V.P. & R. P. T. P. SCIENCE COLLEGE
INDUSTRIAL CHEMISTRY
B. Sc. - Semester – V
COURSE NO: US05CICH01 – ORGANIC CHEMISTRY - II
Date & Day: 1st October 2019

TIME: 11:00 to 12:15 TOTAL MARKS – 25

Q.1 Answer the following MCQs (05)

1. Pyridine reacts with HCl to form.....
   A. Pyridinium chloride
   B. 2-Chloropyridine
   C. 3-Chloropyridine
   D. All of these
2. Naphthalene undergoes reduction with H_2 , in the presence of Nicatalyst at high temperature and pressure to give
   A. Phthaliec acid
   B. Decalin
   C. Benzoic acid
   D. Tetralin
3. _____ Compounds doesn't undergo Aldol condensation.
   A. HCHO
   B. CH_3CHO
   C. CH_3CH_2CHO
   D. $CH_3CH_2CH_2CHO$
4. NMR spectroscopy indicates the chemical nature of the .....and spatial positions of.....
   A. Electrons, Protons
   B. Neutrons, electrons
   C. Nuclei, electrons
   D. Nuclei, neighboring nuclei
5. What is used to cool the superconducting coil?
   A. Hydrogen
   B. Ice
   C. Dry ice
   D. Liquid helium

Q.2 Discuss the "Electrophilic substitution in Furan". (05)

OR

Q.2 Discuss the "Nucleophilic substitution in Pyridine". (05)

Q.3 Electrophilic aromatic substitution reaction takes place predominantly at α-position in Naphthalene. Explain. (05)

OR

Q.3 Write a "Haworth synthesis for Anthracene and Phenanthrene. (05)

Q.4 Illustrate with examples specific uses of the N- Bromosuccinimide. (05)

OR

Q.4 Write a note on "Benzilic Acid Rearrangement". (05)

Q.5 From the following sets of N.M.R., IR and UV data, give a structure consistent.... (05)
Molecular weight: 113gm/mol; %age: C=31.86%, H=5.31%, Cl=62.83%.; IR: 2900, 1380, 300-500cm-1.; NMR: δ 1.8 (quintet, 6.5sq), δ 3.0 (triplet, 12.9sq).

OR

Molecular weight: 102gm/mol; %age: C=58.82%, H=9.80%, O=31.38%.; UV: 204nm, ε-max 60.; IR: 2950, 2840, 2660, 1720cm-1.;NMR: δ 10.92 (singlet, 3.2sq), δ 0.92 (singlet, 29.0sq).

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 (v)
C≡C	Alkynes.	2100-2260 (v)
C=C	Aromatic rings.	1500, 1600 (v)
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 (v)
	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 (v)
$-NO_2$	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			