2024/12

SET A

M.Sc. CHEMISTRY
FIRST SEMESTER
ORGANIC CHEMISTRY I
MSC – 101 [REPEAT]

[USE OMR FOR OBJECTIVE PART]

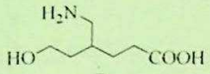
Duration: 3 hrs. **Full Marks: 70**

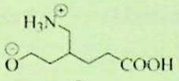
Objective

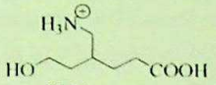
Time: 30 min. **Marks: 20**

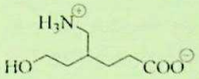
Choose the correct answer from the following: ***1×20=20***

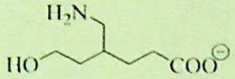
1. If the pKaH of primary amine is 10.7, pKa of carboxylic acid and aliphatic alcohol are 4.5 and 16 respectively, then the actual form of the following compound at **pH 6** will be?



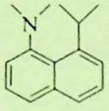
a. 

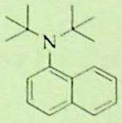
b. 

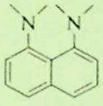
c. 

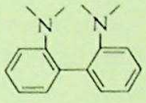
d. 

2. The example of the proton sponge is

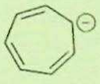
a. 

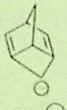
b. 

c. 

d. 

3. Which one of the followings is homoaromatic?

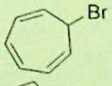
a. 

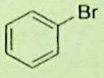
b. 

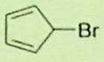
c. 

d. 

4. Which one of the followings will give precipitation of AgBr in the presence of Ag?

a. 

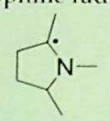
b. 

c. 

d. 

5. Which of the following is an example of electrophilic radical?

a. 

b. 

c. 

d. 

6. Which of the following is not true about nucleophile?

a. nucleophiles are Lewis acids

b. Il molecules or ions with a free pair of electrons

c. donates an electron pair to an electrophile to form a chemical bond

d. a nucleophile becomes attracted to a positive charge.

7. An example of an ambident nucleophile

a. H_2O

b. NH_3

c. ROH

d. $C_6H_5O^-$

8. The S_N2 reactivity of alkyl halideswill follow the order:

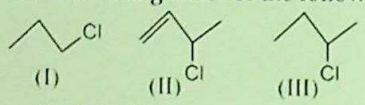
a. 1°-halides > 2°-halides > 3°-halides

b. 2°-halides > 3°-halides > 1°-halides

c. 3°-halides > 2°-halides > 1°-halides

d. 3°-halides > 1°-halides > 2°-halides

9. The decreasing order of the following chlorides towardsS_N1 reactivityis



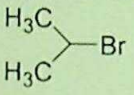
a. I > II > III

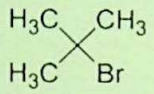
b. II > I > III

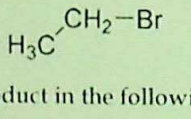
c. II > III > I

d. III > II > I

10. Which of the following alkyl bromides shows complete stereochemical inversion during S_N2 reaction?

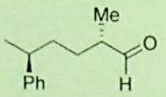
a. 

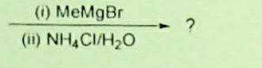
b. 

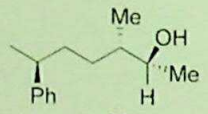
c. 

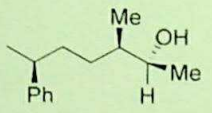
d. CH_3-Br

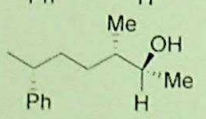
11. Product in the following reaction will be:

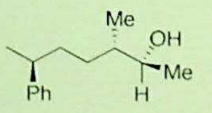




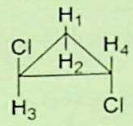
a. 

b. 

c. 

d. 

12. The correct stereochemical relationship of H_1/H_2 and H_3/H_4 atoms in the following molecule is



a. H_1/H_2 homotopic and H_3/H_4 enantiotopic
b. H_1/H_2 diastereotopic and H_3/H_4 enantiotopic
c. H_1/H_2 homotopic and H_3/H_4 also homotopic.
d. H_1/H_2 enantiotopic and H_3/H_4 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.

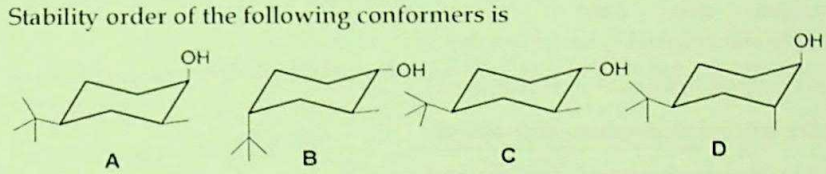
The **correct statement** about the above are:

a. A and C
b. A and D
c. B and C
d. B and D

14. Which of the following is **true** of **any (*R*)-enantiomer**?

a. It rotates plane-polarized light to the right
b. It rotates plane-polarized light to the left
c. It is the mirror image of the corresponding (S)-enantiomer
d. It is a racemic form

15. Stability order of the following conformers is

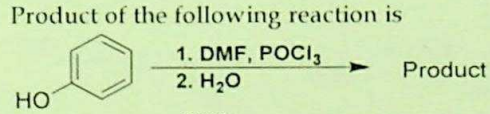


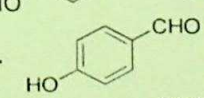
a. C>A>D>B
b. B>C>A>D
c. C>A>B>D
d. C>D>A>B

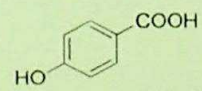
16. The Pinacol-Pinacolone rearrangement is.....type reaction- Fill the blanks

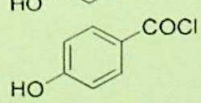
a. Nucleophilic substitution,
b. Free radical substitution
c. Carbocation rearrangement,
d. Electrophilic addition

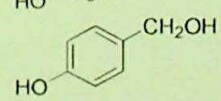
17. Product of the following reaction is



a. 

b. 

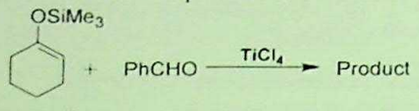
c. 

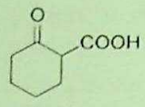
d. 

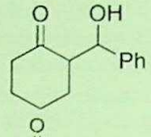
18. Robinson annulation reaction is a combination of which of the following two reactions

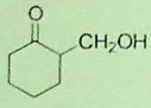
a. Michael addition and Aldol condensation
b. Mannich reaction addition and Aldol condensation
c. Claisen condensation and Aldol condensation
d. Mannich reaction addition and Claisen condensation

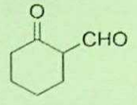
19. Which is correct product of the following reaction



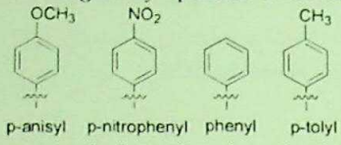
a. 

b. 

c. 

d. 

20. The migratory aptitude of the following moiety is



a. *p*-anisyl>*p*-nitrophenyl>phenyl>*p*-tolyl

b. *p*-anisyl>*p*-tolyl >phenyl> *p*-nitrophenyl

c. *p*-tolyl>*p*-nitrophenyl>phenyl> *P*-anisyl

d. *P*-anisyl> phenyl >*p*-nitrophenyl >*p*-tolyl

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Descriptive

Time : 2 hrs. 30 mins. **Marks : 50**

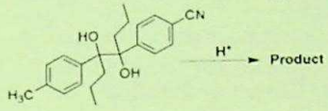
[Answer question no.1 & any four (4) from the rest]

1. **a.** Which of the followings will have lower pKa value and why? **3+2+2 +3=10**

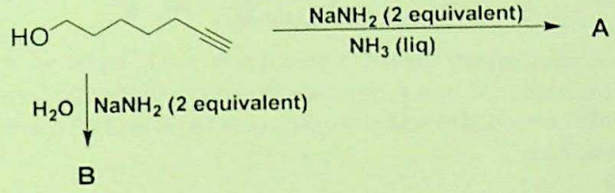
b. What are hard and soft nucleophiles? Give examples.

c. Calculate the **optical rotation** of an enantiomeric mixture having the following data. Specific rotation of the compound = 40°, the mixture contain 60% of d-isomer and 40% l-isomer.

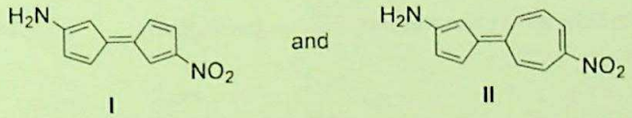
d. What will be the product of the following reaction? What is the name of the following reaction? Describe the mechanism.



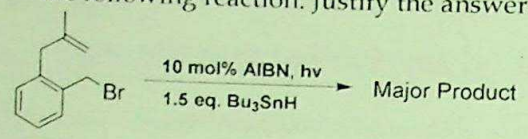
2. **a.** Write the expected product **A** and **B** of the following reactions. Explain **3+3+4 =10**



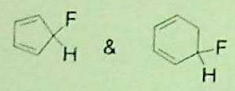
b. Which of the followings will have higher dipole moment? Explain

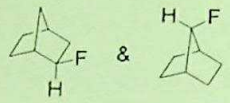


c. Write the all-possible products and identify the major product of the following reaction. Justify the answer.

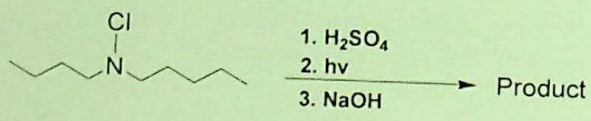


3. **a.** Which compound of **each pair** will react with SbF_5? Explain — 3+2+3 +2=10

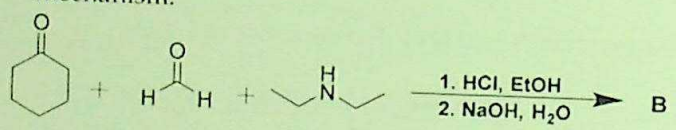
(i) 

(ii) 

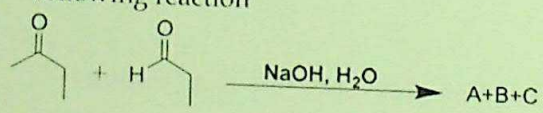
b. Write the major product and reaction mechanism of the following reaction



c. What is the product of the following reaction? Give the detailed mechanism.

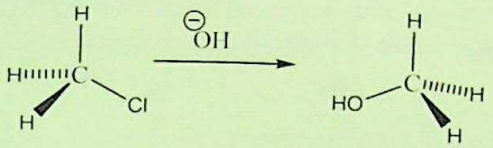


d. Write the only cross Aldol addition products (A, B and C) for the following reaction

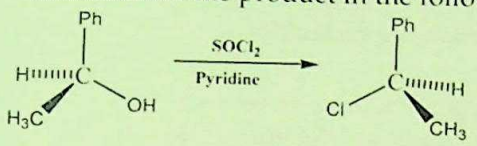


4. **a.** What are the factors that affect the nucleophilic substitution reactions. — 2+5+3 =10

b. Predict the mechanism of the following reaction and draw its energy profile diagram. Give the evidences in favour of your mechanism.

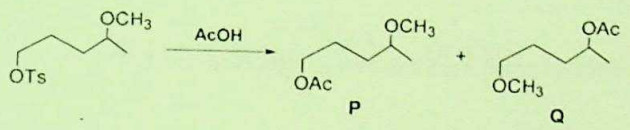


c. What is S_Ni reaction? Discuss the mechanism to justify the formation of the product in the following reaction.

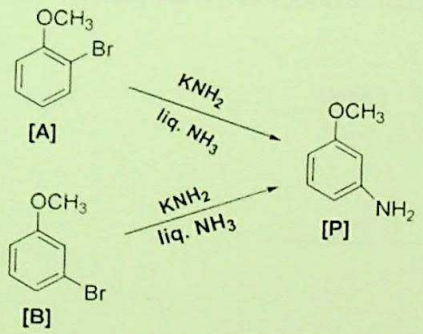


5. **a.** Define **NGP** reaction. What is anchimeric assistance? **2+3+5 =10**

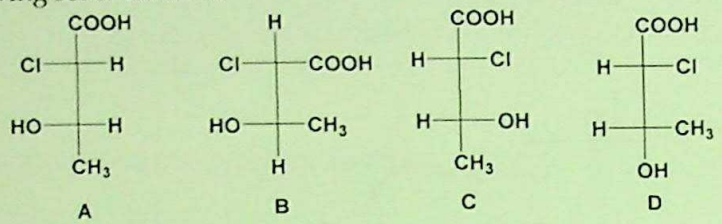
b. Propose a mechanism to explain the formation of the products P and Q in the following reaction.



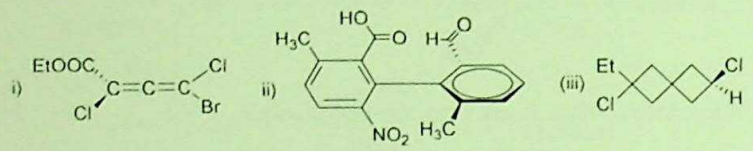
c. What is benzyne? How is it formed? Justify the formation of the product P from two different reactants A and B in the following reactions.



6. **a.** Find homomers, enantiomers and diastereomers from the following set of isomers. **3+3+2 +2=10**

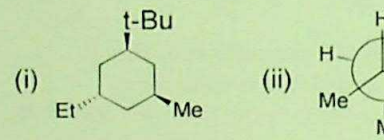


b. Give R/S configurations for the following molecules

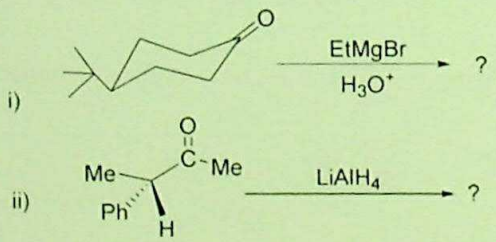


c. What do you mean by locked conformations? Explain with example.

d. Draw a chair conformation for **(i)** and Fischer projection for **(ii)**



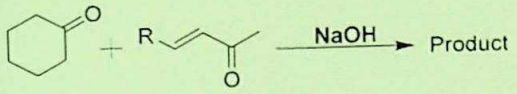
7. **a.** Write down the configuration of the major product in the following two reactions. **4+3+3 =10**



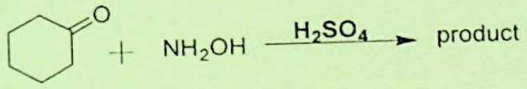
b. Explain what you mean by Stereo selective and stereo specific reactions. Explain with appropriate examples.

c. Between cis and trans isomers of 1-bromo 4-t-butyl cyclohexane, which one will undergo SN^2 reaction faster? Explain with reasoning.

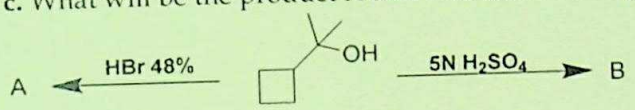
8. a. Write down the correct product of the following reaction. What is the name of the following reaction? Describe the mechanism. **4+4+2 =10**



b. Write down the correct product of the following reaction. What is the name of the following reaction? Describe the mechanism.



c. What will be the product A and B of the following reaction



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