BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION)

CLASS: B. PHARMACY **SEMESTER: IV**
BRANCH: PHARMACY **SESSION: SP2025**

SUBJECT: BP401T PHARMACEUTICAL ORGANIC CHEMISTRY III

TIME: 3.00 Hours **FULL MARK: 75**

INSTRUCTIONS:

1. **The missing data, if any, may be assumed suitably.**
2. **Before attempting the question paper, be sure that you have got the correct question paper.**
3. **Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.**
4. **This question paper consists of (03) three parts. Read the part wise instructions before attempting the questions.**

PART-I

Objective types questions (Instruction: Answer all questions)

Q1. (10 x 2 = 20 Marks)

A. Fill in the blanks

i) Sodium borohydride ($NaBH_4$) is a _____ reducing agent compared to Lithium aluminum hydride ($LiAlH_4$).

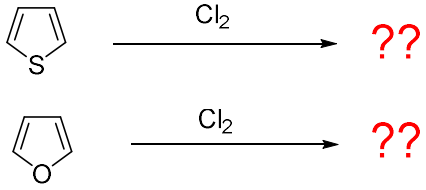
ii) Reactions with LiAlH4 cannot be performed in a _____ solvent.

B. State True or False

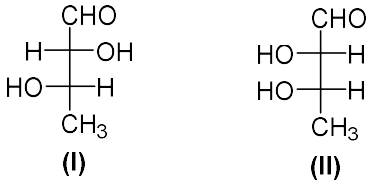
i) Electrophilic substitution reactions of five-membered heterocyclic compounds are regioselective to the α-position compared to the β-position.

ii) Furan is π-deficient and less reactive than benzene towards electrophilic substitution reactions.

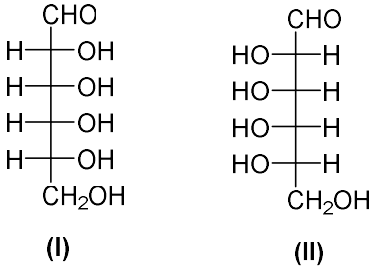
C. Write the structures of the products of the following reactions.



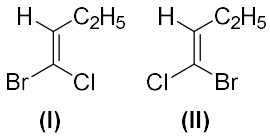
D. Write the nomenclatures of the following compounds based on the ***R*** and ***S*** configuration.



E. Identify the **asymmetric centers**, and **D** and **L** configurations of the following structures.



F. Identify the ***E*** and ***Z*** configurations of the following structures.



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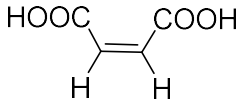
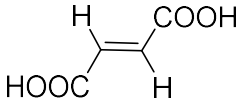
G. Which of the following isomers has a higher melting point? Give reason.

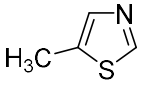


(I)



(II)

H. Write the IUPAC nomenclature of the following molecules.



(I)

(II)

I. Write the structures of the following compounds.
   a. Benzo[b]thiophene
   b. Benzo[c]pyridine

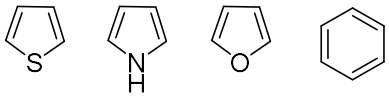
J. Define specific rotation.

PART-II
Short Answers
(Instruction: Answer seven out of nine questions)

(7 x 5 = 35 Marks)

Q2. What are optical isomers? Write the minimum requirement for compounds to show optical activity.

Q3. Explain the reactivity of the following compounds towards the electrophilic substitution reaction compared to benzene.



(i) (ii) (iii) (iv)

Q4. Differentiate between Enantiomers and Diastereomers. Give examples.

Q5. Compare the reactivity of pyridine with benzene.

Q6. Write the mechanism of Paal-Knorr synthesis of furan.

Q7. Explain stereoselective and regioselective reactions with examples.

(OR)

Write the Vilsmeier-Haack reaction of thiophene.

Q8. Explain, with an example, the plane of symmetry (σ) and the center of symmetry (i).

(OR)

Write the mechanism of the **Beckmann Rearrangement** Reaction.

PART-III
Long Answers
(Instruction: Answer two out of three questions)

(2 x 10 = 20 marks)

Q9. Using the Newman projection formula, draw the various conformations and potential energy graphs of ETHANE. Explain the relative stability of different conformers of ethane.

Q10. Explain the R/S system of nomenclature with the help of the sequence rule. Give examples.

(OR)

Differentiate between the racemic mixture and racemization. Describe three methods for separating racemic mixtures.

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