U.G. 4th Semester Examination - 2022

CHEMISTRY

[HONOURS]

Course Code : BCEMCCHC403

Course Title : Organic Chemistry IV

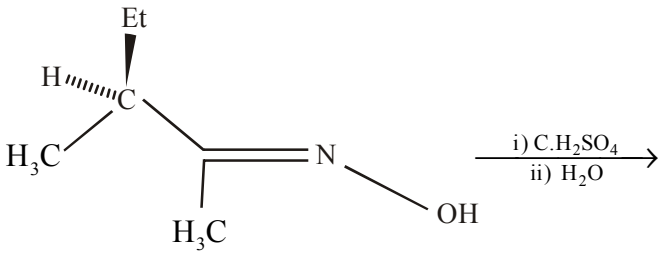
Full Marks : 30 Time : 2 Hours

The figures in the right-hand margin indicate marks.

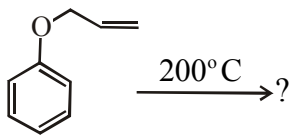
Candidates are required to give their answers in their own words as far as practicable.

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

a) Predict the product of the following reactions:



b) Write the product of the following reaction:



c) Define Overtone.

d) On the basis of IR spectrum how can you distinguish between acid chloride and ester?

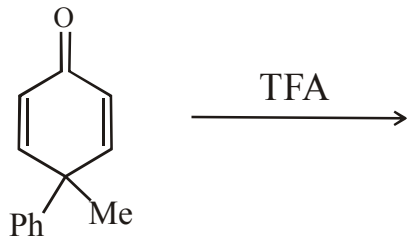
e) What is the value of fingerprint region in IR spectrum?

f) Give the value of characteristic IR frequency of $C \equiv N$ stretching in cyanides.

g) How will you convert benzaldehyde to cinnamic acid?

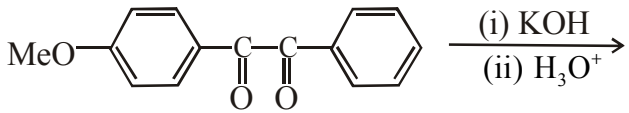
h) A peak appears in NMR spectrum at 1410Hz from TMS at an applied frequency of 300MHz. What is its value in δ?

i) Predict the product of the following reaction:

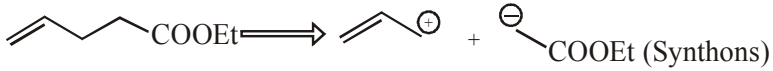


j) What is the reagent used in Meerwein-Ponndorf-Verley reduction?

k) Give the product of the following reaction:

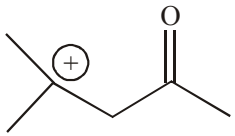


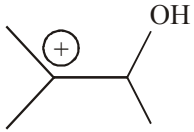
l) Consider the following disconnection:



Replace these synthons with practical reagents.

m) What reagents are used for the following synthons?

(i) 

(ii) 

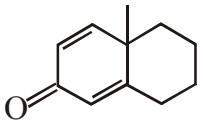
n) What are the characteristic peaks of an isolated ethyl group in ^{1}H-NMR?

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

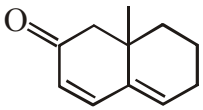
$$\pi - \pi^* \text{ or } n - \pi^*$$

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

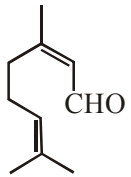
a) How would you distinguish between the following pair of compounds by UV-Vis spectroscopy?



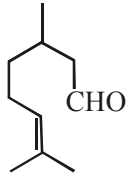
and



b) How would you distinguish the following compounds using IR spectroscopy?

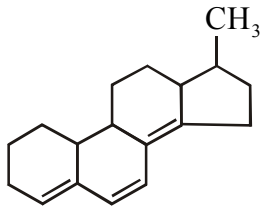
i) 

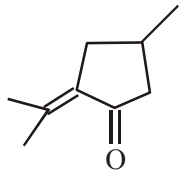
and



ii) $PhCOOCH_3$ and CH_3COOPh.

c) Calculate λ_{max} value for the following compounds:

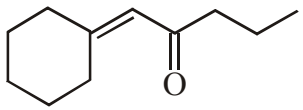
i) 

ii) 

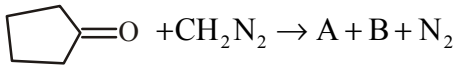
d) Convert PhCHO to $PhCOCH_3$: with the help of umpolung reaction.

e) How would you convert cyclopropanone to cyclobutanone?

f) Propose a retrosynthetic analysis of the following compound:



g) What are A and B in the following reaction?

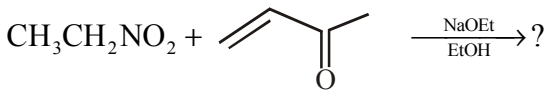


h) Outline the protection and deprotection strategy of amines using t-Butyl Carbamate (Boc) as the protecting agent.

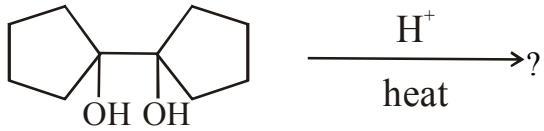
3. Answer any **two** questions: 5×2=10

a) i) An organic compound C_8H_8O shows absorption bands at 2825,2717 and,1700 cm^{-1} in its infrared spectrum. The ^{1}HNMR spectrum shows signals at δ 2.4 (3H, singlet), δ 7.1-7.9 (4H, as a pair of doublets, J=8Hz) and at δ 10.0 (1H, singlet). Assign a structure to this compound. 3

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



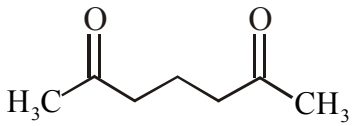
b) i) Predict the product(s) with reaction mechanism:



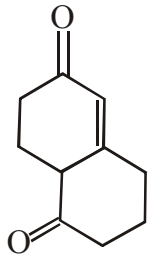
ii) PhCOCOPh $\xrightarrow[\text{ii) } H_3O^+]{\text{i) } \overset{\ominus}{O}H}$? $2\frac{1}{2}+2\frac{1}{2}$

c) Outline the retrosynthetic analysis and the designed synthesis of the following target molecules:

i)



ii)



iii)

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