

U.G. 2nd Semester Examination - 2021

CHEMISTRY

[HONOURS]

Course Code : BCEMCCHC 202

Course Title: Organic Chemistry II

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.

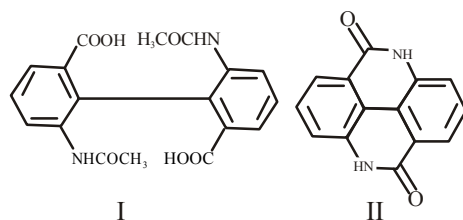
1. Answer any **ten** questions: 1×10=10

a) Give an example which satisfy the following statement:

Enantiotopic ligands in an allene having prochiral axis.

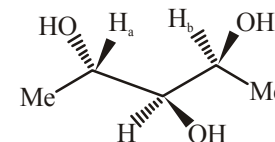
b) Write down the Arrhenius equation and mention each term.

c) Which compound is resolvable and why?

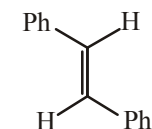


[Turn Over]

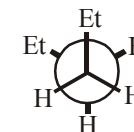
- d) What is Saytzeff's rule?
- e) Designate H_a and H_b in the following compound as homotopic or heterotopic.



- f) Draw an energy profile diagram of a S_N2 reaction.
- g) NH_2^- in liquid NH_3 is strong or weak base and why?
- h) Provide the Re-Re, Re-Si or Si-Si descriptors to π faces of the following compounds, when viewed from the top.



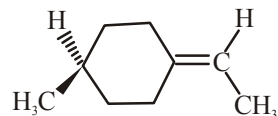
- i) The following conformer of hexane is chiral, then why is hexane optically inactive?



- j) Which factors affect S_N1 reactions?
- k) Draw the P-conformation of $BrCH_2CH_2Br$.

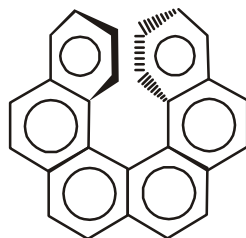
l) What is the difference between transition state and intermediate in a reaction pathway?

m) Designate the following compound as R_a/S_a .



n) How do you confirm whether a reaction is S_N1 mechanism or not?

o) Comment on the chirality of the following molecule.



2. Answer any **five** questions: $2 \times 5 = 10$

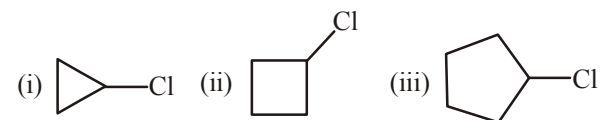
a) The barrier of rotation about C-C bond of bromoethane is 15 KJ/mol, $H \leftrightarrow H$ eclipsed interaction costs 4.0 kJ/mol. What energy value you assign to an $H \leftrightarrow Br$ eclipsed interaction?

b) Among guanidine and urea, which one is more basic and why?

c) Define Buttrressing effect with suitable example.

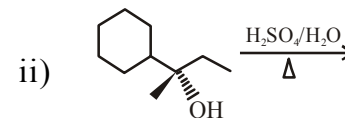
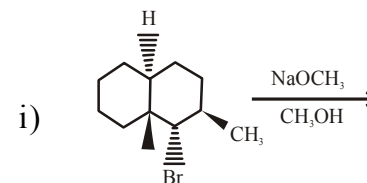
d) Among trichloroacetic acid and acetic acid, which one is more acidic and why?

e) Arrange the following compounds on order of increasing S_N1 reactivity. Explain the reason.



f) Describe thermodynamically controlled product and kinetically controlled product with suitable examples.

g) Provide the structure of the major product for the following reactions.



h) If (S)-2-butanol is treated with thionyl chloride the corresponding chloride is formed with retention of configuration of the hydroxyl bearing carbon atom. Explain.

3. Answer any **two** questions: $5 \times 2 = 10$
- a) i) Draw the most stable conformation of the following molecules. Give reason. 3
- A) $\text{F-CH}_2\text{CH}_2\text{F}$
- B) $\text{CH}_3\text{CH}_2\text{CH}_2\text{Cl}$
- C) $\text{HOCH}_2\text{CH}_2\text{Cl}$
- ii) What are the topicities of the $-\text{CH}_2-$ group in $\text{CH}_3\text{COCH}_2\text{Ph}$? How are the topicities of the methylene H's changed when the carbonyl group is converted to a chiral centre? 2
- b) i) Why phenol is acidic in nature? Explain with the resonating structures. 2
- ii) Explain primary kinetic isotope effect with a suitable example. 3
- c) i) When 1-iodo-1-methylcyclohexane is treated with $\text{NaOCH}_2\text{CH}_3$ as the base, the more highly substituted alkene predominates. Further less highly substituted alkene predominates, when $\text{KOC}(\text{CH}_3)_3$ is used as the base. Write the structure of the two products and offer an explanation. 3

- ii) The optical rotation of a solution of sodium iodide (+)-2-iodopentane in acetone slowly goes to zero. Explain this observation. 2
- _____