JB-003-001607 Seat No. _____

B. Sc. (Sem. VI) (CBCS) Examination

August – 2019

Chemistry : Paper - C-602

(Organic Chemistry & Spectroscopy) (Old Course)

Faculty Code : 003
Subject Code : 001607

Time : $2\frac{1}{2}$ Hours] [Total Marks : **50**

Instructions : (1) Total **three** questions. All questions are **compulsory**.

(2) Question-**1** carries **20** marks. Remaining questions-**2** and **3** carry **25** marks each.

(3) Figures at the **right** side indicate the marks of individual question.

1 Answer the following questions : **20**

(1) Which terpenaid is present in ginger ?

(2) Give structure of isoprene.

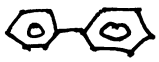
(3) Give two names of any amino acids.

(4) Write structure of TNT.

(5) Amino acids can be obtained by the hydrolysis of _____.

(6) Parathion is _____. (Drug / Dye / Perfume / Insecticide)

(7) Write the structure of naphthalene.

(8) Ph-Br + _____ + Br – Ph →  + 2 NaBr.
Write the catalyst used.

(9) Conformers are also known as Rotamers. (True or False)

(10) Dihedral angle in fully eclipsed conformers of two bulky groups is _____. (0^o, 10^o, 100^o, 120^o, 180^o)

(11) Give full form of NMR.

(12) Deuterim will show signal in PMR. (True or False)

(13) 5δ = _____ τ. (0, 10, 15, 5)

(14) Spinning bar magnet is called _____.

(15) Diethylether will give _____ signals in PMR spectrum. (1, 2, 3, 4)

(16) The highest intensity peak in Mass Spectrum is called _____ peak.

(17) The energy of electron beam, bombarded on molecule (in ionisation chamber) is _____eV. (7, 70, 100, 700)

(18) m/e value of molar ion peak, indicates _____. (MF, MW, Functional group)

(19) Give equation to find DBE.

(20) If any substance shows 260 nm UV peak, it means, aromatic (or (conjugate) d.b.) is absent. (True or False)

2 (a) Answer any **three** : **6**

(1) Define - Terpenoids.

(2) Difference between proteins and polypeptides.

(3) Write structural formulae of Baygon and PETN.

(4) Explain classification of polynuclear hydrocarbons.

(5) Explain isolation of essential oil by fat method.

(6) Classify - Amino acids.

(b) Answer any **three** : **9**

(1) Explain : Isoprene rule.

(2) Give synthesis of Geranic acid.

(3) Write short note : Zwitter ion.

(4) Define : Explasive, perfume and pesticides.

(5) Give synthesis of RDX.

(6) Write synthesis of Naphthalene.

(c) Answer any **two** : **10**

(1) Explain conformation of n-Butane.

(2) Describe chemical reactions for Naphthalene.

(3) Give synthesis of Thyroxine.

(4) Discuss the constitution of α-Terpineol.

(5) Give synthesis of Polypeptides.

3 (a) Answer any **three** : **6**

(1) Define : Equivalent and nonequivalent protons.

(2) Which solvents are used in PMR spectroscopy ? Give examples.

(3) MF : $C_{17}H_{36}$, gives one PMR signal. Find its structure.

(4) What informations can be abtained from mass spectroscopy ?

(5) Give the names of different parts of mass spectrometer.

(6) Give No. of signals and splitting for undermentioned compound.

$H_2C = CH - Cl$

(b) Answer any **three** : **9**

(1) Explain : Chemical shift.

(2) What is spin-spin coupling constant "J" ?

(3) Explain : Shielding and Deshielding effect.

(4) Discuss : McLafferty Rearrangement.

(5) Write PMR spectra of Ethylbenzene.

(c) Answer any **two** : **10**

(1) Explain - Mass spectra of alkane.

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

(3) Describe the advantages of using TMS as reference.

(4) Write short note : Deuterium Labelling.

(5) Derive the structure using the following spectral data :

MF : $C_8H_{18}O_4$

UV : No absorption above 200 nm

IR : 2941, 2857, 1745, 1458, 1180 cm^{-1}

PMR : (a) quartet, 4.14 δ, 4 H

(b) singlet, 2.6 δ, 4 H

(c) triplet, 1.2 δ, 6 H

Spectral Data

Infra-Red Data

		$\bar{\nu}$ cm^{-1}
Alkane (Stretching)	C–H	2850–2960 (v)
Alkane (bending)	$-CH_3$	1370–1395 (cm)
		1430 – 1470 (sh)
	$-CH_2$	1445–1485(sh)
Alkane gem dimethyl	$-C(CH_3)_2$	1430–1475 (m) &
		1375–1385(m)
	$-C(CH_3)_3$	1365 (s)
Alkene (stretching)	=C–H	3100–3200 (m)
Alkyene (st.)	$C-H$	3200–3300 (m)
Aromatic	C–H	3010–3100 (cm)
Aromatic ring st.	C=C	1500–1650 (m,v)
Alkene	>C=C<	1610–1650 (v)

Alkyene	$-C \equiv C-$	2100–2260(s)
Aldehyde (st)	–C–H	2820–2880 (w) &
		2775–2700 (w)
Aldehyde	C = O	1740–1720 (s)
Ketone	C = O	1725–1710 (s)
Carboxylic acid	C = O	1725–1705(s)
Ester	C = O	1730–1750 (s)
Amide	C = O	1640–1670 (s)
Anhydride	C = O	1810–1860 (s) &
		1740–1790 (s)
Acid chloride	C=O	1800(s)
Ether	C–O–C	1070–1150 (s)
Alcohol, ester, carboxylic		
acid, anhydride, phenol	C–O	1000–1280 (s)
Alcohol, Phenol (st.)	Free-OH	3600–3650 (sh)
	bonded –OH	3200–3500 (b)
Carboxylic Acid (st.)	Free – OH	3200–3400 (b)
	bonded –OH	2500– 3200 (b)
Amines (st.)	N–H	3330–3500 (doublet)
Bending	–N–H	1550–1640 (m)
Nitrile (st.)	$-C \equiv N$	2210–2280 (s)
Bending	$-C \equiv N$	1250–1340 (m)
Alkene monosubtituted		
(Vinyl gp.)	CH_2=CH–	$985–995_{(s)}$ &
		$905–915_{(s)}$
Alkene disubstituted	Cis	690(s)
Alkene disubstituted	Trans	970–960 (s)
Ar-C-H out of plane		
bending	Adjucent H atom	
	5	$700_{(s)}$ & $750_{(s, v)}$
	4	$750_{(s)}$
	3	$780_{(v)}$
	2	830 (s)
	1	850(v)

NMR Data : Chemical Shift :

Types of proton		Chemical shift in δ ppm.
Primary	$R-CH_3$	0.9
Secondary	R_2-CH_2	1.3
Tertiary	R_3-CH	1.5
Vinylic	$C=C-H$	4.6–5.9
Acetylinic	$C\equiv C-H$	2.3
Aromatic	Ar–H	6–8.5
Benzylic	Ar–C–H	2.2–3
Allylic	$C=C-CH_3$	1.7
Flourides	HC–F	4–4.5
Bromide	HC–Br	2.5–4
Iodides	HC–I	2–4
Alcohols	HC–OH	3.4–4
Ethers	HC–OR	3.3–4
Esters	RCOO–CH	3.7–4.1
Acids	HC–COOH	2–2.6
Carbonyl comp.	HC–C=O	2–2.7
Aldehydic	RCHO	9–10
Hydroxylic	ROH	1–5.5
Phenolic	Ar–OH	4–12
Carboxylic	R-COOH	10.5–12
Amino	$R\cdot NH_2$	1–5