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BBG-003-001607 Seat No. _____

B. Sc. (Sem. VI) Examination

July - 2021

Chemistry : C - 602

(Organic Chemistry & Spectroscopy)

(Old Course)

Faculty Code : 003

Subject Code : 001607

Time : $2\frac{1}{2}$ Hours] [Total Marks : **70**

Instructions : (1) Paper contains three questions and all are compulsory.

(2) Que. 1 carries 20 marks.

(3) Que. 2 and 3 carries 25 marks each.

1 Answer the following questions : **20**

(1) Write IUPAC name of Isoprene.

(2) Define α amino acid.

(3) Complete the reaction : Naphthalene $\xrightarrow[\text{anh. } AlCl_3, CS_2]{+CH_3COCl}$?

(4) What is called simple protein ?

(5) Write the structure of cyclonite.

(6) Define conformation.

(7) Write the structure of Tyrosin.

(8) Complete the reaction : $\text{Diphenylmethane} + Br_2 \longrightarrow ?$

(9) Write the structure of p - cymene.

(10) Write the structure of chair form of cyclohexane.

(11) Write full form of NMR.

(12) Deaterium will show signal in NMR.

(True or False)

(13) $5\delta =$ _____ τ. (0, 5, 10, 15)

(14) Spinning bar magnet is called _____.

(15) Diethyl ether will give _____ signals in NMl^2 spectroscopy.

(16) What is called base peak in mass spectroscopy ?

(17) The energy of electron beam bombarded on molecule in ionization chamber is _____ eV.

(7, 70, 100, 700)

(18) M/e value of molar ion peak indicates _____.
(Mol. formula, Mol. wt, Functional group)

(19) Write equation to double bond equivalence. (DBE)

(20) A compound shows uv peak at 260 nm. Suggesting absence of aromatic or conjugated double bond.

(True or False).

2 (A) Answer any **three** from the following : **6**

(1) Write method to determine olifinic double bonds in terpinoid.

(2) Explain iso electric point.

(3) Write any two reaction of –COOH group in α aminoacid.

(4) Define explosive.

(5) Write any two synthesis of diphenyl.

(6) What is pitzer strain ?

(B) Answer any **three** from the following : **9**

(1) Write Howarth synthesis of Naphthalene.

(2) Write dehydration reaction of α terpineol.

(3) Write Erlenmayer azalactone synthesis of α amino acid.

(4) Define insectiside. Write synthesis of parathion.

(5) Explain conformation of monosubstituted cyclo hexane.

(6) Write any three colour reaction of protein.

(C) Answer any **two** from the following : **10**

(1) Prove the structure of Citral analytically.

(2) Give synthesis of polypeptide.

(3) Disucss conformation of n butane.

(4) Write synthesis of Anthracene.

(5) Define Perfume. Write characteristics of perfume write synthesis of musk xylene and musk ketole.

3 (A) Answer any **three** from the following : **6**

(1) Define equivalent and non-equivalent proton.

(2) Name the solvents used in NMR spectroscopy.

(3) A compound having molecular formula $C_{17}H_{36}$ gives one PMR signal. Find it's structure.

(4) What information can we obtain from mass spectroscopy.

(5) Write the names of various peak of mass spectroscopy.

(6) Give the number of signals and spliting for the compound 1 chloro ethene $CH_2 = CH - Cl$.

(B) Answer any **three** from the following : **9**

(1) Explain chemical shift.

(2) What is spin spin coupling constant.

(3) Explain shilding and deshilding effect.

(4) Discuss McLafferty rearrangement.

(5) Write PMR spectra of Anisol.

(6) Assign the structure to a compound having following characteristics : M.F. $C_4H_8O_2$

IR : 2840, 1740, 1373, 1239, 1049, 847cm^{-1}.

NMR :

(a) Triplet δ 2.25 (3H)

(b) Quartlet δ 4.5 (3H)

(c) Singlet δ 3.02 (3H)

(C) Write any two from the following : **10**

(1) Explain mass spectra of alkane.

(2) Discuss PMR spectra of cyclohexane at different lowered temperature.

(3) Discuss advantages of using TMS as reference.

(4) Write short note on Deuterium labelling.

(5) Determine the molecular structure for the following from the data :

(i) M. F. C_7H_9N

(ii) IR Spectral Data : 3440(d), 3010, 2920, 2870, 1623, 1510, 1451, 1270, 810cm^{-1}.

(iii) NMR Data :

(a) Singlet δ 2.2 3H

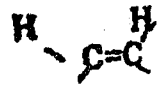
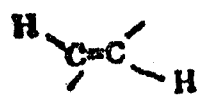
(b) Singlet δ 3.3 2H

(c) Doublet δ 6.42 (2H)

(d) Doublet δ 6.85 (2H)

Spectral Data

Infra - Red Data

Alkene (strcteching)	–C–H	2850-2960(v)
Alkene	=C–H	3100-3200(m)
Alkyene	=C–H	3200-3300(s)
Aromatic	ArC–H	3010-3100(m)
Aromatic ring	C=C	1500-1600(v) (two to three)
Alkene	>C=C<	1610-1680(v)
Alkyene	–C≡C–	2100-2260(s)
Alkene (Bending)	–C-H	1340(w)
	$-C(C_6H_5)_3$	1430-1470(m) & 1380-1385(s)
	$-C(CH_3)_3$	1365 (S)
Aldehyde	–C–H	2820-2000(w)&2650 2760(s)
Adehyde	C=O	1740-1720(s)
Ketone	C=O	1725-1710(s)
Carboxylic acid	C=O	1725-1705(s)
Ester	C=O	1750-1730(s)
Amide	C=O	1670-1640(s)
Anhydride	C=O	1810-1860(s)&1740-1790
Alecohols, Ethers, esters Carboxylic acids, Anhydride	C-O	1300-1000(s)
Alcohols, phenols :		
Free	O-H	3650-3600(sh)
bonded	O-H	3500-3200(b)
Carboxylic acids free		
Free	O-H	3500-3650(m)
H-bonded	O-H	2500-3200(b)
amines (stretch)	N-H	3330-3500(m)
Bnding	-N-H	1640-1550(m)
Nitrile	-C≡N	2210-2280(s)
Ether	-O-	1070-1150(s)
Alkene bending disulstituted Cis.		-690(s)
disulstituted Trans.		960-970(s)

Aromatic substitution :

Type C-H out of plane bending No. of adjacent H atom.	range cm
5	750(s) & 700(s)
4	750
3	780
2	830
1	850

NMR Data : Chemical Shift

Types of proton		Chemical shift in δ_{ppm}
Primary	$R\text{-}CH_3$	0.9
Secondary	$R_2\text{-}CH_3$	1.3
Tertiary	$R_3\text{-}CH$	1.5
Vinylic	C=C-H	4.6-5.9
Acetylinic	Cr-C-H	2.3
Aromatic	Ar-H	6-8.5
Benzylic	Ar-C-H	2.2-3
Allylic	$C\text{=}C\text{-}CH_3$	1.7
Florides	H-C-F	4-4.5
Chlorides	HC-Cl	3.4
Bromides	HC-Br	2.5-4
Iodides	HC-I	2.4
Alcohols	HC-OH	3.4-4
Ethers	HC-OR	3.3-4
Esters	R-COO-CH	3.7-4.1
Acids	HC-COOH	2-2.6
Carbonyl comp.	HC-C=O	2-2.7
Adehyde	R-CHO	9-10
Hydroxylic	R-OH	1-5.5
Phenolic	Ar-OH	4-12
Carboxylic	R-COOH	10.5-12
Amino	$R\text{-}NH_2$	1.5