Name: **Enrolment No:**	

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

Course: Inorganic Chemistry-IV **Semester : VIth**
Program: B.Sc. (H) Chemistry

Time : 03 hrs.
Course Code: CHEM3016 **Max. Marks: 100**

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

SECTION A
(5Qx4M=20Marks)

S. No.		Marks	CO
Q 1	Which form of mercury (Hg) is more toxic: elemental, organic or inorganic? Write the name of compound found to be involved in Minamata disease in Japan.	**4**	**CO1**
Q 2	Do the following compounds obey 18 e^- rule? Comment on the magnetic behaviour and geometry attained by individual metal atom in each case. $Fe_2(CO)_9$, Diiron nonacarbonyl $Co_2(CO)_8$, Dicobalt octacarbonyl	**4**	**CO2**
Q 3	Draw the molecular orbital diagram of carbon monoxide (CO) using s-p mixing of orbitals. What are the frontier molecular orbitals (HOMO and LUMO) in this diagram?	**4**	**CO1** **CO2**
Q 4	Differentiate among the chemical structures of porphyrin, chlorin and corrin ring. Write the name of at least one metalloprotein for each in which they are found.	**4**	**CO2** **CO3**
Q 5	Explain the oxygen binding curve of hemoglobin (Hb) and myoglobin (Mb).	**4**	**CO3**
	SECTION B **(4Qx10M= 40 Marks)**		
Q 6	What are the possible ways to treat lead (Pb) poisoning in living beings? Write a short note on chelation therapy to treat Pb poisoning.	**10**	**CO3**
Q 7	Why does CO bind more tightly to iron(II) porphyrins? Explain in one or two sentences.	**10**	**CO2**

Q 8	What is the role of sodium-potassium (Na-K) pump in physiological processes. How does it function to maintain the electrical gradient across the cell membrane?	**10**	**CO3**
Q 9	What are π-donor and π-acceptor ligands? Discuss in brief the synergic effect in complex $[Ni(CO)_4]$. **OR** Write the chemical reactions involved in preparing Zeise's salt? State the geometry, hybridization, and ligand's hapticity (if any) in this compound.	**10**	**CO1** **CO2**
SECTION-C **(2Qx20M=40 Marks)**			
Q 10	Write a short note on the active site and functions of the following metalloenzymes in biosystem. i) Carboxyanhydrase ii) Carboxypeptidase	**20**	**CO3**
Q 11	Explain in detail the toxic effects caused by arsenic (As) in (i) Pyruvate oxidation and (ii) Glycolysis **OR** Write a note on cisplatin acting as an anti-cancer drug. Highlight the mechanistic pathways involved into DNA-drug interaction.	**20**	**CO2**