

M.Sc. CHEMISTRY
FIRST SEMESTER
ORGANIC CHEMISTRY I
MSC-102 [SPECIAL REPEAT]
[USE OMR FOR OBJECTIVE PART]

SET
A

Duration : 3 hrs.

Full Marks : 70

Time : 30 min.

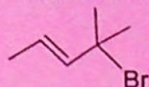
Marks : 20

(Objective)

1X20=20

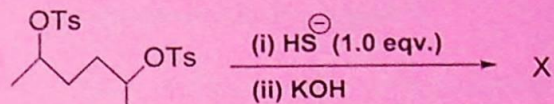
Choose the correct answer from the following:

1. The carbon containing Br-atom in the following compound is known as



- a. Allyl
b. Aryl
c. Vinyl
d. Carbonyl

2. In the following reaction,



X

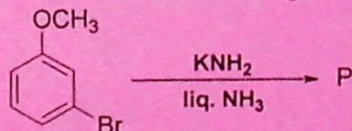
X will be:

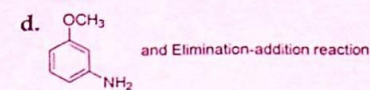
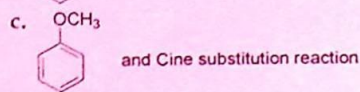
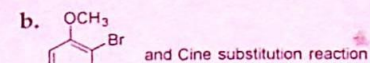
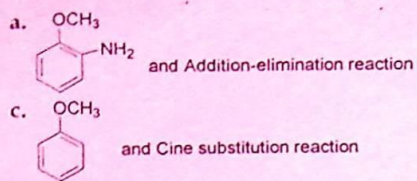
- a.
- b.
- c.
- d.

3. Pick out the alkyl bromide which proceeds with retention of configuration in an S_N2 reaction with CH_3ONa

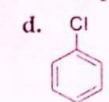
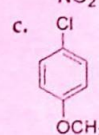
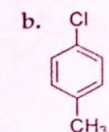
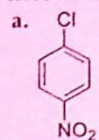


4. Identify the product 'P' in the following reaction and predict the type of reaction.





5. Which of the following aromatic halides undergo nucleophilic substitution reaction most easily?



6. E2 reaction is a

- a. Bimolecular & multistep reaction mechanism
 c. Bimolecular & single step reaction mechanism

- b. Unimolecular & multistep reaction mechanism
 d. Bimolecular & two step reaction mechanism

7. Polar protic solvent favour

- a. E1 reaction
 c. E1 & E2 both

- b. E2 reaction
 d. none of them

8. 1,3-dioxane consist of a

- a. five membered ring
 c. seven membered ring

- b. six membered ring
 d. four membered ring

9. In Diels-Alder reaction which of the following reagent is involved?

- a. AlCl_3
 c. both of these

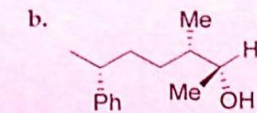
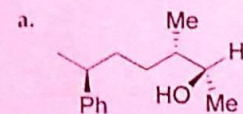
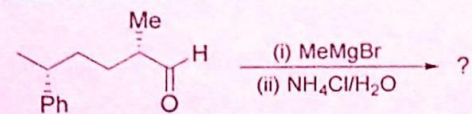
- b. BF_3
 d. none of these

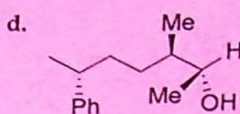
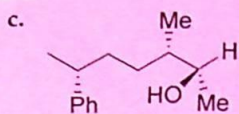
10. In Friedel-Craft acylation the intermediate is a

- a. acylium cation
 c. carbanion

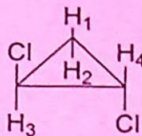
- b. arenium ion
 d. none of these

11. Product in the following reaction will be:





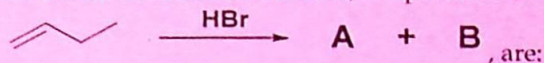
12. The correct stereochemical relationship of H₁/H₂ and H₃/H₄ atoms in the following molecule is



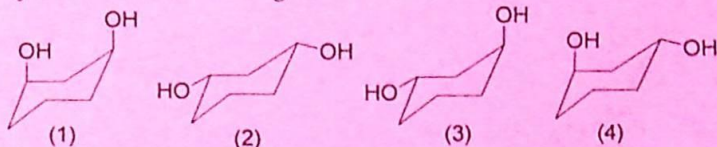
- a. H₁/H₂ homotopic and H₃/H₄ enantiotopic
 b. H₁/H₂ diastereotopic and H₃/H₄ enantiotopic
 c. H₁/H₂ enantiotopic and H₃/H₄ homotopic
 d. Both H₁/H₂ and H₃/H₄ are homotopic.
13. Consider the following statements about trans- and cis-decalins
 (A) cis-decalin is more stable than trans-decalin
 (B) trans-decalin is more stable than cis-decalin
 (C) trans-decalin undergoes ring-flip.
 (D) cis-decalin undergoes ring-flip.

The correct statement about the above are

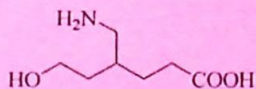
- a. A and C
 b. B and D
 c. B and C
 d. A and D
14. In the following Markownikov addition reaction, the products A and B

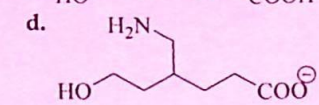
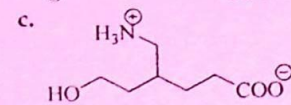
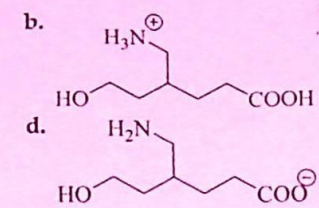
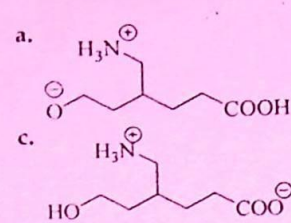


- a. Enantiomers
 b. Diastereomers
 c. Homomers
 d. Regiomers
15. Stability order of the following conformers is

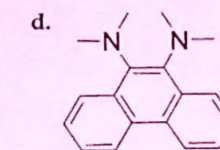
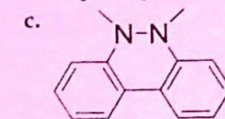
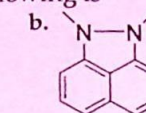
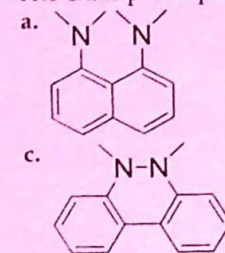


- a. 1>2>3>4
 b. 2>1>3=4
 c. 1>2>3=4
 d. 2>1>4>3
16. If the pK_aH of primary amine is 10.7, pK_a of carboxylic acid and aliphatic alcohol are 4.5 and 16 respectively, then the actual form of the following compound at pH 6 will be?

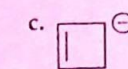
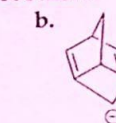
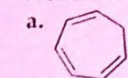




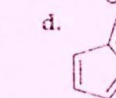
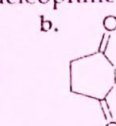
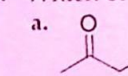
17. The example of proton sponge among the following is



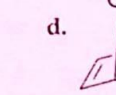
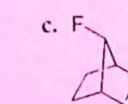
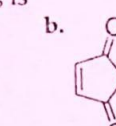
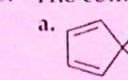
18. Which one of the following carbanions is most stable?



19. Which of the following is an example of a nucleophilic radical?



20. The compound that reacts rapidly with SbF_5 is



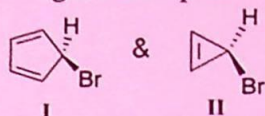
(Descriptive)

Time : 2 hrs. 30 mins.

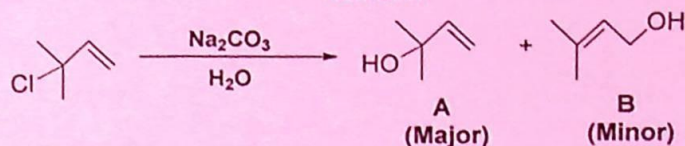
Marks : 50

[Answer question no.1 & any four (4) from the rest]

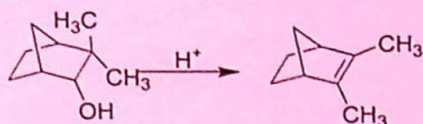
- a. Which one of the followings is expected to give precipitation of AgBr in the presence of AgNO₃? Explain 3



- b. What is allylic arrangement? Write the mechanism of the following reaction. 2

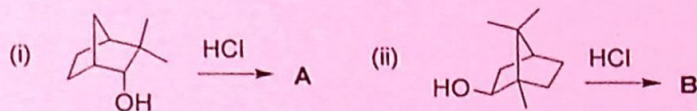


- c. Give a mechanism by which it is formed and write the name of this mechanism. 3

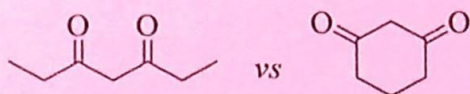


- d. Calculate the optical rotation of an enantiomeric mixture having the following data. Specific rotation of the compound = (-)30°, the mixture contain 80% of d-isomer and 20% l-isomer. 2

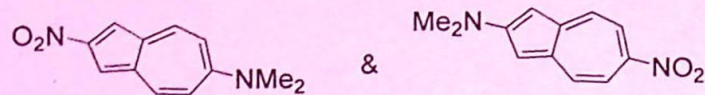
2. a. Write the products (A & B) of the following reactions with justifications 2+2+3
+3=10



- b. Which of the following compound is having lowest pKa? Explain

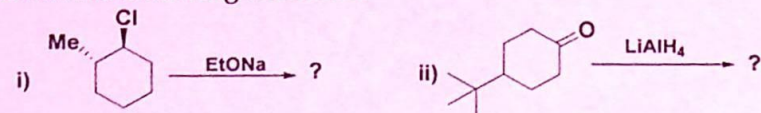


c. Which of the following compound will have higher dipole moment? Explain



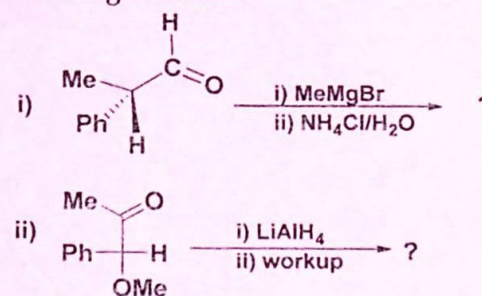
3. a. Write down the structure/conformation of the major product formed in the following reactions.

4+2+4
=10



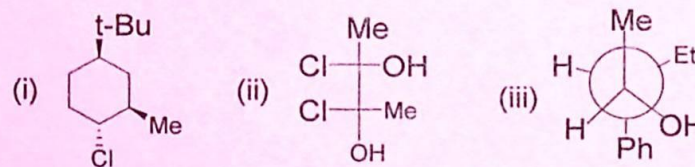
b. Explain what you mean by Stereo selective and stereo specific reactions. Explain with appropriate examples.

c. Define Cram's rule. Use Cram's/anti Cram's rule to predict the major product in the following reactions:

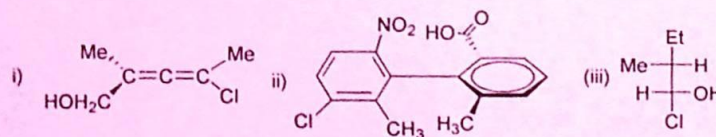


4. a. Draw Chair conformation for (i), Newman's projection for (ii) and Fisher projection for (iii).

3+3+2
+2=
10



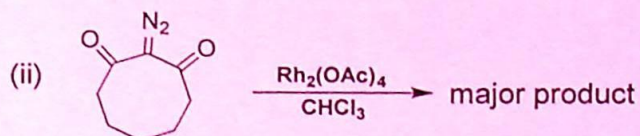
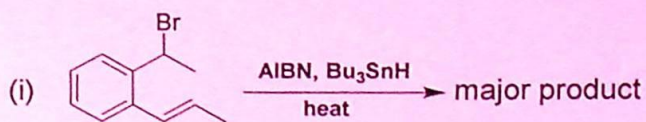
b. Give R/S configurations for the following molecules



- c. Explain why axial methyl cyclohexane is less stable than equatorial methyl cyclohexane.
 d. Explain why cis-1-4 di-t-butyl cyclohexane exist in boat conformation?

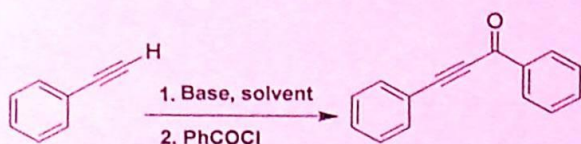
5. a. Write the major product of the following reactions with mechanism.

3+2+2
+3=10

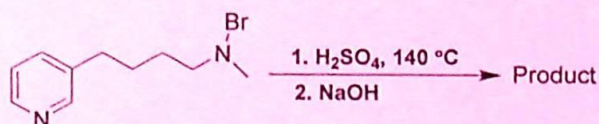


- b. Which of the following bases will be the most suitable to generate nucleophile for carrying out the reaction given below? Explain

Bases: KOH, KNH₂, Et₃N



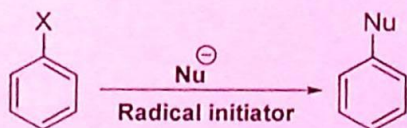
- c. Write the major product of the following reaction with mechanism.



6. a. Explain cine substitution with examples.

2+3+5
=10

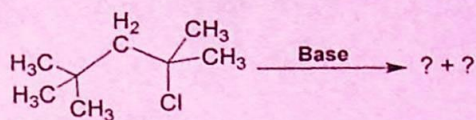
- b. What is S_{RN}1 reaction? Give the mechanism of the following reaction.



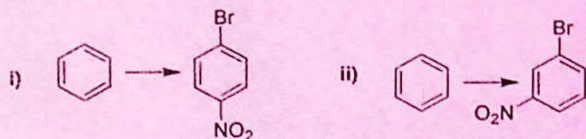
c. What is isotopic labelling? ^{14}C -Bromobenzene (labelled bromobenzene) on being treated with KNH_2 in liq. NH_3 produces a mixture of 1- ^{14}C -aniline and 2- ^{14}C -aniline. Justify the reaction.

7. a. Write down the products and mention the major one in the following reaction. Describe the mechanism.

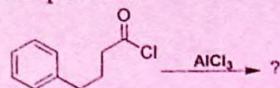
4+2+2
=10



b. How will you convert



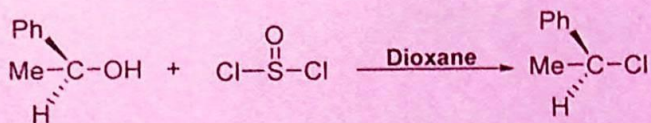
c. Write down the product and detailed mechanism of the reaction.



8. a. Explain ambident nucleophiles with examples.

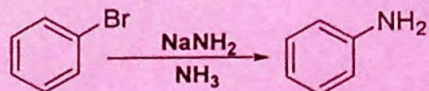
2+3+3
+2=10

b. What is $\text{S}_{\text{N}}1$ reaction? Explain the mechanism of the following reaction.



c. Write down the structure of Benzyne intermediate. How can it be trapped? Show a reaction of trapping Benzyne.

d. Write down the detailed mechanism involved in the following reaction.



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