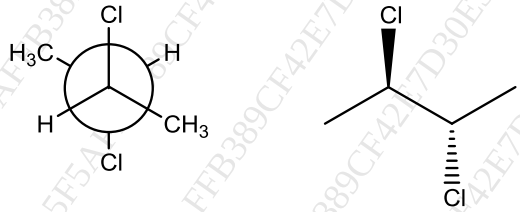
**Time: 3 Hrs** **Marks: 75**

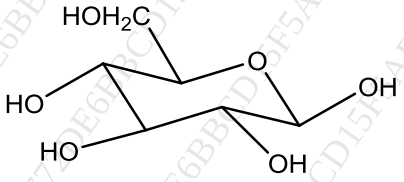
**QI. Answer the following.** **20M**

**Q1.** Which of the following terms best describes the pair of compounds?



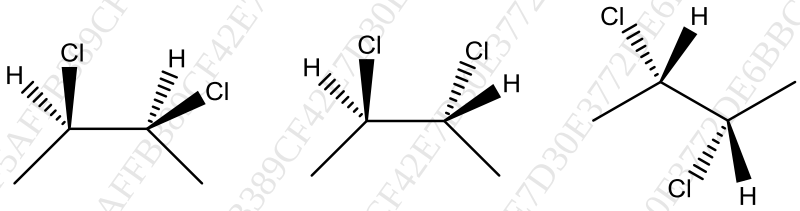

A. Diastereomers B. Homomers C. Enantiomers D. Positional isomers

**Q2.** How many asymmetric carbons are present in the compound below?




A. 2 B. 4 C. 6 D. 5

**Q3.** Identify the meso compound from the following.



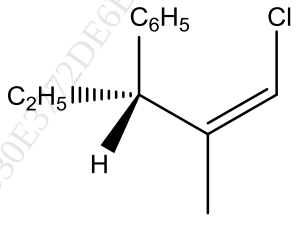

1 2 3

A. 1 B. 2 C. 3 D. All 1, 2 and 3

**Q4.** Identify the correct statement from the following.

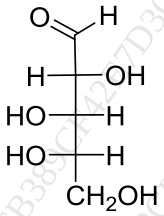
**A.** Enantiomers do not have a chiral centre in its structure.
**B.** Diastereomers have the same physical properties.
**C.** Enantiomers are a pair of non-superimposable mirror images.
**D.** Diastereomers are non-superimposable mirror images.

**Q5.** Assign R/S or E/Z notation (whichever relevant) to the given molecule.

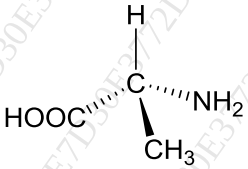



A. 1E, 3R B. 1Z,3R C. 1E, 3S D. 1Z, 3S

**Q6.** Nomenclate the given molecule using a suitable notation**:**



Arabinose



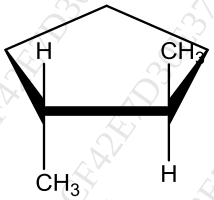
Alanine

A. L-Arabinose and D-Alanine
B. D-Arabinose and L-Alanine
C. D-Arabinose and D-Alanine
D. L-Arabinose and L-Alanine

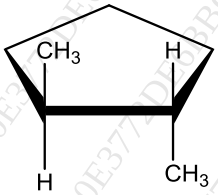
**Q7.** To convert an eclipsed conformer to a staggered conformer, the molecule has to be Rotated by a dihedral angle of ……

A. 60 B. 80 C. 120 D. 180

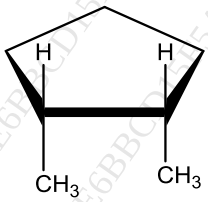
**Q8.** Observe the following structures carefully and tick the correct statement.



i



ii



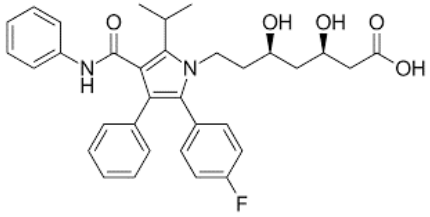
iii

A. Compound i and ii are chiral and exist as a pair of enantiomer.
B. Compound i and ii are achiral.
C. Compound i and iii are chiral and exist as a pair of enantiomer.
D. Compound iii is chiral.

**Q9.** Identify the incorrect statement related to atropisomerism:

A. Restriction of rotation about single bond.
B. Neither ring must have vertical plane of symmetry.
C. No hindrance to rotation, presence of internal plane of symmetry**.**
D. Substitution at ortho position must have large size.

**Q10.** Identify the heterocycle present in the following drug.




A. Pyrrolidine B. Pyrrole C. Pyrazole D. Imidazole

**Q11.** Bromination of acridine gives ……..

A. 2-bromoacridine
B. 2-bromoacridine and 2,7-dibromoacridine
C. 2,7-dibromoacridine
D. 2-bromoacridine

**Q12.** The favourable position for electrophilic substitution reaction in imidazole is ___

A. 1 B. 2, 4 C. 3 D. 4, 5

**Q13.** The reagents for Hanstzsch synthesis of pyrrole are:

A. α-haloketone + β-keto ester + amine
B. 1,4-diketone + ammonia
C. α-haloketone + β-keto ester
D. Furan + ammonia

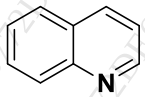
**Q14.** When 4,5-diaminopyrimidine and formic acid reacts together they form-------

A. Pyridine B. Purine C. Quinoline D. Indole

**Q15.** The medicinal use of ranitidine is _____

A. Anti-infective B. Antihistaminic C. Antihypertensive D. Indole

**Q16.** Find out the correct name for the following compound:

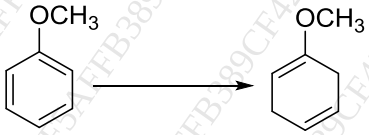



A. Benzo[c]pyridine B. Benzo[b]pyridine C. Benzo[d]pyridine
B. Benzo[e]pyridine

**Q17.** Identify the most basic heterocycle:

A. Oxazole B. Pyrazole C. Thiazole D. Imidazole

**Q18.** Identify the reagents required to carry out following reaction:

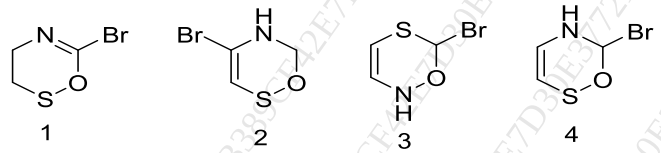



A. Na, liquid ammonia, Alcohol. C. Lithium aluminium hydride, dry ether
B. Sodium borohydride D. Hydrazine, potassium hydroxide, ethylene glycol

**Q19.** Conversion of Acetophenone to N-methyl benzamide is via

A. Beckmann rearrangement C. Claisen-Schmidt condensation
B. Schmidt rearrangement D. Dakin oxidation

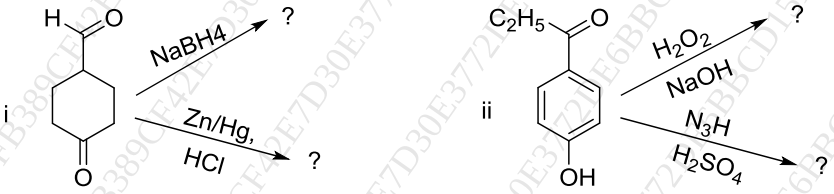
**Q20.** Select correct option which indicate the structure of 6-bromo-5,6-dihydro-1,2,5-oxathiazine.




A. 1 B. 2 C. 3 D. 4

**QII. Answer any two from the following.** **20M**

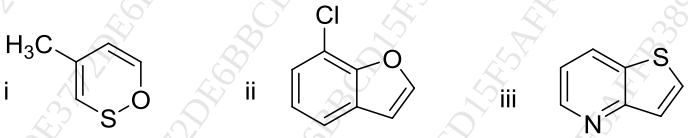
1. Explain the mechanism of addition of bromine to trans-2 pentene. Comment on optical activity of product? Comment on generation of chiral centre from achiral reactants.
2. Compare the aromaticity of furan, pyrrole and thiophene with justification. With the help of resonance, explain the favourable positions for electrophilic and nucleophilic substitutions in thiophene.
3. a. Depict the mechanism for Beckmann rearrangement and Oppenauer oxidation.
   b. Give the products of the following reactions:



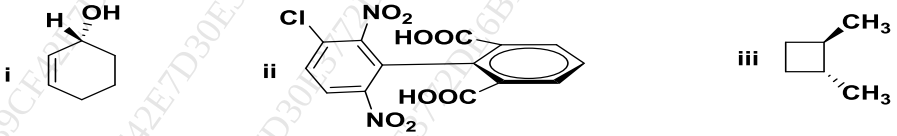

**QIII. Attempt any seven questions from the following:** **35M**

1. a. Draw structures for the following compounds (**any two**):
   i) 2,3-Dihydro-1H-pyrrole-2-carbaldehyde
   ii) 2-Bromo-2H-oxete
   iii) 1H-indol-5-ol

   b. Nomenclate for the following structures as per Hantzsch-Widman rules:




2. a. Identify the symmetry elements which may be present in the given molecules. Also predict whether the given molecule is chiral or achiral.




   b. What are the necessary conditions required for molecules to exhibit atropisomerism?

3. Enlist various methods of resolution of racemic modification and explain any one method in detail.

4. With the help energy profile diagram for all possible conformations analysis of cyclohexane. Indicate the most stable and least stable conformer.

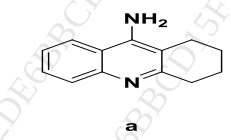
5. Explain the term asymmetrical synthesis. Discuss any two methods employed for the same.

6. Give the name of reagents required for the following conversions (**any 5**)
   a. Benzaldehyde + acetone to Benzylidene acetone
   b. Isoquinoline to phthalic acid.
   c. 2-Dimethylamino-3H-azepine to 4,5 dihydro-3H-azepine
   d. Ethyl propionate to propanol
   e. Salicylaldehyde to catechol
   f. Methyl phenyl ketone oxime to acetanilide

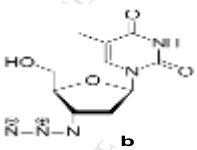
7. Give the mechanism for the following synthesis. (**any two**)
   i. Hantzsch synthesis of pyridine
   ii. Radiszewskii synthesis of imidazole
   iii. Hinsberg synthesis of thiophene

8. Give the products of the following reactions. (any 5)
   i. Furane + excess chlorine →
   ii. Pyrazole + $HNO_3$ + $H_2SO_4$ →
   iii. Acylamino ketone + $PCl_5$ →
   iv. Quinoline + Sodium amide + liquid ammonia →
   v. Indole +formaldehyde +ammonia →
   vi. Pyrimidine + hydrazine →

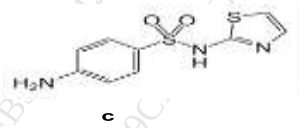
9. Complete the table:



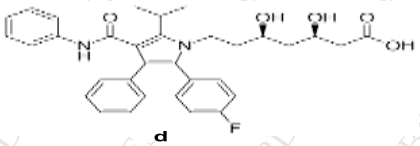
a



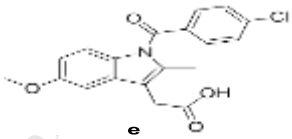
b



c



d



e

| Structure | a | b | c | d | e |
|---|---|---|---|---|---|
| Heterocycle present | | | | | |
| Medicinal use | | | | | |

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