various binding modes of carbonyl in metal carbonyl complexes are differentiated using IR spectroscopy? | CO1 | 6 |
| c. | Explain the preparation, structure and properties of metal nitrosyl complexes. | CO1 | 10 |
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| 3. | a. | Write a method for the preparation of metal allyl complexes. Draw its structure. | CO1 | 4 |
|  | b. | Compare the migration and insertion reactions in organometallic complexes. | CO1 | 6 |
|  | c. | How are metallocene complexes synthesized? Discuss their structure and properties. | CO1 | 10 |
| (OR) | | | | |
| 4. | a. | With examples, describe the oxidative addition reaction. | CO1 | 4 |
|  | b. | Briefly explain the various types of fluxional processes in organometallic complexes. | CO1 | 6 |
|  | c. | What is meant by ligand cone angle? How does it affect the reactivity? Outline its importance with examples. | CO1 | 10 |
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| 5. | a. | Write short note on the catalyst used for the alkene polymerization reaction. | CO1 | 4 |
|  | b. | Demonstrate the various photochemical processes with a neat diagram. | CO1 | 6 |
|  | c. | Which catalyst is used for the alkene hydrogenation reaction? Draw the Tolman cycle and explain each step. | CO1 | 10 |
| (OR) | | | | |
| 6. | a. | Compare the thermal and photochemical reactions in metal complexes. | CO1 | 4 |
|  | b. | Explain the photosubstitution reactions in Cr3+ complexes. | CO1 | 6 |
|  | c. | Using the catalytic cycle, explain Wacker process. | CO1 | 10 |
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| 7. | a. | Draw the structures of three iron-sulfur clusters in ferridoxins | CO1 | 4 |
|  | b. | Discuss the role of zinc in carbonic anhydrase. | CO1 | 6 |
|  | c. | Write a detailed account on the structure and functions of hemoglobin. | CO1 | 10 |
| (OR) | | | | |
| 8. | a. | Briefly explain the structure of heme group. | CO1 | 4 |
|  | b. | Write a short note on blue-copper proteins. | CO1 | 6 |
|  | c. | What is meant by nitrogen fixation process? Describe the in-vitro and in-vivo nitrogen fixation processes. | CO1 | 10 |
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|  | | **Compulsory**: |  |  |
| 9. | a. | What are biomaterials? explain | CO1 | 4 |
|  | b. | Explain the defects in solids. | CO1 | 6 |
|  | c. | With two examples, discuss the structures of compounds of type AX. | CO1 | 10 |

ALL THE BEST