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

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**End Semester Examination – Nov/Dec – 2018**

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| **Code :** | **17CH3008** | **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. | Find out the total number of M-M bonds and bonds per each metal for (i) Os3(CO)12, (ii) Fe2(CO)9 and (iii) Rh4(CO)12. Draw the basic geometry. | CO1 | 6 |
| b. | Explain the synthesis of metal carbonylate ions with examples. Write isoelectronic complexes for [Co(CO)4]- and [Mn(CO)5]-. | CO2 | 4 |
| c. | Describe the preparation and properties of (i) Vaska’s complex and (ii) Metal alkyl complexes. | CO2 | 10 |
| (OR) | | | | |
| 2. | a. | Select the oxidation state of the transition metal atom, dn count, and number of valence electrons at each metal center for the following compounds.  Ir(Pcy3)2H2(H2)2an exampleCpMn(CO)3   1. (ii) (iii)   Indicate whether you are using the covalent model or ionic model. | CO1 | 6 |
| b. | Explain the bonding in metal-nitrosyl complexes. | CO2 | 4 |
| c. | Discuss the preparation, bonding and characterization of metal carbonyl complexes. | CO2 | 10 |
|  |  |  |  |  |
| 3. | a. | How are metal-arene complexes synthesized? | CO2 | 2 |
| b. | Explain oxidative addition and reductive elimination reaction. | CO3 | 6 |
| c. | Write a detailed account on preparation, structure and bonding in metal-alkene complexes. | CO2 | 12 |
| (OR) | | | | |
| 4. | a. | Write examples of metal alkyne complex and metal-allyl complex. | CO2 | 2 |
| b. | Discuss the substitution reactions in ferrocene. | CO2 | 6 |
| c. | Discuss the substitution reactions in metal carbonyl complexes and the effect of ligand cone angles in substitution reactions. | CO3 | 12 |
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| 5. | a. | Draw the catalytic cycle for hydroformylation reaction and explain each step. | CO3 | 10 |
| b. | State Adamson’s rule. Discuss the photosubstitution reactions in coordination complexes. | CO4 | 10 |
| (OR) | | | | |
| 6. | a. | Using the catalytic cycle, explain Monsanto acetic acid process. | CO3 | 10 |
| b. | Describe the structure, reduction potentials and applications of [Ru(bpy)3]2+. | CO4 | 10 |
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| 7. | a. | Discuss the binding of dioxygen to Myoglobin. | CO5 | 8 |
| b. | Draw the structure of chlorophyll. Propose a mechanism for the photoevolution of oxygen and explain. | CO5 | 12 |
| (OR) | | | | |
| 8. | a. | Write an account on the structure of plastocyanin and the role of copper in it. | CO5 | 8 |
| b. | Draw the structure of porphyrin and outline its importance in biological processes. On the basis of structure, how are the various types of heme are differenciated? | CO5 | 12 |
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|  | | **Compulsory**: |  |  |
| 9. | a. | State the reactions catalyzed by (i) carbonic anhydrase and (ii) Vitamin B12 coenzymes. | CO5 | 8 |
| b. | Write a detailed account on defects in crystals. | CO6 | 6 |
| c | With an example, discuss the structures of the compounds of type AX2. | CO6 | 6 |