

UG 1st Semester Examination 2021

CHEMISTRY (Honours)

Paper: DC-1
(Organic Chemistry)
(CBCS)

The figures in the margin indicate full marks. Candidates are required to give their answers in their own words as far as practicable.

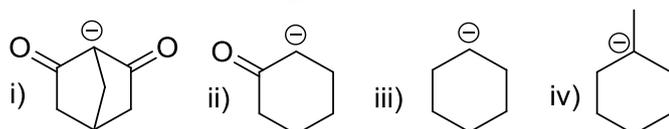
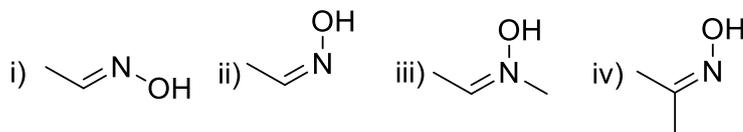
Full Marks : 25

Time : Two Hours

1. Answer any *five* questions from the following:

1×5=5

(a) Which of the following is more stable?

(b) What is the correct structure of *E*-acetaldehyde oxime?(c) Which of the following molecule don't have C_{2v} point group?

- i) *Cis*-1,2-dichloroethylene
- ii) Water
- iii) CHCl_3
- iv) CH_2F_2

(d) Which of the following is an example of ambident nucleophile

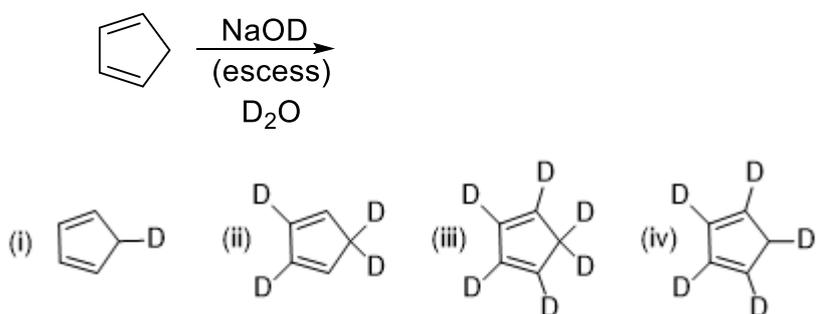
- (i) $[\text{CN}]^-$ (ii) $[\text{SCN}]^-$ (iii) $[\text{NO}_2]^-$ (iv) all of these

(e) The molecule *trans*-1,2-dichloroethylene belongs to the symmetry point group-

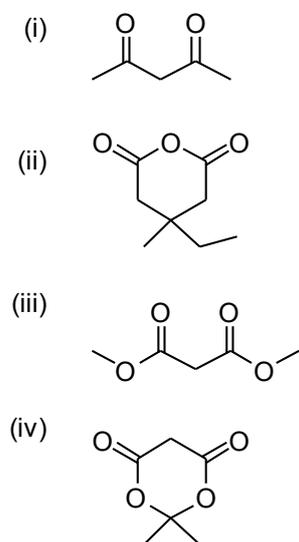
- (i) C_{2h}
- (ii) C_{2v}
- (iii) D_{2d}

(iv) D_{2h}

(f) The possible product of the reaction.



(g) Select the strongest acid in the following compounds-



(h) Which of the following statement is correct?

- (i) singlet carbene reacts with *cis*-2-butene stereospecifically
- (ii) triplet carbene reacts with *trans*-2-butene which results 50% *trans*-1,2-dimethylcyclopropane
- (iii) diazomethane on pyrolysis produce carbene
- (iv) all of these

2. Answer any *four* questions:

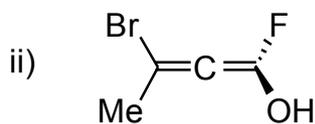
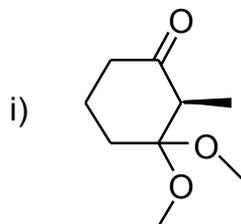
2×4=8

(a) Choose the proper solvent of the model reaction with proper justification

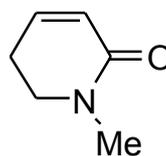
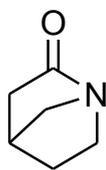
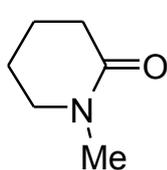


(b) A dicarboxylic acid has the molecular formula $C_4H_4O_4$. It satisfies the symmetry operations: E , C_2 , σ_h , i . Draw the structure of the compound.

(c) Assign R/S descriptors to the following compounds and also show the priority order of the groups.

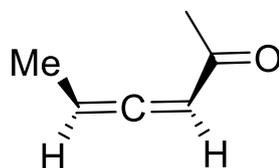


(d) Arrange the following amides in increasing order of basicity. Give reason:



(e) Dipole moment of 1,2-dichloro ethane increases with temperature. Explain.

(f) Draw the molecular orbital picture of the given molecule.



(g) How can you explain that cyclooctatetraene behave like diradical.

(h) Draw the various stereoisomers of 2,3,4-tribromo pentane 1,5-dioic acid. In which form it has pseudo-asymmetric centre and non stereogenic centre

3. Answer any *two* questions:

6×2=12

(a) (i) Ethylene glycol exists almost exclusively in the H-bonded gauche forms- explain.

Cite evidence in favour of this.

3

(ii) Indicate the symmetry elements present in (i) chloroform and (ii) 1,2-dibromoethene.

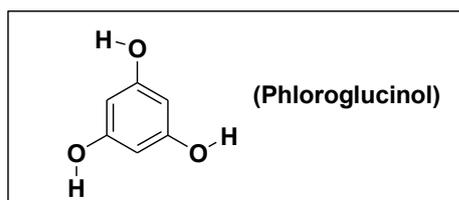
2

(iii) Explain that Fischer projection of a molecule having a definite configuration cannot be rotated in the plane of the paper by 90°. 1

(b) (i) Draw the orbital picture of allene $H_2C=C=CH_2$. 2

(ii) What are the various symmetry elements present in phloroglucinol.

Find its point group. 3

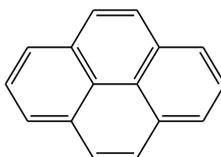


(iii) Between neopentane and n-pentane which one has higher melting point and why? 1

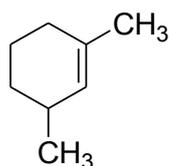
(c) (i) Explain why azulene show high dipole moment. 1

(ii) Comment the aromaticity of the following compound.

Also find the value of n. 2



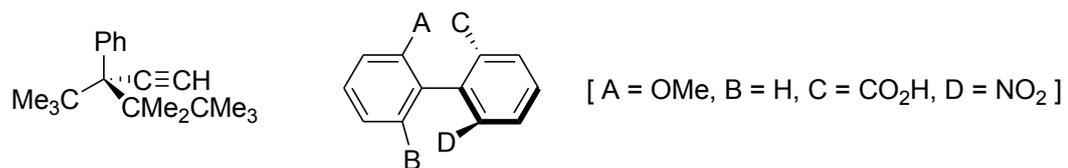
(iii) Write the no. of allylic hydrogens of the following compound. 2



(iv) Draw the staggered and eclipsed structures of n-butane in perspective formula. 1

(d) (i) Assign **R/S** at the following compound.

2



(ii) Explain why between hydroxide and hydroperoxo anion which one more nucleophilic in nature and why?

1¹/₂

(iii) The C-C bond in cyclopropane is highly reactive than cyclohexane. Explain why?

1¹/₂

(iv) Calculate the formal charge of formate ion.

1