

B.Sc. BIOTECHNOLOGY  
THIRD SEMESTER (SPECIAL REPEAT)  
CHEMISTRY-I  
BBT-303  
[USE OMR SHEET FOR OBJECTIVE PART]

2023/08

**SET  
A**

Duration: 3 hrs.

Full Marks: 70

Time: 30 mins.

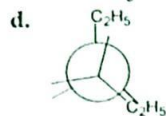
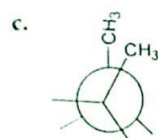
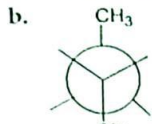
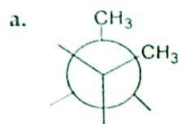
Marks: 20

**(Objective)**

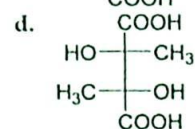
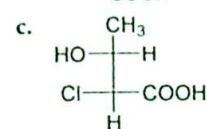
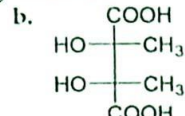
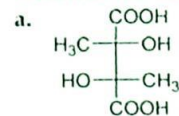
1 × 20 = 20

Choose the correct answer from the following:

1. Which of the following conformations will be least stable?



2. Which of the following molecule is optically inactive?



3. Brady's reagent is:

- a. R-Mg-X  
c. 2,4-Dinitrophenylhydrazine

- b. 2,4-Dinitro phenylhydrazine  
d. None of the above

4. Knoevenogel reaction is the synthesis of:

- a.  $\alpha,\beta$ -Saturated acids  
c.  $\alpha,\beta$ -unsaturated acids

- b.  $\beta$ -Unsaturated acids  
d.  $\beta$ -Saturated acids

5. CH<sub>3</sub>OH is an example of:

- a. Aprotic polar solvent  
c. Aprotic non-polar solvent

- b. Protic polar solvent  
d. Non-polar solvent

6. E<sup>2</sup> elimination reaction follow:

- a. One step mechanism  
c. Three step mechanism

- b. Two step mechanism  
d. Four step mechanism

6. In Cannizzaro reaction aldehyde undergo :
- Self-oxidation-reduction
  - Only self-oxidation
  - Only self-reduction
  - Condensation
7. A low concentration of nucleophile favors which of the following?
- SN<sup>2</sup> reaction
  - SN<sup>1</sup> reaction
  - Both SN<sup>1</sup> & SN<sup>2</sup>
  - None
8. In Aldol condensation reaction the substrate must have:
- One β-H
  - One α-H
  - One β-C
  - One β-F
9. S<sub>N</sub>2 stands for:
- Substitution nucleophilic bimolecular
  - Substitution nucleophilic unimolecular
  - Substitution electrophilic bimolecular
  - Substitution electrophilic unimolecular

10. Which of the following are Oxidation processes?

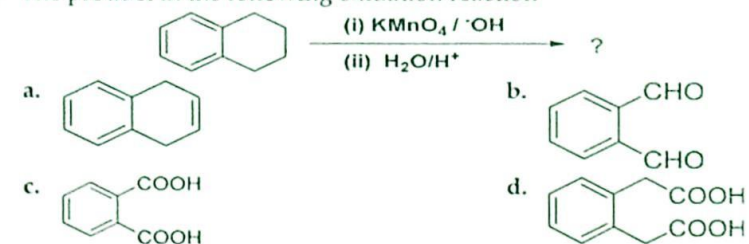
- An alcohol is converted to aldehyde
- An acid is converted to alcohol
- An aldehyde is converted to acid
- An acid is converted to ester

- 1 & 3
- 2 & 3
- 3 & 4
- 1, 2 & 3

11. Which of the following is/are reducing agents?

- Na and C<sub>2</sub>H<sub>5</sub>OH
  - K<sub>2</sub>Cr<sub>2</sub>O<sub>7</sub>
  - PCC
  - NaBH<sub>4</sub>
- 1 & 2
  - 2 & 3
  - 3 & 4
  - 1 & 4

12. The product in the following oxidation reaction

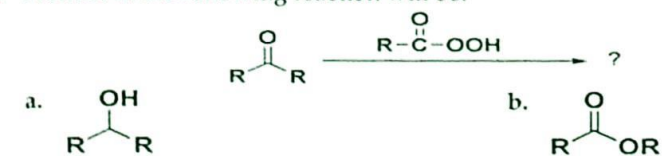


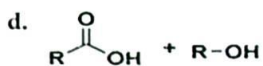
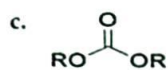
13. Which of the following reagent will carry out the following transformation?



- Na in EtOH
- NaBH<sub>4</sub>
- LiAlH<sub>4</sub>
- PCC

14. Product in the following reaction will be:





16. The reagent used in Clemmensen Reduction is:

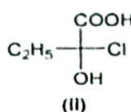
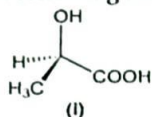
- a. Zn/Hg and HCl  
b.  $\text{NH}_2\text{NH}_2$  and NaOH  
c. Zn and HCl  
d.  $\text{NH}_2\text{NH}_2$  and EtONa

17. The total number of asymmetric carbon & stereoisomers of the following compound will be



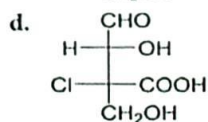
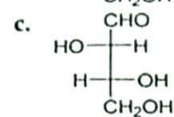
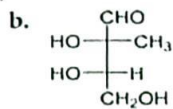
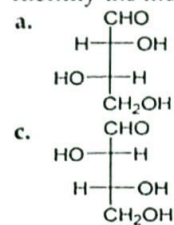
- a. 3 & 6  
b. 2 & 4  
c. 1 & 2  
d. 3 & 8

18. The configurations of following molecules (i) and (ii) are respectively



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

19. Identify the molecule with D-configuration.



20. Cyclohexane has the following interconvertible conformations (I to IV). The most and the least stable of these are respectively



- a. I & II  
b. I & IV  
c. II & IV  
d. IV & II

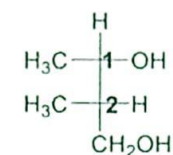
**( Descriptive )**

Time : 2 hr. 30 mins.

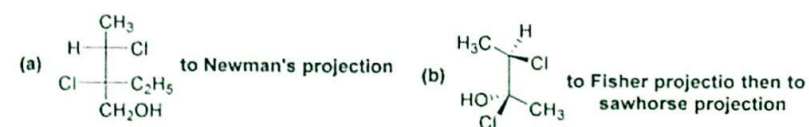
Marks : 50

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

1. Write down five differences between SN<sup>1</sup> and SN<sup>2</sup> reactions. Draw the energy profile diagram for SN<sup>1</sup> and SN<sup>2</sup> reaction mechanism. Give an example of aprotic polar solvent. 5+4+1=10
2. State Saytzeff's rule and give one suitable example. Show three ways by which alkene is prepared. What is Knoevenogel reaction? Give its reaction and show its mechanism. 2+3+5=10
3. a) What is the difference between conformations and configurations of molecules? Illustrate with examples. 5  
b) Draw different conformations of n-butane. Indicate the most stable and least stable conformers of n-butane. Draw energy vs dihedral angle diagram for the conformers of n-butane. 5
4. a) Mention (R/S) configurations of chiral centres 1 and 2 in the following molecule 3

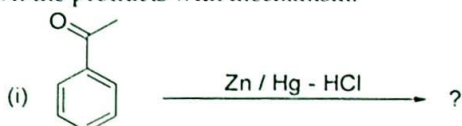


- b) The product in the following oxidation reaction 2  
$$\text{C}_6\text{H}_5-\text{CH}=\text{CH}-\text{CHO} \xrightarrow{\text{LiAlH}_4} ?$$
- c) Define aldol condensation, Cannizzaro reaction. Show its proper mechanism for both the reaction. 5
5. a) Why chair conformation of cyclohexane is more stable than boat conformation? Give reason. Draw Newman's projection for both these forms. Indicate axial and equatorial bonds in chair form and flagpole bonds in boat form. 5  
b) Methyl group in methyl cyclohexane can exist in axial or equatorial bond. Explain. 2  
c) Convert the following structures: 3



6. a) Write down the products with mechanism.

2+2=4



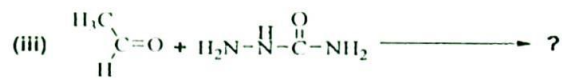
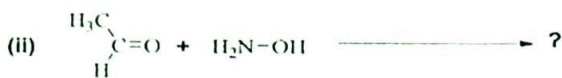
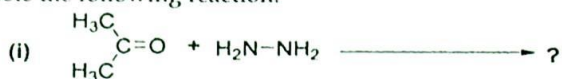
b) Write notes on: (*any two*)

3+3=6

- i) Wolff-Kishner reduction
- ii) Rosenmund reduction
- iii) Oppenauer oxidation

7. a) Complete the following reaction:

5

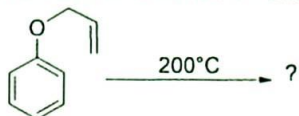


1+2=3

b) State the Markovnikov's rule. Write down three factors affecting E1 reaction.

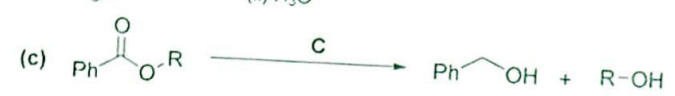
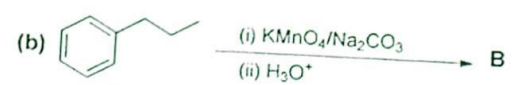
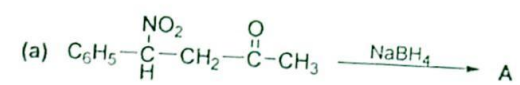
2

c) Complete the reaction and mention what type of reaction it is.



8. Write down the structures of the products/reagent A, B, C, D and E in the following reactions.

2×5=10



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