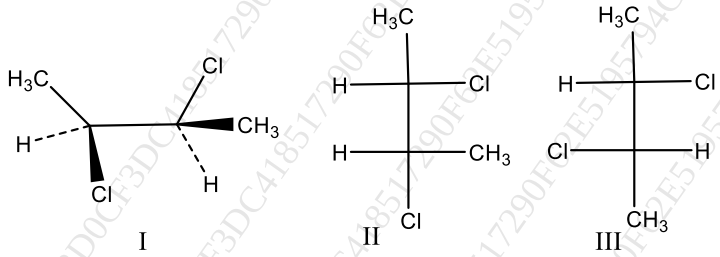
Duration: 3 Hours **[Max Marks :75]**

N.B. : (1) All questions are compulsory.
(2) Figures to the right indicate full marks.

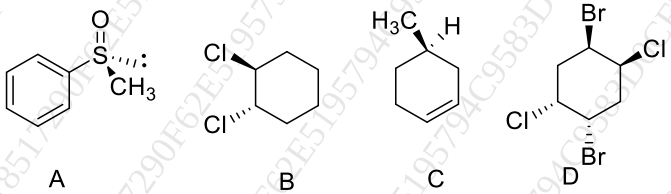
QI. Select correct option for the following multiple choice questions. (20)

1 Predict the relationship between the given molecules:



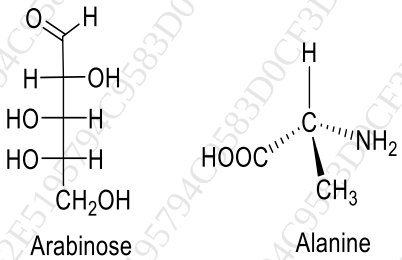
A I and II enantiomers and III is meso compound
B I, II and III all are same
C I, II and III all are diastereoisomers
D I and II are same and III is meso compound

2 Which of the following compounds is achiral?



A A
B B
C C
D D

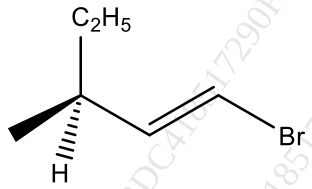
3. Assign D/ L notation to the given compounds:



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

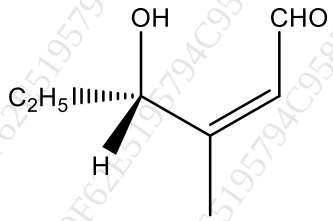
4. Which of the following is not used in partial asymmetric synthesis?
A (R)-Lactic acid
B Chiral borane
C D-Glyceradehyde
D Right circularly polarised light

5. Indicate the appropriate nomenclature for the following compound:



A (3R,1E)-1-bromo-3-methylpent-1-ene
B (3S,1E)-1-bromo-3-methylpent-1-ene
C (3S,1E)-5-bromo-3-methylpent-4-ene
D (3R,1Z)-1-bromo-3-methylpent-1-ene

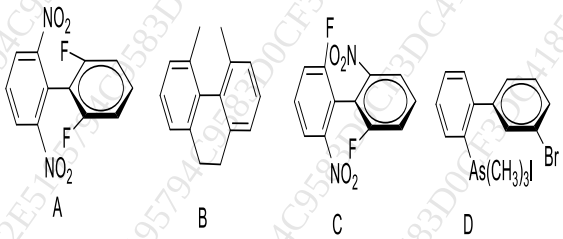
6 Indicate the correct nomenclature for the following compound:



A (4R,2Z)-3-Methyl-4-hydroxyhex-2-enal
B (4R,2E)-3-Methyl-4-hydroxyhex-2-enal
C (4S,2Z)-3-Methyl-4-hydroxyhex-2-enal
D (4S,2Z)-3-Methyl-4-hydroxyhex-2-enal

7 According to Bayer's Theory which cycloalkane is more stable?
A Cyclopropane
B Cyclooctane
C Cyclopentane
D Cyclohexane

8 Which of the following molecules will not exhibit optical activity?



A A
B B
C C
D D

9 Identify the molecule which is optical active:

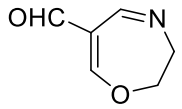
A Cis-1,2-Dimethylcyclobutane

B Trans-1,2-Dimethylcyclobutane

C Trans-1,2-Dimethylcyclopentane

D Cis-1,2-Dimethylcyclopentane

10 Nomenclate the given molecules according to IUPAC rules:



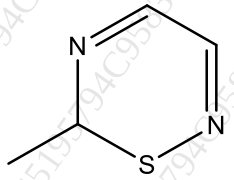
A 2,3-Dihydro-1,4-oxazepine-6-formaldehyde

B 6,7-Dihydro-1,5-oxazepine-3-formaldehyde

C 6,7-Dihydro-1,5-oxazepine-3-carbaldehyde

D 2,3-Dihydro-1,4-oxazepine-6-carbaldehyde

11 Nomenclate the given molecules according to IUPAC rules:



A 3-Methyl-3H-1,2,4-thiadiazine

B 2-Methyl-2H-1,3,6-thiadiazine

C 6-methyl-6H-1,2,5-thiadiazine

D 6-Methyl-1,2,5-thiadiazine

12 What is increasing order of aromaticity of furan, thiophene and pyrrole?

A Thiophene < Pyrrole < Furan

B Furan < Thiophene < Pyrrole

C Furan < Pyrrole < Thiophene

D Pyrrole < Furan < Thiophene

13 Which is the most preferred position in Imidazole ring for an electrophilic attack?

A 1

B 2

C 3

D 4(5)

14 Imidazole can be converted to Imidazole-4-sulphonic acid using:

A Pyridine-sulphur trioxide

B 50-60% Oleum, 160°C

C Nitric acid and sulfuric acid

D Hydrogen sulphide

15 Condensation of formaldehyde and 2 moles of acetoacetic ester in presence of ammonia named as…… synthesis.

A Van-Leusen synthesis of oxazole
B Madelung synthesis of indole
C Hantzsch synthesis of pyridine
D Gabriel synthesis of thiazole

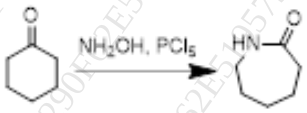
16 Reaction of indole with formaldehyde and dimethylamine is the _____.

A Vilsmeier Hack reaction
B Mannich reaction
C Chichibabin reaction
D Van-Leusen reaction

17 Identify the reagents required to carry out synthesis of 1,2-dihydroquinoline by Skraup synthesis.

A Aniline + glycerol + H_2SO_4
B Aniline + β-keto ester
C Aniline + glycerol + nitrobenzene + H_2SO_4
D Acetaldehyde + aniline

18 Identify the type of rearrangement involved in the following reaction.



A Schmidt rearrangement
B Beckmann rearrangement
C Claisen Schmidt condensation
D Clemmensen reduction

19 Identify the reagents for the Wolff-Kishner reduction.

A Na, liquid NH_3, Alcohol
B Lithium aluminium hydride, dry ether
C Sodium borohydride
D Hydrazine, potassium hydroxide, ethylene glycol

20 What is the medicinal use of clonidine?

A Antilipidemic agent
B Antihypertensive agent
C Antimalarial agent
D Anti-HIV agent

QII. Answer **any two** of the following (20)

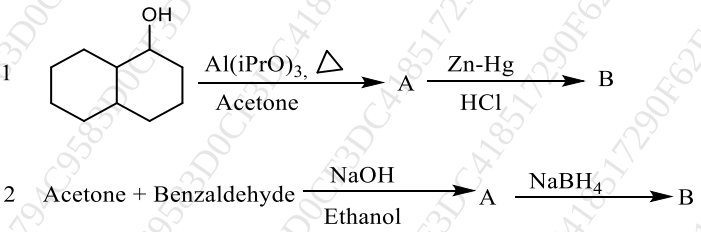
1 Comment on the reaction of chiral molecule which cause generation of second chiral centre. Predict the products for the bromination of various geometric isomers of 2-butene. Discuss the mechanism for the same and predict whether the reaction is stereospecific &/or stereoselective.

2 i Arrange thiazole, imidazole, and oxazole with decreasing order of basicity with proper justification. Depict resonance in thiazole.

ii Attempt **any two** of the following conversions:
1. Acrolein to quinoline
2. Pentose to furfural
3. Benzene to azepine

3 i Depict the mechanism for the Beckmann and Schmidt rearrangement.

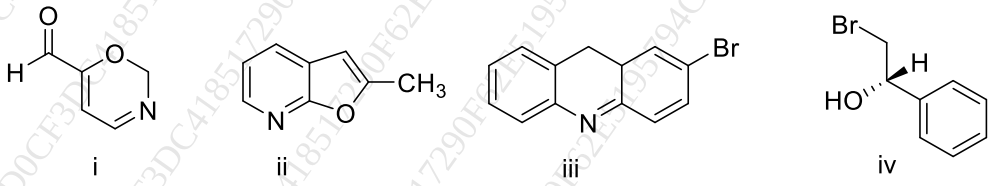
ii Attempt the following conversions



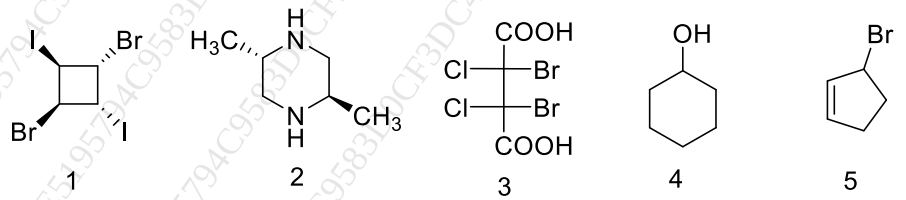
QIII. Answer **any seven** of the following questions: (35)

1 i Draw the structure for **any two** of the following compounds:
1. 5-Bromo-6H-1,3-thiazine
2. 3-Nitro-1H-pyrrole-2-carbaldehyde
3. 4-Phenylisoquinoline

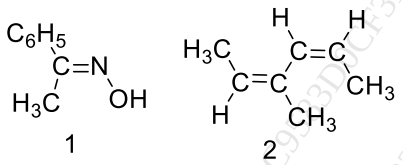
ii Give a correct IUPAC nomenclature for **any three** of the following:



2 Predict whether the following structures are chiral or achiral. Identify the elements of symmetry in the achiral molecule.



3 Discuss any one method for determination of configuration of geometrical isomers. Nomenclature for the following compounds using Cahn-Ingold-Prelog rules:



1 2

4 Name the reagents which are instrumental for the following conversions (any 5):

i) 2-Methylbut-2-ene to 2-methyl butane

ii) 3-Pentene-2-one to pent-3-en-2-ol

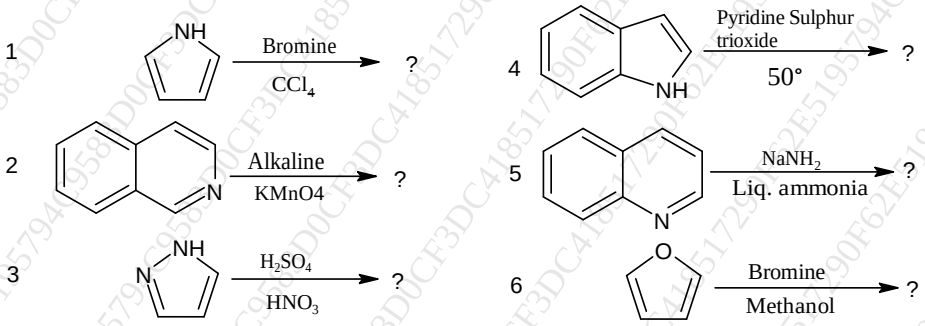
iii) Benzaldehyde to toluene

iv) Propionamide to propan-1-amine

v) 2-Propanol to 2-propanone

vi) p-Hydroxy acetophenone to benzene-1,4-diol

5 Complete the following reactions (any 5):



6 Write synthesis with reaction mechanism of the following (any two)

i. Fischer indole synthesis

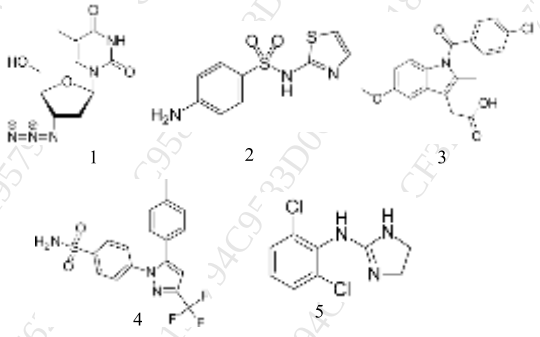
ii. Bischler Napiralski synthesis

iii. Traube synthesis

7 Explain in brief isomerism in substituted biphenyls. Comment on the optical activity of these compounds.

8 Discuss the methods available for resolution of racemic mixtures. Elaborate on any one method.

9 Identify the heterocyclic compound present in the following drugs, and also mention the medicinal uses.



****