V. P. & R. P. T. P Science College,
B.Sc. Industrial Chemistry (Semester-V) Internal Test
ORGANIC CHEMISTRY

Date: 29/09/2018 **Subject Code: US05CICV01**
Time: 10:00 a.m. to 12: 00 p.m. **Total Marks: 50**

Q.1 Select the correct option **8**

1. Heterolytic cleavage of a carbon-carbon bond produces _____.
   a. Two carbonium ions b. One cation and one anion
   c. Two free radicals d. A free radical and carbanion
2. A nucleophile is ___
   a. A Lewis acid b. Electron rich species c. Electron deficient species d. None
3. Aldol condensation requires _____ reagent.
   a. $LiAlH_4$ b. Mild base c. $AlCl_3$ d. NBS
4. In Meerwein–Ponndorf–Verleyreduction reaction ___ is used as catalyst.
   a. $AlCl_3$ b. $(Me_2CHO)_3Al$ c. $LiAlH_4$ d. R-MgX
5. N - Bromosuccinimide is an important ___ reagent.
   a. Brominating b. Reducing c. Oxidizing d. Alkylating
6. Osmium Tetraoxide is an important ___ reagent.
   a. Hydroxylating b. Oxidizing c. Reducing d. None
7. Splitting of peak in a ^{1}HNMR spectra is observed due to effect of _____.
   (a) Neighboring carbon (b) Neighboring proton (c) Neighboring electrons (d) All of above
8. The spectrum of infrared spectroscopy indicates _____.
   (a) Molecular Mass (b) Functional Groups (c) Protons (d) Carbons

Q.2 Answer the following in short (ANY FIVE) **10**

I. What are nucleophiles? Give an example.
II. Explain elimination reaction.
III. What are free radicals? How they are generated?
IV. Give reaction for Meerwein–Ponndorf–Verley Reduction.
V. Brief out about Diels–Alder Reaction.
VI. Discuss the preparation of N- Bromosuccinimide.
VII Exemplify the uses of Osmium Tetroxide.
VIII. Give uses of U. V. Spectroscopy.

Long Question

Q.3	a.	Explain the Substitution reactions in detail.	4
	b.	Write a short note on Carbocation.	4
		OR	
Q.3	a.	Explain reaction intermediates giving examples.	4
	b.	Write note on nitrogen equivalent of carbenes.	4
Q.4	a.	Write a short note on Aldol Condensation.	4
	b.	Discuss the types of Rearrangements.	4
		OR	
Q.4	a.	Discuss the mechanism and applications of Diels Alder Reaction.	4
	b.	Detail out the Friedel–Craft's Reaction.	4
Q.5	a.	Explain Aluminum Chloride as a reagent.	4
	b.	Discuss in detail the preparation and role of NBS as a reagent.	4
		OR	
Q.5	a.	Write short note on Acetoxylating reagent.	4
	b.	Write short note on Sodium borohydride.	4
Q.6		Write about equivalent and non-equivalent protons by giving suitable examples and also explain about multiplicity of peaks.	8
		OR	
Q.6		From the following sets of N.M.R., IR and UV data, give a structure consistent with each of the following:	8

1. Molecular Formula: $C_{15}H_{14}O$; UV: λmax: 258, 288nm;
   IR: 3095-3035, 2925-2900, 1725, 1605, 1587, 1496 and 1455 cm^{-1}.;
   NMR: δ 3.54 (singlet, 2H) and δ 7.15 (multiplet, 5H).
2. Molecular Formula: C_4H_8O; UV: λmax 220nm;
   IR: 2900, 2750, 1725, 1380, 1370 cm^{-1}.;
   NMR: 1.1(doublet), 2.7(multiplet), 9.5(singlet).

Characteristic Infrared Absorption Frequencies.

Bond	Compound type	Frequency range cm^{-1}
C-H	Alkanes.	2850-2960, 1350-1470.
C-H	Alkenes.	3020-3080 (*m*), 675-1000.
C-H	Aromatic rings.	3000-3100 (*m*), 675-870.
C-H	Alkynes.	3300
C=C	Alkenes.	1640-1680 (ν)
C≡C	Alkynes.	2100-2260 (ν)
C=C	Aromatic rings.	1500, 1600 (ν)
C-O	Alcohols, Ethers, Carboxylic acids, Esters.	1080-1300
C=O	Aldehyde, Ketones, Carboxylic acids, Esters.	1690-1760
O-H	Monomeric alcohols, Phenols	3610-3640 (ν)
	Hydrogen bonded alcohols, Phenols.	3200-3600 (*broad*)
	Carboxylic acids.	2500-3000 (*broad*)
N-H	Amines.	3300-3500 (*m*)
C-N	Amines.	1180-1360.
C≡N	Nitriles.	2210-2260 (ν)
$-NO_2$	Nitro compounds	1515-1560, 1345-1385

Double Bonds	
Structure unit	Frequency cm^{-1}
C=C	1620-1680
C=O	
Aldehydes and ketones	1710-1750
Carboxylic acids	1700-1725
Acid anhydrides	1800-1850 & 1740-1790
Acyl halides	1770-1815
Esters	1730-1750
Amides	1680-1700
Substituted derivatives of Benzene	
Mono substituted	730-770 & 690-710
Ortho-disubstituted	735-770
Meta-disubstituted	750-810 & 680-730
Para-disubstituted	790-840

Characteristic Proton Chemical Shift

Type of Proton		Chemical shift δ, ppm	Type of Proton		Chemical shift δ, ppm
Cyclopropane		0.2	Alcohols	H-C-OH	3.4 – 4
Primary	$R-CH_3$	0.9 -1.8	Ethers	H-C-OR	3.3 – 4
Secondary	R_2CH_2	1.3	Esters	RCOO-C-H	3.7 – 4.1
Tertiary	R_3CH	1.5	Esters	H-C-COOR	2 – 2.2
Vinylic	C=C-H	4.6 -5.9	Acids	H-C-COOH	2 – 2.6
Acetylenic	C≡C-H	2 - 3	Carbonyl compounds	H-C-C=O	2 – 2.7
Aromatic	Ar-H	6 - 8.5	Aldehydic	RCH=O	9 – 10
Benzylic	Ar-C-H	2.2 - 3	Hydroxylic	RO-H	1 – 5.5
Allylic	C=C-C-H	1.7	Phenolic	ArO-H	4 – 12
Fluorides	H-C-F	4 - 4.5	Enolic	C=C-O-H	15 – 17
Chlorides	H-C-Cl	3 - 4	Carboxylic	RCOO-H	10.5 – 12
Bromides	H-C-Br	2.5 - 4	Amino	$R-NH_2$	1 – 5
Iodides	H-C-I	2 – 4			