(Common for Analytical, Organic & Inorganic)

MASTER OF SCIENCE (CHEMISTRY) (CBCS - 2018 COURSE)
M.Sc. (Chemistry) Sem-II : WINTER :- 2021
SUBJECT: ORGANIC CHEMISTRY - II

Day : Saturday
Date 5/2/2022

W-20146-2021

Time : 02:00 PM-05:00 PM
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.

SECTION – I

Q.1 Attempt **ANY THREE** of the following: **[15]**

a) What are Sulphur ylides? How are they prepared? Discuss their applications.

b) What is Mannich reaction? Discuss its mechanism and applications.

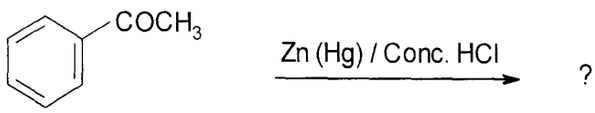
c) Discuss the preparation of organolithium compounds. How are they useful for the preparation of alcohols, amines and cyanides?

d) Discuss the reduction of carbonyl compounds by $LiAlH_4$.

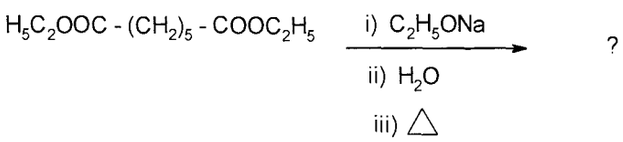
e) Write a note on : Oppenauer oxidation.

Q.2 Predict the product/s in **ANY THREE** of the following reactions by giving mechanism. Justify your answer. **[15]**

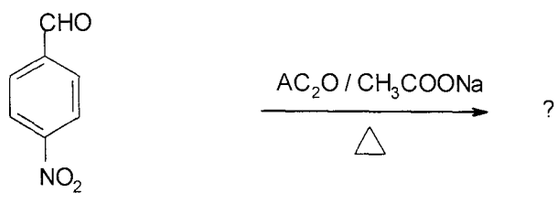
a)



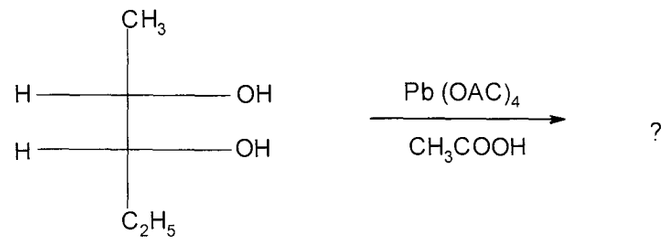
b)



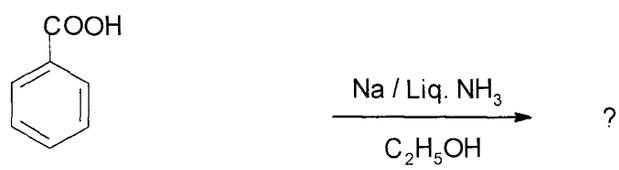
c)



d)



e)

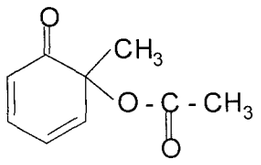


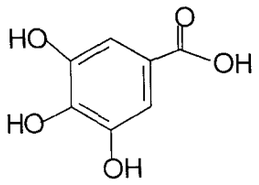
P.T.O.

SECTION – II

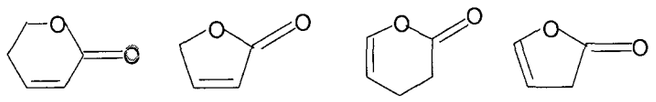
Q.3 Attempt **ANY THREE** of the following: **[15]**

a) Calculate λ_{max} for the following compound:

i) 

ii) 

b) Arrange the following compounds with their increasing order of IR streaching frequencies and justify your answer.



c) **i)** Make a comment on magnetic anisotropy.

ii) What is spin-spin coupling? Explain spin-spin coupling in 2-chloroethane.

d) **i)** Explain the genesis of 2 – pentanone with reference to M.Lafferty rearrangement.

ii) How is molecular formula determined from mass spectroscopy? Explain with suitable example.

e) Explain O-hydroxyacetophenone on methylation shows a blue shift while phydroxyacetophenone on methylation shows a red shift.

Q.4 Assign the structure to **ANY THREE** of the following using spectral data: **[15]**

a) MF : $C_{10}H_{10}O_2$
UV : 230, 320 nm
PMR : 2.4 δ (3H, s)
: 6.7 δ (1H,d, J = 16 Hz)
: 7.3 δ (2H, d, J = 8 Hz)
: 7.5 δ (2H, d, J = 8Hz)
: 7.9 δ (1H, d, J = 16Hz)
: 8.25 δ (1H, bs, D_2O Exchange)

b) MF : $C_8H_{15}NO$
UV : featureless
IR : 1715
PMR : 1.08 δ (6H, d, J = 7Hz)
: 2.45 δ (4H, t, J = 5 Hz)
: 2.80 δ (4H, t, J = 5 Hz)
: 2.93 δ (1H, sept, J = 7 Hz)

...2

c) MF : $C_6H_{12}Cl_2O_2$
IR : 1150, 1240, 670 cm^{-1}
PMR : 1.2 δ (6H, t)
: 3.7 δ (4H, q)
: 4.6 δ (1H, d)
: 4.2 δ (1H, d)

d) MF : C_5H_6O
IR : 1600, 1500 cm^{-1}
PMR : 2.3 δ (3H, s)
: 5.85 δ (1H, d, J = 2Hz)
: 6.2 δ (1H, dd, J = 1.5 and 2 Hz)
: 7.2 δ (1H, d, J = 1.5Hz)

e) MW : 106
m/e : 106, 105, 77, 51
IR : 1710, 2750 cm^{-1}
PMR : 7.2 δ (5H, s)
: 9.05 δ (1H, s)

* * * *

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