

[This question paper contains 8 printed pages]

**Your Roll No.**

: .....

**Sl. No. of Q. Paper**

: **1374**      **I**

**Unique Paper Code**

: 2172011102

**Name of the Paper**

: DSC 2 - Basic Concepts  
and Aliphatic  
Hydrocarbons (Organic  
Chemistry-1)

**Name of the Course**

: **B.Sc. (Hons.)**

**Semester**

: **I**

**Time : 3 Hours**

**Maximum Marks : 90**

**Instructions for Candidates :**

(a) Write your Roll No. on the top immediately on receipt of this question paper.

(b) Attempt any **six** questions.

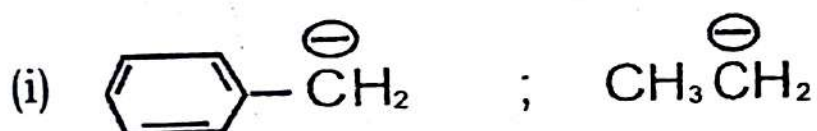
(c) **All** questions carry **15** marks.

1. (a) An alcohol **A** having molecular formula  $C_2H_6O$ , when treated with conc.  $H_2SO_4$  gives an alkene **B**. When **B** is bubbled through

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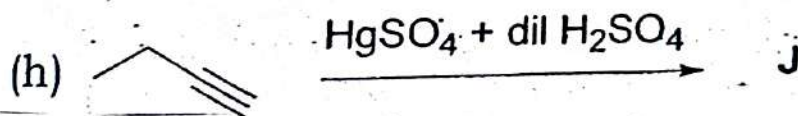
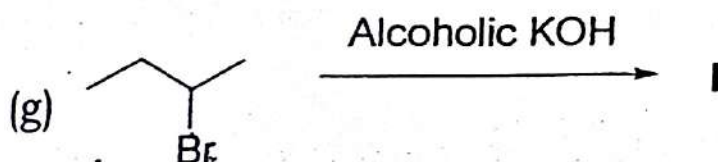
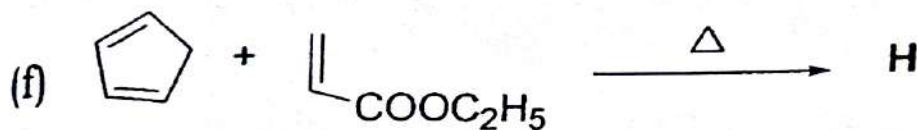
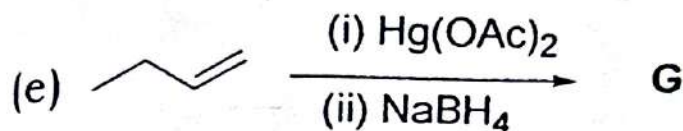
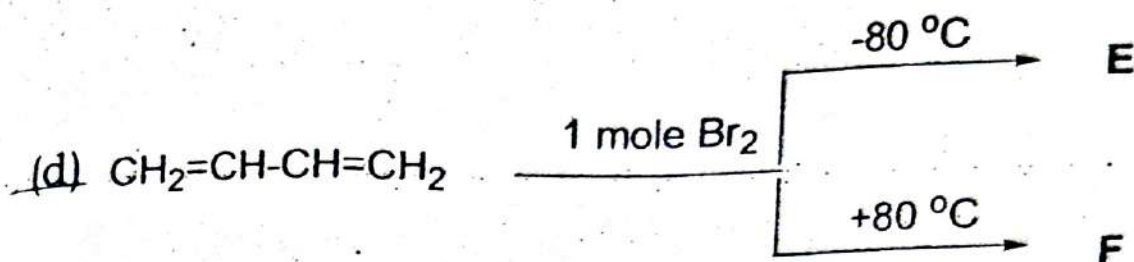
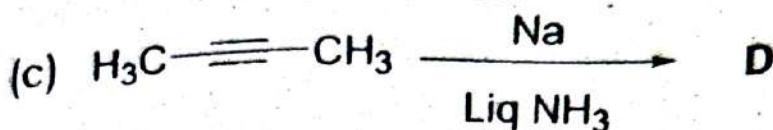
bromine water ( $\text{Br}_2/\text{H}_2\text{O}$ ) and the product obtained is dehydrohalogenated with an excess of strong base sodamide a new compound **C** is obtained. Compound **C** is also obtained by reacting calcium carbide with water. Compound **C** gives **D** when treated with dilute  $\text{H}_2\text{SO}_4$  in presence of  $\text{HgSO}_4$ . Identify **A** to **D**. Write the sequence of chemical reactions involved. 5

- (b) Out of following pairs, which is more stable ?  
Give reason. 5



- (c) Define the terms racemic mixture. Demonstrate the chemical method for resolving a racemic mixture of an acid, using an example. 5

2. (a) How many stereoisomers are possible for tartaric acid ? Draw their Fischer projection structures, describe the relationships between them and identify which are optically active and which are optically inactive. 5

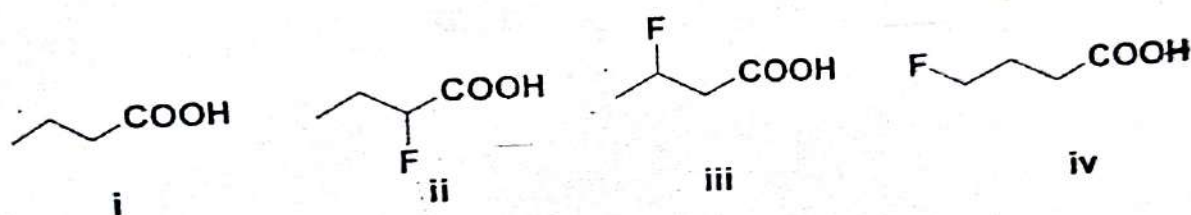

$$5 \times 3 = 15$$

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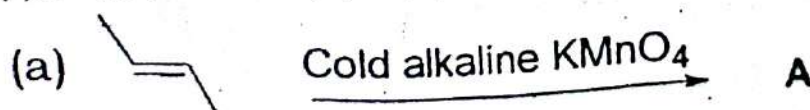


- (b) *trans*-2-Butene upon bromination gives meso-dibromo product, while *cis*-2-butene gives racemic mixture ? 5
- (c) Bromination is more selective than chlorination of alkanes ? 5
6. (a) What do you mean by inductive effect ? Arrange the following carboxylic acids in the increasing order of their acidity strength. 5



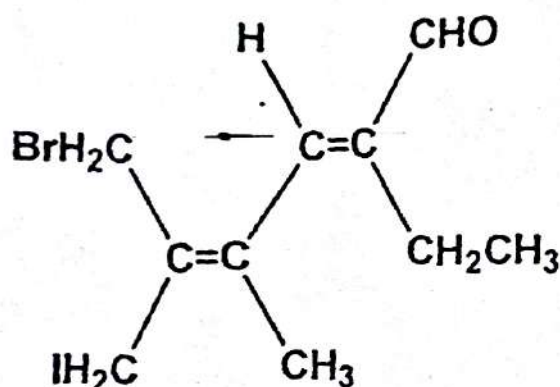
- (b) 2, 3-Dimethylbut-2-ene is more stable than 2-methylbut-1-ene. Explain. 5
- (c) Draw and name various Conformations of Cyclohexane and arrange them in increasing order of their Stability. Draw their potential Energy diagram. 5

7. Write the structure of product(s) A to J: 10×1.5=15

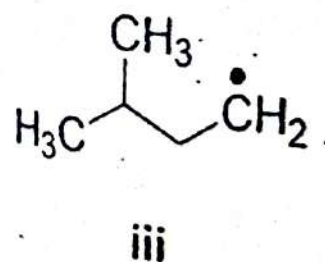
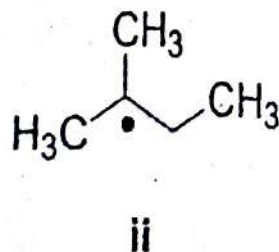
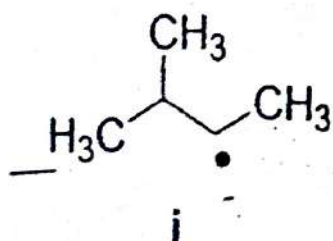


- (b) (i) A  $90^\circ$  in the plane rotation is not allowed in a Fischer projection, while a  $180^\circ$  rotation is permitted. Justify this statement with a suitable example. 2.5

- (ii) Assign E/Z configuration at all the stereogenic centre(s) present in the following molecule : 2.5



- (c) Define the term hyperconjugation effect and arrange the following free radicals in the increasing order of their stability, giving a suitable reason. 5



3. (a) Draw all conformations of *n*-butane resulting from rotation about the C2-C3 bond and arrange them in order of increasing stability, providing reasons for the stability order. Also, illustrate the potential energy diagram.

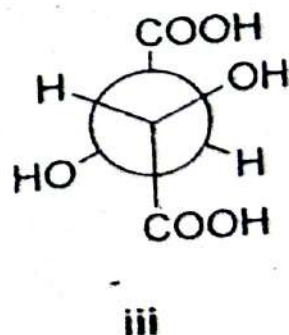
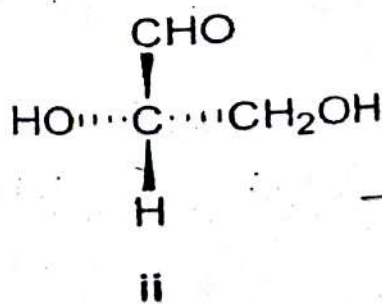
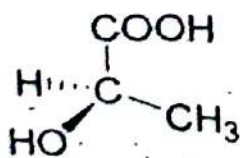
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- (b) (i) Classify the following into Electrophiles or Nucleophiles with explanation. 2.5



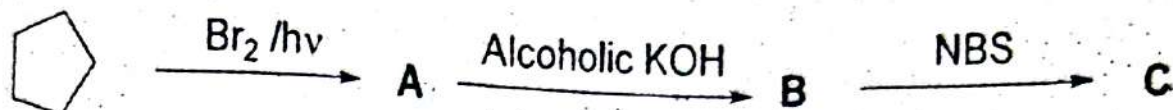
- (ii) Define the terms optical rotation and specific rotation. Explain the factors on which they depend. 5

- (c) Assign the R/S nomenclature at all the chiral centre(s) present in the following molecules : (Do any **two**). 5



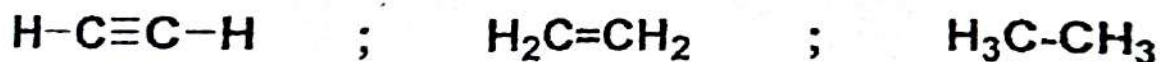


4. (a) Complete the following set of chemical reactions : 5



- (b) 2-Methylpropane is brominated at  $125^\circ\text{C}$  in the presence of light. What % of product will be 2-bromo-2-methylpropane. The relative reactivity for  $1^\circ$ ,  $2^\circ$ ,  $3^\circ$  hydrogens are 1, 82 and 1600, respectively. 5

- (c) (i) Arrange the following in the decreasing order of their acidic strength and give suitable explanation. 2.5



- (ii) How will you distinguish between 1-butyne and 2-butyne ? Provide the chemical reaction. 2.5

5. Give suitable explanations with mechanism (if involved).

- (a) 3, 3, 3-Trifluoropropene when treated with HBr gives 3-bromo-1, 1, 1-trifluoropropane? 5