U.G. 1st Semester Examination - 2020

CHEMISTRY

Course Code : BCEMCCHC101

Course Title : Organic Chemistry–I

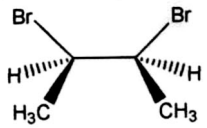
Full Marks : 30 Time : 2 Hours

The figures in the right-hand margin indicate marks.

Candidates are required to give their answers in their own words as far as practicable.

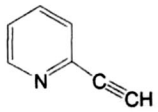
1. Answer any **ten** questions: 1×10=10

a) Convert the following flying-wedge projection into Fisher Projection

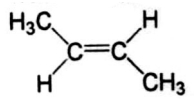


b) Define homoaromaticity with an example.

c) Calculate the DBE of the following molecule

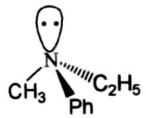


d) Write the symmetry elements present in the following compound.



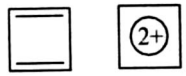
e) Draw the orbital picture of $CH_3CH=C=O$

f) Designate the following as R or S



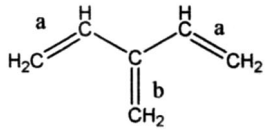
g) Draw the LUMO of 1,3-butadiene.

h) Comment on the relative stabilities of the following compounds

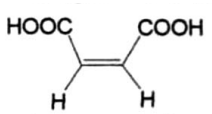


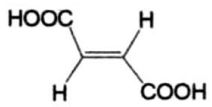
i) Define optical purity.

j) Compare the marked bond lengths in the following cross conjugated system:



k) Among the following compounds, which one has higher dipolemoment.

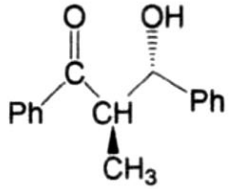




l) Give an example of electrophilic carbene.

m) What type of bond fission occurs in SN^1 reaction.

n) Assign the following compound as syn or anti



o) Identify the following specieces as electrophile of nucleophile

NH_3, PR_3, BF_3, H_2O, $AlCl_3$, Br^+

2. Answer any **five** questions: 2×5=10

a) Calculate the delocalisation energy of benzene in terms of α and β.

b) Methylcyclopentane and cyclohexane both have the same molecular weight, but they have different melting points. The melting points of them are l30.7 K and 279.8 K respectively. Explain this fact.

c) Assign the point group of the following molecule

d) Give an example of [l0]annulene and identify it as aromatic/antiaromatic/nonaromatic.

e) Explain that Fisher projection of a molecule having definite configuration may be rotated by 180° in the plane of the paper but not by 90°.

f) Compare the relative stabilities of l -hexene, (Z)-2-hexene and (E)-2-hexene using suitable thermodynamic parameter.

g) Explain the term invertomerism with an example.

h) 2, 3-Di-tert-butyl-1, 3-butadiene exists nearly exclusively in one conformation. What is the conformation and why?

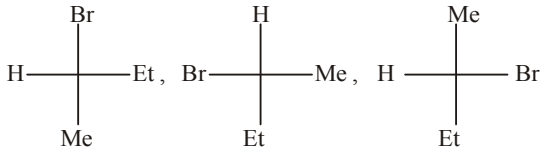
3. Answer any **two** of the following: 5×2=10

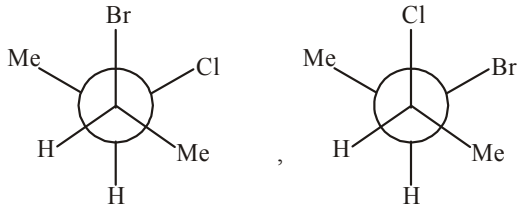
a) i) 2, 6-Dimethyl-4-Nitrophenol is more acidic than 3, 5-Dimenthyl-4-Nitrophenol– explain the observation.

ii) What is Electromeric effect? Explain with one example. 3+2

b) i) Draw the erythro and threo-conformations of tartaric acid. Comment on the chirality of the two conformers.

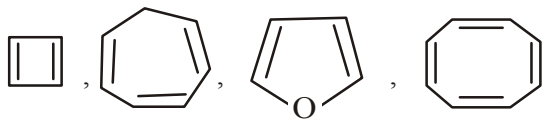
ii) Examine whether the following structures in each set are indentical or not.

I) 

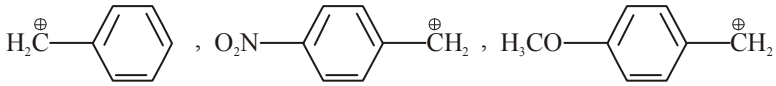
II) 

2+3

c) i) Assign the following molecules as aromatic, anti-aromatic, non-aromatic or homoaromatic:



ii) Arrange the following carbocations in order of decreasing stability and give your reasoning:



2+3