**Name:**

**Enrolment No:**

**UNIVERSITY OF PETROLEUM AND ENERGY STUDIES**
**End Semester Examination, Dec 2023**

**Course: Inorganic Chemistry-IV** **Semester : Vth**
**Program: Int. B.Sc. M.Sc. Chemistry**

**Time : 03 hrs.**
**Course Code: CHEM-3003** **Max. Marks : 100**

**Instructions:** ***Read the questions carefully***

**SECTION A**
**(5Qx4M=20Marks)**

| S. No. | | Marks | CO |
|---|---|---|---|
| Q 1 | Define the term *hapticity* in organometallic chemistry. Give at least two examples to justify your answer. | **4** | **CO2** |
| Q 2 | Does $Fe(CO)_2(NO)_2$ obey the 18 electron rule ? Explain with reason. | **4** | **CO2** |
| Q 3 | How is the C-O bond order related to the C-O stretching frequency in metal carbonyls? Justify your answer. | **4** | **CO2** |
| Q 4 | Explain common ion effect with an appropriate example. | **4** | **CO1** |
| Q 5 | Draw the chemical structure of the active site in hemoglobin. Plot the oxygen saturation curve for hemoglobin and myoglobin. | **4** | **CO3** |

**SECTION B**
**(4Qx10M= 40 Marks)**

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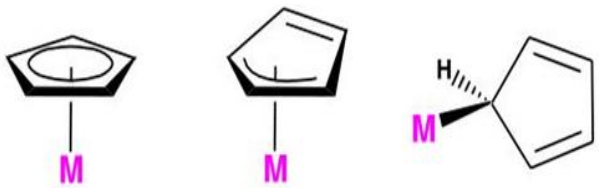
|---|---|---|---|
| Q 6 | Define the term hapticity by considering the following examples and state the hapticity in each case.   | **10** | **CO2** |
| Q 7 | Give brief discussion on the role of Na/K-ATPase enzyme in our biological system. | **10** | **CO3** |
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|---|---|---|---|
| Q 8 | Arrange the following carbonyl compounds in order of decreasing CO stretching frequency with proper reasoning:<br>(i) $Mn(CO)_6^+$ (ii) $Cr(CO)_6$ (iii) $V(CO)_6^-$ | **10** | **CO2** |
| Q 9 | Explain the 18-electron rule and show how the following compounds adhere to this rule: $Fe(C_5H_5)_2$ and $Co_2(CO)_8$<br><br>OR<br><br>Give detailed illustration on the structures and functions of myoglobin (Mb) and hemoglobin (Hb). How do their functions differ from each other. | **10** | **CO2**<br>**CO3** |
| | | | |
| **SECTION-C**<br>**(2Qx20M=40 Marks)** | | | |
| Q 10 | What are the possible modes in which a drug can interact with DNA? Explain the mechanism of cisplatin-DNA interaction. | **20** | **CO3** |
| Q 11 | Write down all the fundamental steps participating in the polymerization of alkenes using Ziegler-Natta Catalyst.<br><br>OR<br><br>What is Suzuki-Miyaura Coupling (SMC) reaction. Write down the steps involved in the catalytic cycle of SMC. | **20** | **CO3** |