Name:

Enrolment No:

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, December 2022

Course: Chemistry of Heterocyclic compounds **Semester: III**
Program: MSc. Chemistry **Time: 03 hrs.**
Course Code: CHEM-8027P **Max. Marks: 100**

Instructions:

SECTION A
(5Qx4M=20Marks)

S.No.	Statement of question	Marks	CO
Q 1	Discuss the reactivity of Pyridine towards various electrophiles	**4**	**CO1**
Q2	Explain the difference in the dipole moment of pyrrole and pyrrolidine	**4**	**CO1**
Q3	Write a general mechanism for the synthesis of various heterocycles by Paal-Knorr synthesis	**4**	**CO2**
Q4	Pyridine ring is considered as π electron deficient. Explain with reasons	**4**	**CO2**
Q5	Explain with reasons which is more acidic among phenol and pyrrole?	**4**	**CO3**

SECTION B
(4Qx10M= 40 Marks)

S.No.	Statement of question	Marks	CO
Q1	Compare the stability of the following heterocycles on the basis of resonance a) Furan b) Thiophene c) Pyrrole d) Pyridine	**2.5+2.5+2.5 +2.5**	**CO1**
Q2	What is the oxidation state, and geometry of Iron in the heme complex of oxyhemoglobin and deoxyhemoglobin. Explain your answer based on MOT.	**10**	**CO3**
Q3	Write any one method for the synthesis of the following heterocycles a. 1,2,3-triazole b. Azepines	**5+5**	**CO2**
Q4	Compare the reactivity of Indole with nucleophile and electrophiles. Which is the most probable position of attack by these species?	**10**	**CO3**
	OR		
	Discuss with mechanism the synthesis of Indole via Fischer Indole method and Reissert Method	**5+5**	**CO3**

SECTION-C (2Qx20M=40 Marks)			
S.No.	**Statement of question**	**Marks**	**CO**
Q1	a. Discuss the mechanism for the synthesis of Imidazole with α-hydroxy ketone and amidine. b. Explain the reactivity of pyridine with a) $NaNH_2$ and b) *n*-C_4H_9Li c. Give reasons why thiophene is less reactive than benzene for electrophilic substitution? d. Explain with a valid reason why azepine is non-aromatic despite having a conjugated π-electron density?	**5+5+5+5**	**CO2**
Q2	a. Discuss the role of Sulfur and phosphorus ylides for the synthesis of various heterocycles. Explain the mechanism for the same. b. Elaborate on the porphyrin system present in hemoglobin? Draw the geometry of its complex with low spin and high spin Fe(II).	**10+10**	**CO3**
	OR		
	a. Discus the biological relevance of Imidazole and Triazole rings b. Compare the rigidity of crown ether with porphin ring. How does it influence the metal coordination by these rings?	**10+10**	**CO3**