

Name:	
Enrolment No:	

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, Jan 2021

Course: Advanced Inorganic Chemistry
Programme: M. Sc. Chemistry
Course Code: CHEM7017

Semester: I
Time: 3 hours
Max. Marks: 100

SECTION A

1. Each Question will carry 5 Marks

2. Instruction: Complete the statement / Select the correct answer(s)

S. No.	Question	Marks	CO
Q 1	How many metal-metal bonds will be present for the following complexes (i) Re_2Cl_8 (ii) $\text{Fe}_3(\text{CO})_{12}$	5	CO3
Q 2	Write the ground state term symbols and possible number of microstates for d^3 and p^2	5	CO1
Q 3	For Ferrocene mention true/false (i) Undergoes Mannich reaction (ii) Chloromercuration occurs when reacts with $\text{Hg}(\text{OAc})_2$ and LiCl (iii) Acetylation is not possible	5	CO3
Q 4	What is Hapticity? Give one example of sandwich complex follows 18-electrin rule	5	CO3
Q 5	Mention the IR stretching frequencies range of carbonyls in metal complexes i) Terminal. ii) μ_2 bridged iii) μ_3 bridged	5	CO2
Q 6	Calculate the spin only magnetic moments and CFSE values of the following ions: (i) $[\text{MnCl}_6]^{3-}$ (ii) $[\text{Fe}(\text{CN})_6]^{3-}$.	5	CO1

SECTION B

1. Each question will carry 10 marks

2. Instruction: Write short / brief notes

Q 1	Explain magnetic behavior of $\text{Fe}(\text{H}_2\text{O})_6^{2+}$ with the help of Molecular orbital diagram	10	CO1
Q 2	Plot Orgel energy level diagrams for d^2 , d^3 , d^4 , and d^1 systems	10	CO2
Q 3	Explain Marcus-Husch theory for redox reactions occurs in metal complexes	10	CO3

Q 4	Write mechanisms for inner-sphere or outer-sphere one and two -electron-transfer reactions with examples.	10	CO2
Q 5	Explain migratory insertion mechanism when $(OC)_5Mn-CH_3$ reacts with CO	10	CO3
Section C			
1. Each Question carries 20 Marks. 2. Instruction: Write long answer.			
Q 1	<p>a) Discuss briefly about different classes of Boranes</p> <p style="text-align: center;">OR</p> <p>Explain the equations of balance, which provides relation between Boron hydride $(BH)_p H_q$ and the kind of bonds.</p> <p>b) Calculate the all possible s t y x numbers for B_6H_{10}</p> <p style="text-align: center;">OR</p> <p>Plot the structures for B_4H_{10}, B_5H_{11} with s t y x numbers (4 0 1 2) and (3 2 0 3) respectively</p>	10	CO4
		10	