

B.Sc. 1st Semester (Honours) Examination, 2019-20**CHEMISTRY****Course ID : 11411****Course Code : SH/CHEM/101/C1****Course Title: Organic Chemistry****Time: 1 Hour 15 Minutes****Full Marks: 25**

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

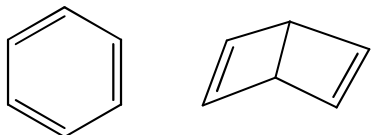
1. Answer any five of the following:

1×5=5

(a) Which one of the following has higher dipole moment and why?

(b) Draw the HOMO of $\text{CH}_2=\text{CH—CH}_2^+$ cation.

(c) The correct statement for Benzene and Dewar benzene is



(i) Structural isomer

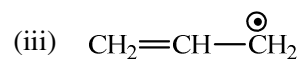
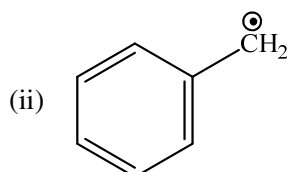
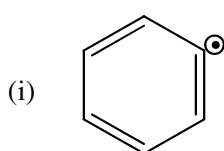
(ii) Canonical forms

(iii) Tautomers

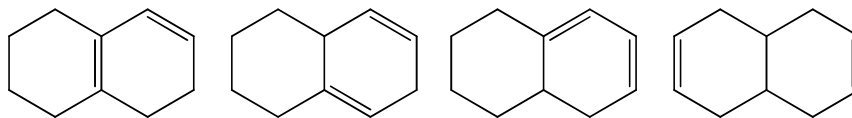
(iv) Conformational isomers

(d) State the point group of the following molecule CHCl_3 , with symmetry elements.

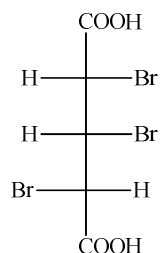
(e) Which one of the following radicals is most stable?



(f) Give the decreasing order of heat of hydrogenation for the following compounds:



(g) Draw one epimeric form of the following compound:



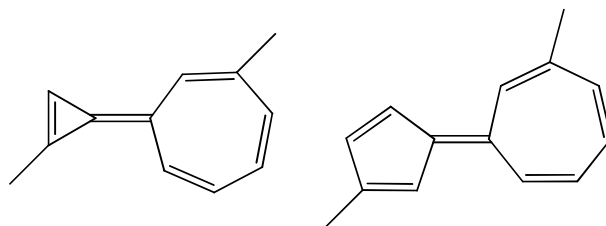
(h) What can be said with certainty if a compound has $[\alpha]_D^{25} = -9 \cdot 25^\circ$?

- The Compound has the (S) Configuration.
- The Compound has the (R) Configuration.
- The Compound is not a meso form.
- The Compound possesses only one stereogenic center.

2. Answer any two of the following:

5×2=10

(a) (i) Between A and B, which has the lowest energy barrier for the E, Z- isomerization?



(ii) Choose the correct option (s) and explain your choice with suitable example:

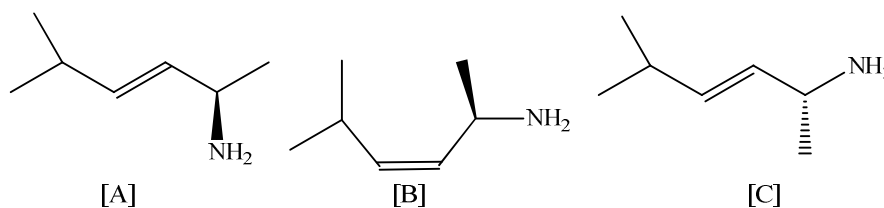
Addition reaction of alkenes are characterised by

- Addition of two groups across a double bond
- Breaking of a σ -bond
- Breaking of a π -bond

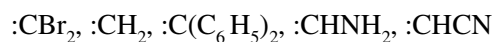
(iii) Explain: All chiral centers are stereogenic centers but all stereogenic centers are not chiral centers.

$$2 + 1\frac{1}{2} + 1\frac{1}{2} = 5$$

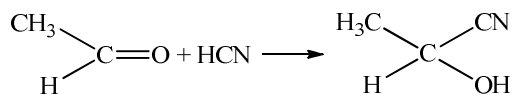
(b) (i) How is compound 'A' related to compound B and C — enantiomer, diastereomer, homomer.



(ii) Identify the electrophilic and nucleophilic carbene.



(iii) Among the Inductive, Electromeric and Mesomeric effects which effect is facilitating the following reaction: 2+2+1=5

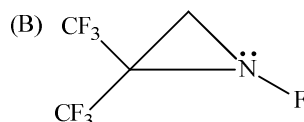
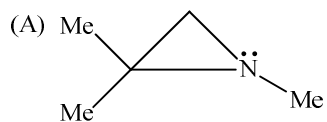


(c) (i) Arrange the following compounds in order of increasing boiling point and explain

(A) *n*-hexanol; (B) *n*-butanol (C) *t*-Butanol

(ii) What is meant by bond angle strain?

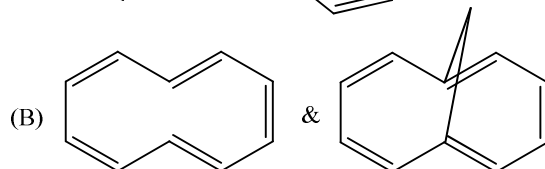
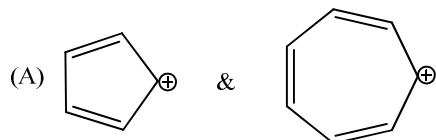
(iii) Explain whether the following compounds are resolvable or not:



2+1+2=5

(d) (i) Draw the Frost diagram of cyclobutadiene and explain its antiaromaticity..

(ii) Ascertain which of the following in each pair is more stable and why?

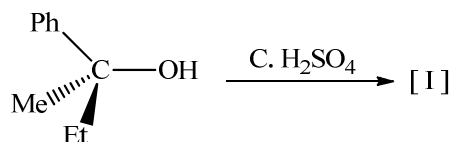


2+3=5

3. Answer any one of the following questions:

10×1=10

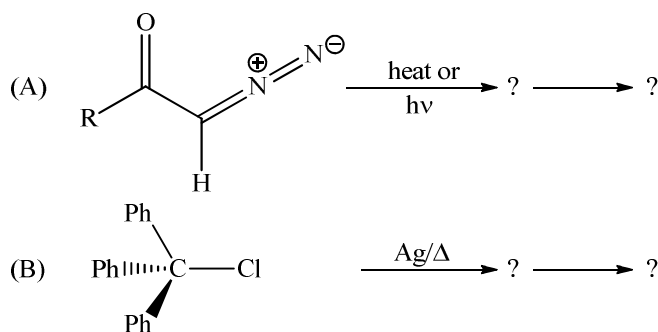
(a) (i) What is meant by reactive intermediate? Give the structure of intermediate [I] in the following, if any.



(ii) What is Captodative radical? Explain with an example.

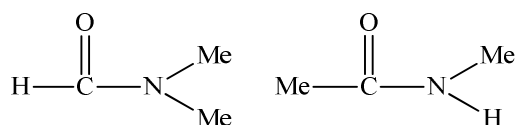
(iii) What are singlet and triplet carbenes?

(iv) Give the product in the following reactions with intermediate.

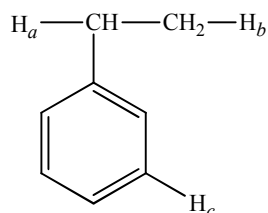


(1+2)+2+2+3=10

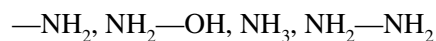
(b) (i) Compare the boiling points of the two isomers and explain.



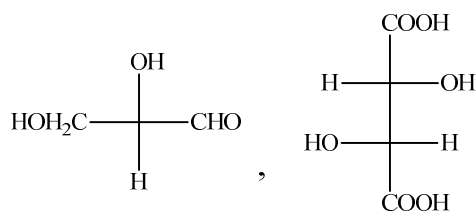
(ii) Arrange the following hydrogens (*a*, *b*, *c*) in decreasing order of bond energy — Explain.



(iii) Arrange the following in order of increasing nucleophilicity:

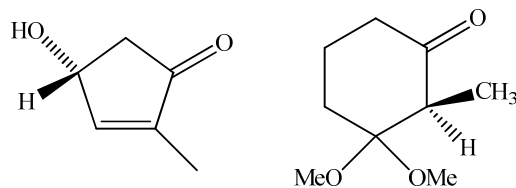


(iv) Designate the following as D or L



(v) Dextrorotatory $\text{EtCH}(\text{Me})\text{COPh}$ loses optical activity during deuteration with $\text{D}_2\text{O}/\text{NaOD}$ — Explain.

(vi) Give R/S and E/Z Stereochemical descriptions.



2+1+1+2+2+2=10