

B. Sc. CHEMISTRY
SECOND SEMESTER
ORGANIC CHEMISTRY I
BSC - 201

(Use Separate Answer Scripts for Objective & Descriptive)

Duration : 3 hrs.

Full Marks : 70

(PART-A: Objective)

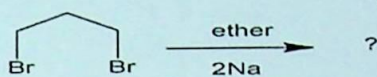
Time : 20 min.

Marks : 20

Choose the correct answer from the following:

1X20=20

1. The product of the reaction will be



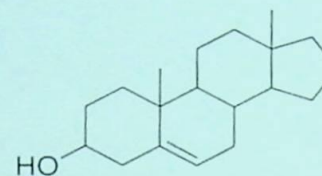
- a. cyclopropane
b. cyclobutane
c. Propane
d. butane
2. E1cB follows
a. single step mechanism
b. two step mechanism
c. three step mechanism
d. Pseudo one step mechanism
3. Oxymercuration-Demercuration reaction gives
a. Saytzeff product
b. Hoffmann product
c. Markovnikov addition
d. Anti-Markovnikov addition
4. The solvent used for Wurtz coupling reaction is
a. Dry alcohol
b. Dry ether
c. Dry Acetone
d. Chloroform
5. Hydroboration of alkenes give
a. Anti-Markovnikov product
b. Markovnikov product
c. Both a and b are possible
d. None of a and b are possible
6. The effect that refers to the polarity produced in a multiple bond in presence of attacking reagent is
a. Inductive effect
b. Electromeric effect
c. Resonance effect
d. Hyperconjugation
7. What is the hybridization of C-atom in the methane molecule
a. sp
b. sp²
c. sp³
d. none of the above
8. Which of the following is the correct order of bond lengths:
a. C-C < C=C < C≡C
b. C-C > C=C > C≡C
c. C=C < C≡C < C-C
d. C≡C > C-C > C=C

9. The following compound belongs to



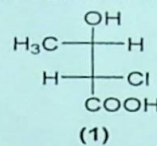
- a. Aromatic
b. Alicyclic
c. Heterocyclic
d. Acyclic
10. Which of the following compounds is a benzenoid aromatic compound?
a. Furan
b. Thiophene
c. Aniline
d. Pyridine

11. The total number of chiral carbon & numbers of optical isomers of the following compound

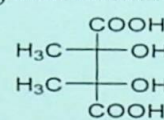


- a. 3 & 6
b. 4 & 16
c. 5 & 32
d. 5 & 22

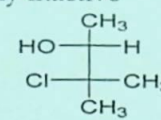
12. Which of the following molecules are optically inactive



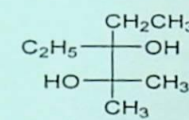
(1)



(2)



(3)



(4)

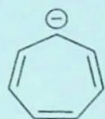
- a. 1 & 3
b. 2 & 3
c. 3 & 4
d. 3 & 4
13. Which of the following statements is not correct.
a. Stereo isomers differ in arrangement of atom/groups in space.
b. Enantiomers are mirror image structures.
c. Geometrical isomers are diastereomers.
d. Enantiomers have different physical and chemical properties.
14. According to Baeyer strain theory, smaller cycloalkanes are highly strained due to
a. Torsional strain
b. Angle strain
c. Steric strain
d. Angle strain and torsional strain
15. In Gauche butane conformation, the dihedral angle between the two $-CH_3$ groups is:
a. 60°
b. 90°
c. 120°
d. 180°

16. Which one is NOT Aromatic?

a.



c.



b.



d.

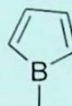


17. Which one is anti-aromatic?

a.



c.



b.

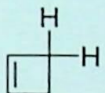


d.

all

18. Which molecule contains the most acidic proton?

a.



b.



c.



d.



19. Which one is the electrophile for Friedel-Crafts alkylation reaction?

a. Alkyl radical

b. Carbanion

c. Carbocation

d. All

20. Which alkyl halide among the following is more reactive towards Friedel-Crafts alkylation reaction?

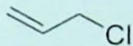
a.



b.



c.



d.



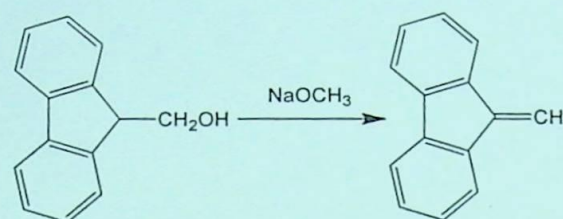
(PART-B : Descriptive)

Time : 2 hrs. 40 min.

Marks : 50

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

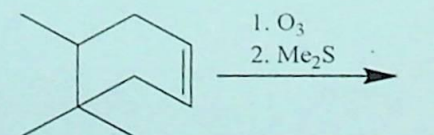
1. a. For the following reaction which elimination mechanism would be appropriate. Write down the plausible mechanism 3+3+2+
2=10



- b. What are Nucleophiles? Explain with examples.
- c. Draw the Newman's projection for staggered and eclipsed propane. Draw a graph of energy vs change of dihedral angle of propane.
- d. Which one of the following molecules is having maximum basicity? Explain.

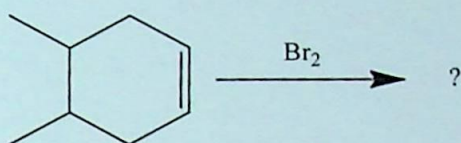


2. a. Discuss the detailed mechanism for the hydroboration of alkenes with an example. Also discuss about the stoichiometry of the reaction. 6+4=10
- b. Write the mechanism of ozonolysis of alkene. What will be the product of the following reaction?



[4]

3. a. Deduce detailed mechanism of Oxymercuration-Demercuration reaction of alkenes taking a suitable example. 5+2+3
=10
- b. What is Frankland reaction?
- c. What will be the product of the following bromination reaction? Deduce the mechanism with proper stereochemistry

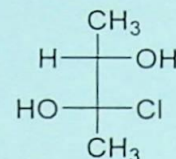


4. a. Define heterocyclic compounds. Give two examples of heterocyclic compounds. 2+3+2+
3=10
- b. What is hybridization? Explain the shape of methane molecule with the help of hybridization.
- c. Explain homolytic and heterolytic fission of a covalent bond.
- d. What are carbocations? Illustrate the shape of methyl carbocation.
5. a. Give reasons why when HBr is added to propene, 2-bromopropane is the major product. 2+3+5
=10
- b. Complete the following reactions and identify the products:
- (i) $\text{CH}_3\text{CH}_2\text{Cl}$ $\xrightarrow{\text{Ethanolic NaOH}}$ Product
Chloroethane
- (ii) $\text{CH}_3\text{CH}_2\text{Cl}$ $\xrightarrow{\text{Aqueous NaOH}}$ Product
Chloroethane
- c. What is Annulene? Write the structure of [8] annulene and comment whether it is aromatic, antiaromatic or nonaromatic. Explain why [10] annulene is nonaromatic.

6. a. Explain the terms:
(i) enantiomers, (ii) Diastereomers and (iii) Meso- compounds

6+4=10

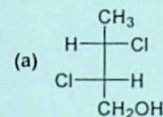
- b. Convert the following structures in to Wedge projection and assign R/S configuration for each of the chiral centre in the molecule



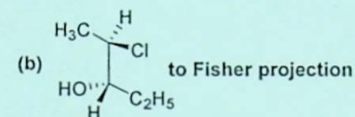
7. a. Draw E and Z configurations for the molecule $\text{CH}_3\text{-CH}=\text{C}(\text{Cl})(\text{Br})$.

2+4+4
=10

- b. Convert the following structures:



to Newman's projection



to Fisher projection

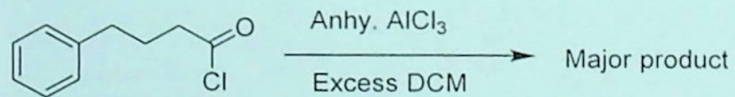
- c. Cyclohexane exists in chair and boat conformations. State which conformation is more stable and why? Also draw Newman's projection for chair and boat conformation, indicating axial and equatorial bonds in chair conformation and flagpole bonds in boat conformation.

8. a. Why nitro ($-\text{NO}_2$) group is meta directing and methoxy ($-\text{OCH}_3$) group is ortho-para directing in electrophilic aromatic substitution reaction? Explain.

3+3+4
=10

- b. Show the steps with reagents for the following syntheses?

- c. Write the structure of the major product and show the reaction mechanism.



== *** ==

[6]