

T.Y.B.SC. SEM – VI (2014 Course) : SUMMER - 2019
SUBJECT : CHEMISTRY : ORGANIC CHEMISTRY – VI

Day : Friday

Time : 03.00 PM To 05.00 PM

Date : 12/04/2019

S-2019-1034

Max. Marks : 40

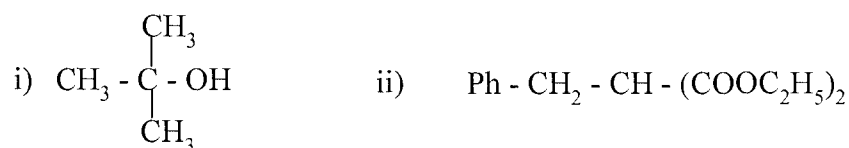
N.B.:

- 1) All questions are **COMPULSORY**.
- 2) Figures to the right indicate **FULL** marks.
- 3) Answers to both the sections should be written in **SAME** answer book.

SECTION – I

Q.1 Attempt **ANY TWO** of the following: **[10]**

- a) Give retrosynthetic approach for the following compounds:



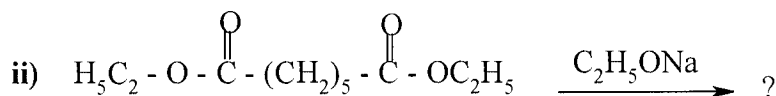
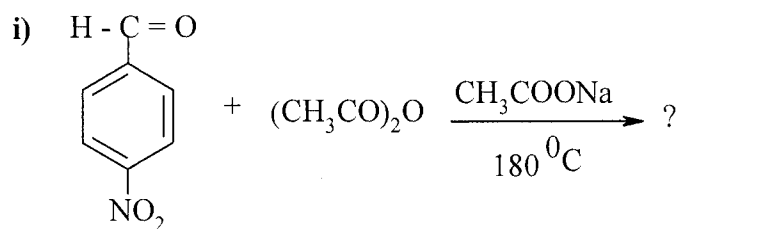
- b) What are carbanions? Discuss their generation and stability.
- c) Write a note on : Wittig reaction.

Q.2 Attempt **ANY TWO** of the following: **[10]**

- a) Define the following terms with one example of each:

- i) Target molecule
- ii) Synthetic equivalent
- iii) Retrosynthetic analysis

- b) Predict the product and suggest the mechanism:



- c) Write a note on : Aldol condensation.

P.T.O.

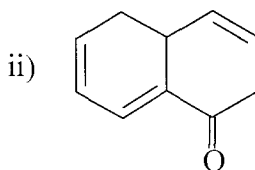
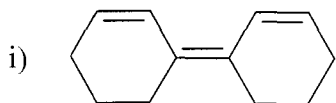
SECTION – II

Q.3 Attempt **ANY TWO** of the following: **[10]**

- a) Explain the following:
 i) Aniline shows hypsochromic shift (Blue shift) in presence of acid.
 ii) Ethylene absorb at shorter wavelength than 1, 3 – butadiene.
- b) A compound C_5H_8 shows λ_{max} at 222 nm and IR bands at 1620, 990 and 910 cm^{-1} . Find the structure of molecule.
- c) Write a note on : Shielding and deshielding of protons.

Q.4 Attempt **ANY TWO** of the following: **[10]**

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



- b) Assign the structure to the following compound using following spectral data:

MF : C_8H_9Br
 PMR : **i)** 2.0 δ (d, 3H)
 : **ii)** 5.15 δ (q, 1H)
 : **iii)** 7.55 δ (s, 5H)

- c) Assign the structure to the following compound using following spectral data:

MF : $C_8H_8O_2$
 IR : 2700 – 3300 (broad), 1700, 1600, 1500 and 920 cm^{-1}
 PMR : **i)** 3.5 δ (s, 12 mm)
 : **ii)** 7.2 δ (s, 30 mm)
 : **iii)** 12.3 δ (s, 6 mm)

* * * *

TABLE : 1

Characteristic Infrared Absorptions of Functional Groups

Group	Frequency Range cm^{-1}	Intensity
A. Alkyl		
C-H (stretching)	2853 - 2962	(m-s)
Isopropyl - CH (CH ₃) ₂	1380 - 1385	(s)
	and 1365 - 1370	(s)
	1385 - 1395	(m)
tert-Butyl - C (CH ₃) ₃	and - 1365	(s)
B. Alkenyl		
C-H (stretching)	3010 - 3095	(m)
C=C (stretching)	1620 - 1680	(v)
R-CH=CH ₂	985 - 1000	(s)
	and 905 - 920	(s)
R ₂ C=CH ₂ (out-of-plane	880 - 900	(s)
cis-RCH=CHR C-H bendings)	675 - 730	(s)
trans-RCH=CHR	960 - 965	(s)
C. Alkynyl		
\equiv C-H (stretching)	3300	(s)
C = C (stretching)	2100 - 2260	(v)
C \equiv N (stretching)	2210 - 2260	(v)
D. Aromatic		
Ar-H (stretching)	3030	(v)
Aromatic substitution type (C-H out-of-plane bendings)		
Monoasubstituted	690 - 710	(very s)
	and 730 - 770	(very s)
o-Disubstituted	735 - 770	(s)
m-Disubstituted	680 - 725	(s)
	and 750 - 810	(very s)
p-Disubstituted	800 - 840	(very s)
E. Alcohols, Phenols, Carboxylic Acids		
OH (alcohols, phenols, dilute solns)	3590 - 3650	(sharp v)
OH (alcohols, phenols, hydrogen bonded)	3200 - 3550	(broad, s)
OH (carboxylic acids, hydrogen bonded)	2500 - 3000	(broad, v)
F. Aldehydes, Ketones, Esters and Carboxylic Acids		
C = O stretch	1630 - 1780	(s)
Aldehydes	1690 - 1740	(s)
Ketones	1680 - 1750	(s)
Esters	1735 - 1750	(s)
Carboxylic acids	1710 - 1780	(s)
Amides	1630 - 1690	(s)
G. Amies	3300 - 3500	(m)

TABLE : 2

Approximate Proton Chemical Shifts in NMR

Type of Proton	Chemical Shift, Delta, PPM (δ)
1° Alkyl, RCH ₃	0.8 - 1.0
2° Alkyl, RCH ₂ R	1.2 - 1.4
3° Alkyl R ₂ CH	1.4 - 1.7
Alkyllic, R ₂ C = C - CH ₃	1.6 - 1.9
Benzylic, ArCH ₂	2.2 - 2.5
Alkyl chloride, RCH ₂ Cl	3.6 - 3.8
Alkyl bromide, RCH ₂ Br	3.4 - 3.6
Alkyl iodide, RCH ₂ I	3.1 - 3.3
Ether, ROCH ₂ R	3.3 - 3.9
Alcohol, HOCH ₂ R	3.3 - 4.0
Ketone, RC(=O)CH ₃	2.1 - 2.6
Aldehyde, RCHO	9.5 - 9.6
Vinyllic, R ₂ C = CH ₂	4.6 - 5.0
Vinyllic, R ₂ C = CH - R	5.2 - 5.7
Aromatic, ArH	6.0 - 9.5
Acetylenic, RC \equiv CH	2.5 - 3.1
Alcohol hydroxyl, ROH	0.5 - 6.0 ^a
Carboxylic, RCOOH	10 - 13 ^a
Phenolic, ArOH	4.5 - 7.7 ^a
Amino R - NH ₂	1.0 - 5.0

^a The chemical shifts of these groups vary in different solvents and with temperature and concentration.

TABLE : 3

U. V. Absorption rules for diene chromophores		U.V. Absorption rules for Enone System	
1) Parent	215 nm	1) Parent	215 nm
2) Each extra conjugation	30 nm	2) Each extra conjugation	30 nm
3) Homoannular	39 nm	3) Homoannular	39 nm
4) Exocyclic double bond	05 nm	4) Substituents	
5) Each alkyl (R) substituent directly attached to double bounded carbon	05 nm	a) Alkyl group at α	10 nm
		b) Alkyl group at β	12 nm
		c) Alkyl group at γ, δ	18 nm