

B.SC. CHEMISTRY  
FIRST SEMESTER  
ORGANIC CHEMISTRY I  
BSC - 101

**SET  
A**

[USE OMR SHEET FOR OBJECTIVE PART]

Duration: 3 hrs.

Full Marks: 70

Time: 30 min.

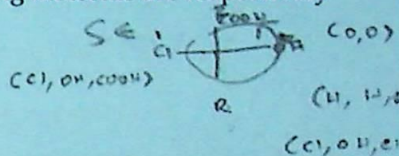
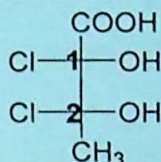
( Objective )

Marks: 20

Choose the correct answer from the following:

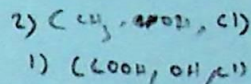
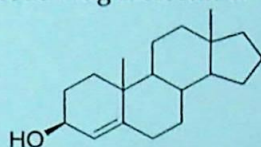
1X20=20

1. The configurations of chiral centres 1 and 2 in the following molecule are respectively



- a. S and R  
c. S and S  
b. R and S  
d. R and R

2. No of chiral carbon in the following molecule is



- a. 3  
c. 5  
b. 4  
d. 6

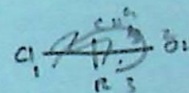
3. Which of the following statements are correct?

- (A) Configurational isomers are readily interconvertible.  
(B) Meso compound possess either plane or centre of symmetry.  
(C) Conformational isomers are formed by rotation around single bond.  
(D) energy differences among conformational isomers are very high.

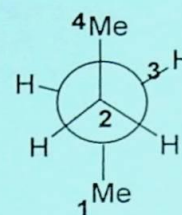
- a. A, B and C  
c. B, C and D  
b. B and C  
d. C and D

4. Which of the following correctly lists the conformation of cyclohexane in order of increasing potential energy?

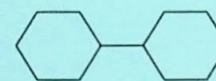
- a. chair < boat < twist-boat < half-chair  
c. chair < twist-boat < half-chair < boat  
b. half-chair < boat < twist-boat < chair  
d. chair < twist-boat < boat < half-chair



5. In the given conformation  $C_2$  is rotated about  $C_2-C_3$  bond clockwise by an angle of  $120^\circ$  then the conformation obtained is

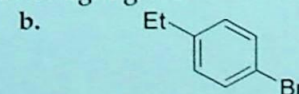
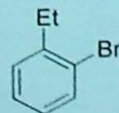


- a. Fully eclipsed conformation  
 c. Gauche conformation
- b. Anti-staggered conformation  
 d. Staggered conformation
6. The effect that refers to the movement of electrons through  $\sigma$  bonds is  
 a. Inductive effect  
 c. Resonance effect
- b. Electromeric effect  
 d. Hyperconjugation
7. The hybridization of C-atom in the ethene molecule is  
 a.  $sp$   
 c.  $sp^3$
- b.   $sp^2$   
 d. none of the above
8. Which of the following is the correct order of bond lengths:  
 a.  $C-C < C=C < C\equiv C$   
 c.  $C=C < C\equiv C < C-C$
- b.  $C-C > C=C > C\equiv C$   
 d.  $C\equiv C > C-C > C=C$
9. The following compound belongs to

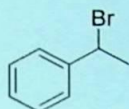


- a. Aromatic  
 c. Alicyclic
- b. Heterocyclic  
 d. Acyclic
10. The IUPAC name of the following organic compound is
- 
- The structure shows a five-membered ring with a double bond between carbons 1 and 2. Carbon 2 has an ethyl group attached, and carbon 3 has a methyl group attached.
- a. 2-Ethyl-3-methylcyclopent-1-ene  
 c. 2-Ethyl-1-methylcyclopent-2-ene
- b. 1-Methyl-2-ethylcyclopent-2-ene  
 d. 1-Ethyl-2-methylcyclopent-2-ene

11. Bromination of ethyl benzene in the presence of light gives



c.

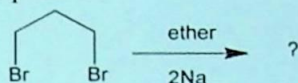


d. Both 'a' & 'b'

12. The order of alkyl halide to undergo E2 elimination reaction is as

- a.  $3^\circ > 2^\circ > 1^\circ$   
 b.  $2^\circ > 3^\circ > 1^\circ$   
 c.  $1^\circ > 2^\circ > 3^\circ$   
 d.  $3^\circ > 1^\circ > 2^\circ$

13. Write down the product



- a. Cyclopropane  
 b. Cyclobutane  
 c. Propane  
 d. Butane

14. E1 and E2 elimination reaction can be distinguished by which of the following characteristic

- a. Base used  
 b. Nature of the leaving group  
 c. Solvent used  
 d. Both 'a' & 'b'

15. The decreasing order of acidity of ethane, ethylene and acetylene is

- a. Ethane > Ethylene > Acetylene  
 b. Acetylene > Ethylene > Ethane  
 c. Ethylene > Acetylene > Ethane  
 d. Acetylene > Ethane > Ethylene

16. The molecule given below is

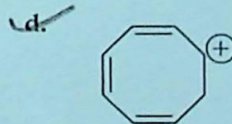
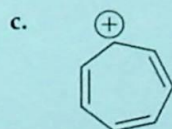
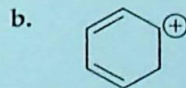
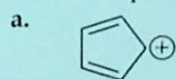


- a. aromatic  
 b. antiaromatic  
 c. nonaromatic  
 d. homoaromatic

17. Which of the following is correct according to the decreasing order of stability?

- a. aromatic > antiaromatic > nonaromatic > homoaromatic  
 b. aromatic > nonaromatic > antiaromatic > homoaromatic  
 c. aromatic > homoaromatic > antiaromatic > nonaromatic  
 d. aromatic > homoaromatic > nonaromatic > antiaromatic

18. The example of a homoaromatic compound is

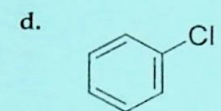
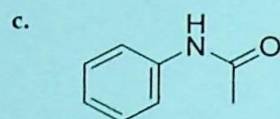
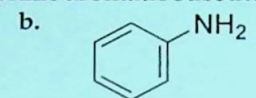
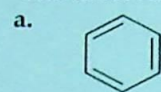


19. The actual electrophile of the mixture containing  $\text{Br}_2$  and  $\text{FeBr}_3$  is

- a.  $\text{Br}_2$   
c/  $\text{Br}^+$

- b.  $\text{FeBr}_3$   
d.  $\text{Br}^-$

20. The most reactive substrate for the electrophilic aromatic substitution reaction is



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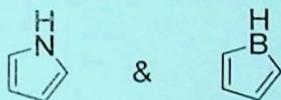
**( Descriptive )**

Time: 2 hrs 30 mins

Marks: 50

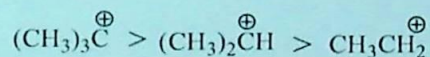
*[Answer question no.1 & any four (4) from the rest]*

1. a. What is hybridization? Discuss the formation of ethene molecule with the help of hybridization. 3+2+3+2  
=10  
b. Mention the differences between conformational and configurational isomers.  
c. Write a note on E1 elimination reaction.  
d. Which one of the followings is antiaromatic and why? Explain.

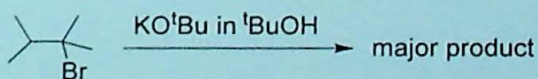


2. a. Define nucleophiles with examples. What are ambident nucleophiles? 3+2+3+2  
=10  
b. Give reason why in spite of having four polar C-Cl bonds in CCl<sub>4</sub> molecule, it is non-polar.  
c. Explain intermolecular and intramolecular hydrogen bonding with examples.  
d. What are organic acids and bases? Give examples.

3. a. State Markovnikov rule. Write are the major and minor products formed when HBr is added to propene. 2+3+2+2  
+1=10  
b. hyperconjugation explain why the stability of the carbocations follows the order given below.



- c. How will you synthesize 2,3-dimethylbutane from propene?  
d. Write a short note on Diels-Alder reaction.  
e. Write the product of the following reaction.



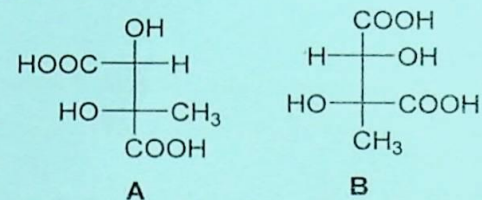
4. a. Match the list I with the list II. Give reasons.

2+2+3+3  
=10

List I	List II
A. Meso compound	1. An equimolecular mixture of enantiomers
B. Racemates	2. Stereo isomers that are not mirror images
C. Diastereomers	3. Molecule with plane or centre of symmetry

- b. Discuss stereochemistry of tartaric acid HOOC-CH(OH)-CH(OH)-COOH.

- c. Following two molecules A and B, find the configurations of each of the chiral centres and also establish whether the molecules are homomers, enantiomers or diastereomers.



- d. Write any two general methods of preparation of cyclo-alkanes.

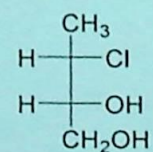
5. a. What is Baeyer strain theory and what are its limitations? Explain.

3+4+3  
=10

- b. Give a short account of different conformations of cyclohexane.

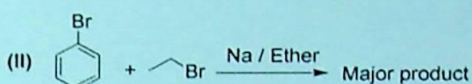
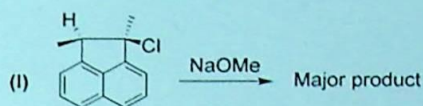
Represent the transformation of these conformations in an energy profile diagram with proper explanations.

- c. Convert the following Fisher projection structure: to Newman's projection and Wedge projection

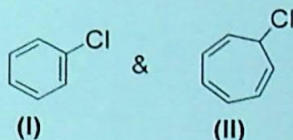


6. a. Define Saytzeff's rule. How are alkene prepared? Write down the factors affecting the role of E2 elimination reaction. What is allylic bromination? Give example. 1+2+2+3  
+2=10

b. Write the products of the following reactions.



7. a. Which of the followings will give precipitation while being treated with  $\text{AgNO}_3$ ? Justify. 3+3+4  
=10



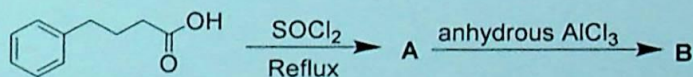
b. What is Annulene? Write the structure of 10-annulene and comment whether it is aromatic, antiaromatic or nonaromatic & justify your answer.

c. What is an electrophile? Which one of the followings will behave as the stronger electrophile? Explain.  
 $\text{PhCOCl}$  and  $\text{PhCOOMe}$

8. a. Write a short note on electrophilic aromatic nitration reaction 6+2+2  
=10

b. Between Friedel-Crafts alkylation and acylation reactions which one is more selective reaction? Explain.

c. Identify A & B of the following reactions



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