JHARKHAND Rai University
RANCHI

End Semester/Reappear (Semester IV) Examination May 2025

Programme: B. Pharm
Course: Pharmaceutical Organic Chemistry III **Full Marks: 75**
Course Code: BP401T **Time: 3 Hrs.**
Enrolment no. _____

Q.No.	Questions	CO	Bloom Taxonomy Category	Marks
	Section I			
1	**Objective Type Questions**			**1 x 20 = 20**
	i. Which of the following compounds will be optically active? a. Succinic acid b. Meso - Tartaric acid c. Lactic acid d. Chloroacetic acid ii.Which of the following heterocylic compounds is not aromatic? a. Pyridine b. Pyrrole c. Furan d. Piperidine iii.Which reagent is typically used in the synthesis of furan via the reaction of 1,4-diketones? a. Hydrochloric acid b. Sulfuric acid c. Zinc dust d. Sodium hydroxide iv.Which starting material is most commonly used in the synthesis of pyrazole? a. Acetone b.Urea c.Hydrazine d. Ethylamine v.Plane - polarized light is affected by a. Identical b. All polymers c. Chiral molecules d. All biomolecules	CO1	Remember	
	vi.Clemmensen reduction is most suitable for: a. Acid-sensitive compounds b. Base-sensitive compounds c. Heat-sensitive compounds d. Water-soluble compounds vii.Which of the following best describes the mechanism involved in Skraup synthesis? a. Free radical substitution b. Electrophilic aromatic substitution c. Friedel–Crafts acylation d. Acid-catalyzed dehydration and cyclization viii In the Skraup synthesis of quinoline, which reagent is commonly used as the oxidizing agent? a. $KMnO_4$ b. H_2O_2 c. Nitrobenzene d. $CuSO_4$ ix.Which of the following metal hydrides is commonly used to reduce esters to alcohols? a. $NaBH_4$. b. $LiAlH_4$. c. CaH_2. d. BH_3 x.In the imidazole ring, the two nitrogen atoms are located at which positions? a.1 and 2 b.1 and 3 c. 2 and 4 d.1 and 5			
	xi.Which of the following is a direct method for synthesizing furan from 2,5-dihydrofuran? a. Oxidation b. Hydrogenation c. Diels-Alder reaction d. Cyclization with sulfuric acid xii.Which of the following compounds may exist as cis - trans isomers? a. 1 - Butene b. 2-Butene c.Cyclopropane d. Acetone xiii.Which of the following combinations can be used to synthesize 3,5-dimethylpyrazole? a. Ethyl acetoacetate + phenylhydrazine b. Acetylacetone + hydrazine hydrate c. Acetone + ammonia d. Malonic acid + hydrazine xiv.Which derivative of hydrazine is often used to introduce aryl substituents into pyrazole ring? a. Methylhydrazine b. Benzylhydrazine c. Phenylhydrazine d. Acetylhydrazine xv.Which of the following drugs contains an imidazole ring and acts as an antifungal agent? a. Omeprazole b. Metronidazole c. Ketoconazole d. Atenolol			
	xvi.Which of the following reagents is used in the Hantzsch pyrrole synthesis? a. Sodium acetate b.Zinc dust c.Acetone d. Lithium aluminum hydride xvii.In the pyrrole synthesis using the Paal–Knorr method, what type of compound is typically used? a.β-diketones b. Aldehydes c. Ketones d. Anhydrides xviii.In the synthesis of thiophene from 1,3-diketones, which method involves the use of sulfur and an acidic catalyst? a. Badeker synthesis b. Hantzsch synthesis c. Paal–Knorr synthesis d. Skraup synthesis xix.Which of the following functional groups is not affected by Wolff–Kishner reduction? a. Ketone b. Aldehyde c. Nitro group d. Carbonyl group xx.The classical synthesis of pyrazole involves the condensation of hydrazine with which type of compound? a. Alkene b. Ketone c. Aldehyde d. 1,3-Dicarbonyl compound			

Section II				
2. Short Answer type questions.				**7 x 5 = 35**
a	Describe how Fisher projections are used to represent optical isomers, using an example.	CO1	Remember	
b	Explain how the E-Z and Syn-anti nomenclature systems differentiate geometrical isomers, with examples.	CO2	Understand	
c	Give the reactivity order of Pyrrole, Furan and Thiophene. Write the structure and uses of two drugs with furan rings.	CO3	Remember	
d	Explain how oxazole is synthesized and describe its role in pharmaceutical applications	CO4	Understand	
e	Explain how $NaBH_4$ and $LiAlH_4$ function as reducing agents and describe the mechanism of the Dakin reaction.	CO5	Remember	
f	Demonstrate how the Beckmann rearrangement can be applied in the drugs synthesis	CO5	Apply	
	or			
	How would you apply the Birch reduction to reduce a specific aromatic compound, such as benzene or a substituted benzene?	CO5	Apply	
g	Describe the resonance of Pyrrole. Write the structure and uses of two drugs with Pyrrole rings.	CO3	Remember	
	or			
	Describe the resonance of Thiophene. Write the structure and uses of two drugs with Thiophene rings.	CO3	Understand	
Section III				
Long Answer Type questions				**2 x 10 = 20**
3	Illustrate examples of compounds that can be synthesized using the Claisen–Schmidt condensation and Oppenauer oxidation. How do these reactions apply to organic synthesis?	CO5	Analyze	
	or			
	Compare and contrast the Schmidt rearrangement and the Dakin reaction. What are the key differences in their mechanisms, reagents, and applications in organic synthesis?	CO5	Analyze	
4	Illustrate how the rotation around single bonds in ethane and butane leads to different conformers, and how cyclohexane adopts chair and boat conformations.	CO2	Evaluate	
	or			
	Evaluate the reliability of different methods used for determining geometrical isomerism	CO2	Evaluate	

Course Outcomes (CO):

CO1: Understand Stereo-chemical features including conformation and stereo electronic effects of organic molecules.

CO2: Understand Stereo-chemical features including conformation and stereo electronic effects; Geometrical isomers

CO3: Understand To draw the structures and synthesize simple pharmaceutically active organic compounds having five and six membered heterocyclic compounds.

CO4: Know To describe detailed mechanisms for common naming reactions

CO5: Understand detailed about Reactions of synthetic importance