MASTER OF SCIENCE (CHEMISTRY) (CBCS - 2018 COURSE)
M.Sc. (Chemistry) Sem-II AC,OC : WINTER- 2022
SUBJECT : ORGANIC CHEMISTRY - II

Day : Monday | Time : 10:00 AM-01:00 PM

Date : 2/1/2023 | **W-20146-2022** | Max. Marks : 60

N.B.:

1) All questions are **COMPULSORY**.
2) Figures to the right indicate **FULL** marks.
3) Answers to both the sections should be written in **SEPARATE** answer book.
4) Draw neat labelled diagrams **WHEREVER** necessary.

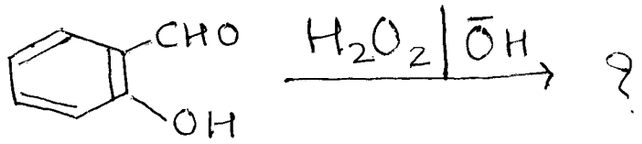
SECTION-I

Q.1 Attempt any **THREE** of the following: **(15)**

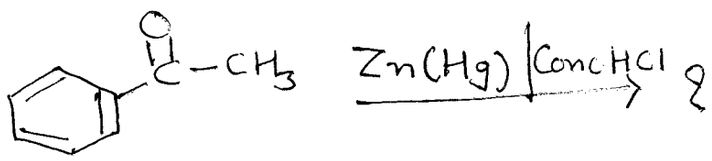
a) What are phosphorous ylides? How are they prepared? Discuss their applications.
b) What is Michael condensation? Discus its mechanism and applications.
c) Discuss the preparation and applications of Organo-zine compounds.
d) What is Birch reduction? Discuss its mechanism with suitable examples.
e) Write a note on: Baeyer-Villiger oxidation.

Q.2 Predict the product/s in any **THREE** of the following reactions by giving mechanism. Justify your answer. (15)

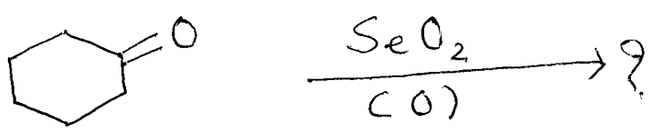
a)



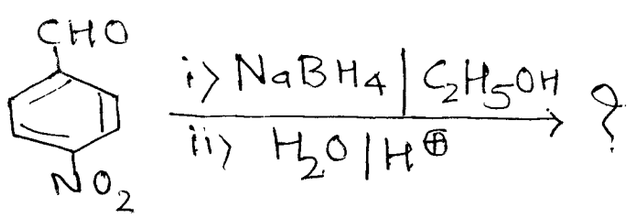
b)



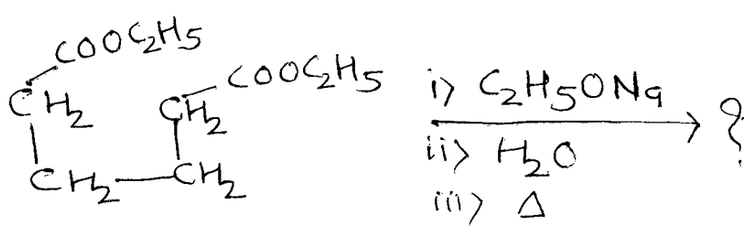
c)



d)



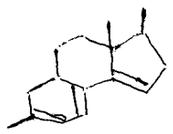
e)

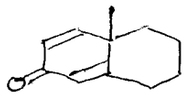


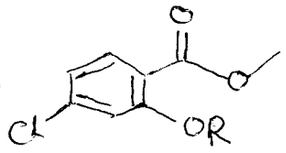
SECTION-II

Q.3 Attempt any **THREE** of the following: **(15)**

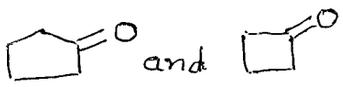
a) Calculate λ_{max} for the following. Clearly show calculations.

i) 

ii) 

iii) 

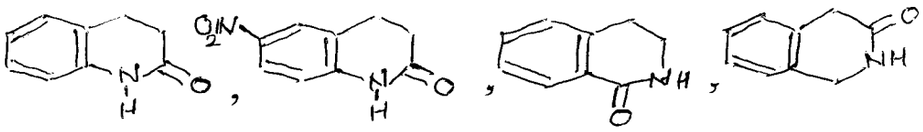
b) Distinguish by IR. Justify answer.

i) 

ii) 

c) Arrange in increasing order of λ_{max}. Justify answer.
PhCHO, PhH, $PhCH_3$, p-hydroxy benzaldehyde.

d) Arrange the following in increasing order of frequency. Justify.

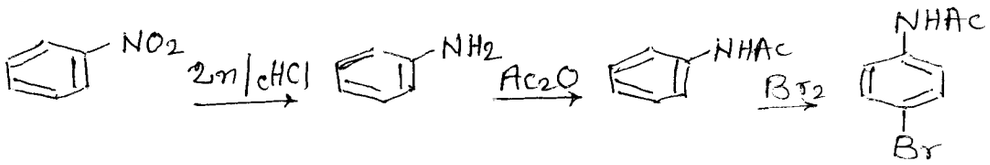


e) *Cis*- cimamic acid absorbs at 268nm (ϵ_{max} 10,760) while, *trans*-isomer at 278nm (ϵ_{max} 15,900). Explain.

Q.4 Attempt any **THREE** of the following: **(15)**

a) A compound having molecular formula $C_7H_7O_2N$ is soluble in $NaHCO_3$.
IR shows bands at: 3550, 3350, 2500,-3300 (br.), 1695cm^{-1}. Determine the structure

b) How will you check the progress of the following reactions sequence by IR spectroscopy?



c) Assign the structure using the given data:
Mol. formula: $C_8H_8O_2$

UV : 250, 260, 265nm
IR : 2500-3300 (very broad), 1721, 1600, 1500, 750, 700cm^{-1}
NMR : 3.5 δ (s, 12mm),
7.2 δ (s, 30mm)
12.3 δ (s, 6mm)

d) Determine the structure form the following data:
Mol. formula: C_7H_8O

UV : four bands in 250- 280nm with low ϵ_{max} value.
IR : 3350 (br), 1600, 1500, 740, 690cm^{-1}
NMR : 3.8 δ (s, 13mm)
4.3 δ (s, 26mm)
7.2 δ (s, 65mm)

e) Predict the structure using given data:
Mol. formula: $C_7H_4O_3NCl$

UV : 255nm (ϵ_{max} 12,000)
IR : 1770, 1590, 1510, 1350, 850cm^{-1}
NMR : (in CCl_4) 's' at 8.35 δ and
(in C_6H_5N) 8.03 δ (d, J= 8H_z, 12mm)
8.13 δ (d, J= 8H_z 12mm)

* * * *

Table 1 :

Some characteristic IR data in cm^{-1}. Only approximate values are listed.

≡ C–H 3300,	= C–H 3050
O = C – H 2800,	N–H 3300
O – H 3600 (free),	C ≡ N 2250
C ≡ C 2200,	C = C 1620 – 1680
Aromatic (C = C) 1600 to 1500,	– C = N 1660
Saturated ketone 1720,	Saturated ester 1750
Saturated acids 1720,	Saturated aldehydes 1730,
Saturated amides 1650	$CH = CH_2$ 900 and 910
CH = CH (trans) 960,	CH = CH – (cis) 690
$C = CH_2$ 890	C = CH 790 – 840
NO_2 1530 and 1050	

Bands for aromatic compounds depends on the number of adjacent free aromatic hydrogens :

5 free – 690 – 710 and 730 – 770

1 free 850 – 900,	4 free 735 – 770
3 free 750 – 810	2 free 770, 800 – 860

Table 2 :

Approximate chemical shifts on methyl, methylene and methine protons, in δ values TMS as internal reference.

$C – CH_3$ 0.9,	$O – C – CH_3$ 1.4
$C = C – CH_3$ 1.6,	$Ar – CH_3$ 2.3,
$O = C – CH_3$ 2.2,	$N – CH_3$ 2.3,
$S – CH_3$ 2.1,	$O - CH_3$ 3.3
C–H in cyclopropane 0.7,	$C = CH_2$ exocyclic 4.6,
$C = CH_2$ open chain 5.3	C – CH 5.1
C ≡ CH cyclic 5.3,	Ar – H 7 to 9