

U.G. 4th Semester Examination - 2021

CHEMISTRY

Course Code : BCEMCCHC403

Course Title : Organic Chemistry

Full Marks : 30

Time : 2 Hours

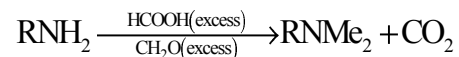
The figures in the right-hand margin indicate marks.

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

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

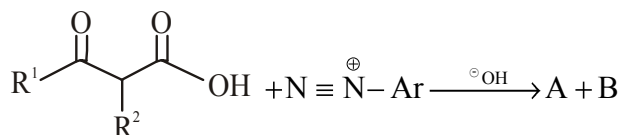
1 × 10 = 10

a) Consider the following reaction:

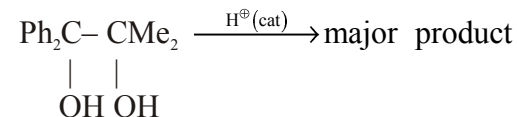


What is the role of HCOOH in this reaction?

b) What is A and B in the following reaction?

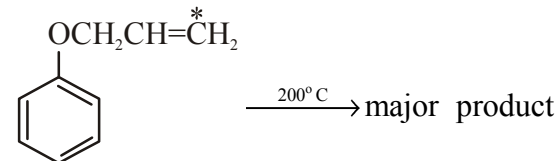


c) Write the structure of major product in the following reaction

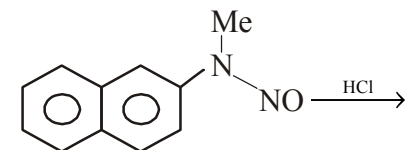


d) Give name and structure of intermediate formed in Beckmann rearrangement with $\text{PhC}(\text{Me})=\text{N}-\text{OH}$.

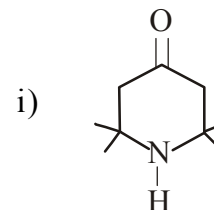
e) Write the product of the following reaction



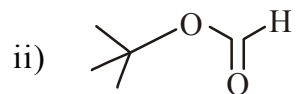
f) Give the product of the following reaction



g) How many signals will there be in the NMR spectrum of each of the following compounds?

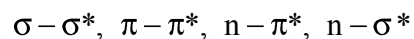


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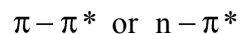


h) From supplied IR spectrum how can you tell that the compound is aromatic or not?

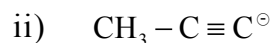
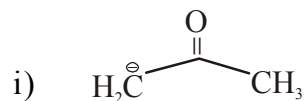
i) Which of the following absorptions in UV-vis spectroscopy occur at shortest and longest wavelength?



j) In more polar solvent which of following absorptions moves to longer wavelength?



k) What reagents are used for the following synthons?

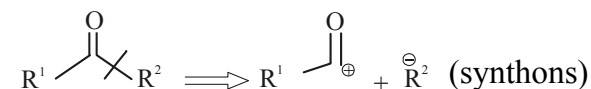


l) Give one example of each of the following:

i) Illogical nucleophiles

ii) Compound with dissonant polarity

m) Consider the following disconnection:

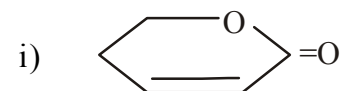


Replace these synthons with practical reagents.

n) Write the structure of the compound from the following information:

M.F. C_9H_{20} (Give two sets of hydrogens in $^1\text{H-NMR}$)

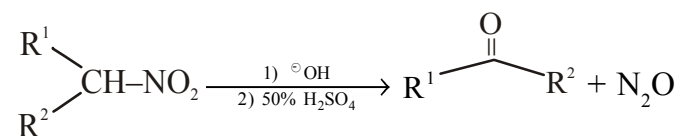
o) How could you differentiate by IR spectroscopy?



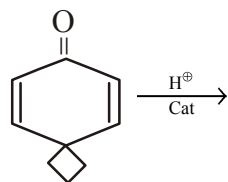
2. Answer any **five** questions from the following:

$$2 \times 5 = 10$$

a) Write the mechanism of the following reaction:



b) Write product with giving mechanism



c) Describe the cumene-hydroperoxide phenol rearrangement with mechanism.

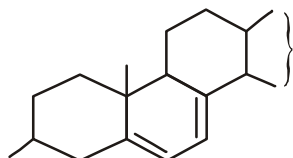
d) Why aldehydic proton gives signal in NMR at higher δ -value than expected?

e) How could IR spectroscopy be used to distinguished the following pairs:

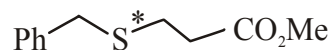
i) the *cis* and *trans* isomers of 3-hexene

ii) 1 hexyne and 3-hexyne

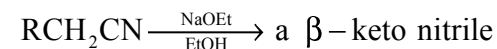
f) Calculate λ_{\max} value for the following compound:



g) Disconnect the marked bond of the following compound. Write the proper synthon and replace them by appropriate reagent.



h) Write product and mechanism for the following reaction:

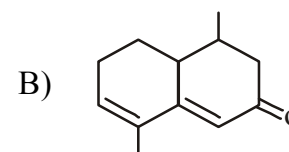
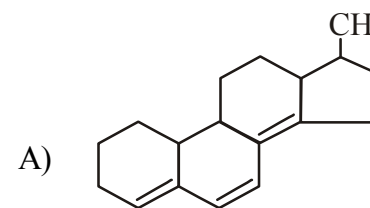


3. Answer any **two** questions from the following:

$5 \times 2 = 10$

a) i) Calculate λ_{\max} for each of the following:

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



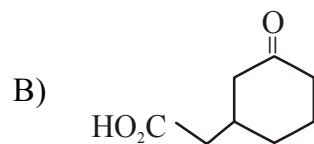
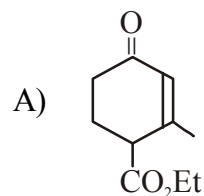
ii) Deduce the structure of the following compound from the given $^1\text{H-NMR}$ spectral data: 2

M.F. – $\text{C}_3\text{H}_7\text{ClO}$;

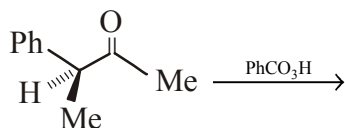
$\delta 2.0$ (2H, quintet); $\delta 2.8$ (1H, S);

$\delta 3.7$ (2H, t); $\delta 3.8$ (2H, t)

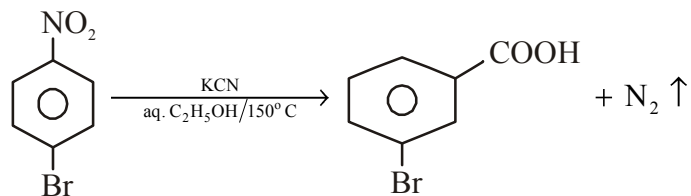
b) i) Carry out the following synthesis showing retrosynthetic analysis: $1\frac{1}{2}+1\frac{1}{2}$



ii) Write product and mechanism of the following reaction: 2



c) i) Give mechanism of the following reaction: 2



ii) Write product for the following reactions: 1+1+1

