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RY-003-1016007 Seat No. _____

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

March - 2019

Chemistry : C - 602

(Organic Chemistry & Spectroscopy)

(New Course)

Faculty Code : 003
Subject Code : 1016007

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

Instructions : (1) Total five questions. All are compulsory.
(2) The figures to the right indicate the marks of the sub question.

1 (a) Answer the questions : **4**

(1) Give the structure of citral.

(2) Which methods are used for the isolation of essential oil from plants ?

(3) Give structure of Baygon.

(4) Define explosive and give examples.

(b) Answer any one : **2**

(1) Give classification of terpenoids.

(2) Give synthesis of Carbendazin.

(c) Answer any one : **3**

(1) Give conversion of α-Terpineol from P.Toluic acid.

(2) Give synthesis and uses of P.E.T.N.

(d) Answer any one : **5**

(1) Discuss general methods for determining the structure of terpenoids.

(2) Describe perfume with example and synthesis.

2 (a) Answer the questions : **4**

(1) Define aminoacid and give examples.

(2) Write Biuret test.

(3) Define Essential amino acid with example.

(4) Write structure of Ninhydrine.

(b) Answer any one : **2**

(1) Give Hofmann's degradation reaction.

(2) Explain Isoelectric point.

(c) Answer any one : **3**

(1) Discuss classification of protein.

(2) Give the reactions due to carboxylic group of amino acid.

(d) Answer any one : **5**

(1) Discuss constitution of Thyroxine.

(2) Give any two synthesis methods of polypeptides.

3 (a) Answer the questions : **4**

(1) Define Isolated polynuclear hydrocarbon and give examples.

(2) Write Fitting reaction.

(3) What is parent peak ?

(4) Give different conformations possible in Butane.

(b) Answer any one : **2**

(1) Explain types of strain.

(2) Give synthesis of diphenyl methane.

(c) Answer any one : **3**

(1) Explain Mass Spectra of alkanes.

(2) Give oxidation reactions of Naphthalene.

(d) Answer any one : **5**

(1) Describe conformational analysis of cyclohexane.

(2) Give different chemical reactions / properties of Anthracene.

4 (a) Answer the questions : **4**

(1) What is Chemical Shift ?

(2) What is long range coupling ?

(3) Why 12_C, 16_O, 32_S do not show NMR spectra ?

(4) Define equivalent and non equivalent protons.

(b) Answer any one : **2**

(1) Explain intensity of singal with example.

(2) Give importance of NMR spectrum.

(c) Answer any one : **3**

(1) Explain in short NMR instrumentation.

(2) Explain Deuterium labeling.

(d) Answer any one : **5**

(1) Discuss Magnetic Anisotropy.

(2) Explain Spin-Spin Coupling.

5 (a) Answer the questions : **4**

(1) What should indicate, if λmax is greater than 215nm ?

(2) Which group is present in compound by IR spectral data is greater than 3200 cm^{-1} ?

(3) What is Nitrogen Rule ?

(4) Which information we get from IR, NMR and Mass spectroscopy individually ?

(b) Answer any one : **2**

(1) Give explanation of DBE with example.

(2) Write about NMR spectral information.

(c) Answer any one : **3**

(1) Determine the molecular structure from the following data :

(i) Molecular Formula : $C_6H_{12}O$

(ii) IR spectral data : 2950, 2870, 1715, 1390, 1365 cm^{-1}

(iii) NMR spectral data :

(a) Singlet δ 2.2 (3H)

(b) Singlet δ 1.1 (9H)

(2) Determine the molecular structure from the following data :

(i) Molecular formula : $C_5H_{10}O_2$

(ii) IR spectral data : 2950, 2840, 1720, 1365 cm^{-1}

(iii) NMR spectral data :

(a) Singlet T-0.92 3.2 square

(b) Singlet T 9.15 29.1 square

(d) Answer any one : **5**

(1) Determine the molecular structure from the following data :

(i) Molecular Formula : C_4H_9NO

(ii) UV-No absorption above 200nm

(iii) IR spectral data : 3300, 2980, 2880, 1655, 1555, 1219 cm^{-1}

(iv) NMR spectral data :

(a) Triplet δ 1.12 (3H)

(b) Singlet δ 1.93 (3H)

(c) Quartet δ 3.22 (2H)

(d) Broad Signal δ 5.15 (1H)

(2) Determine the molecular structure from the following data :

(i) Molecular Formula : C_8H_9NO

(ii) IR spectral data : 3290, 3065, 2980, 2800, 1664, 1598, 1350 cm^{-1}

(iii) NMR spectral data :

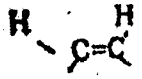
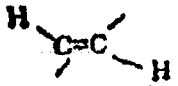
(a) Singlet δ 2.09 (3H)

(b) Singlet δ 3.09 (1H) broad singal

(c) Complex δ 7.27 (5H)

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)
	$-C(C_2H_3)_3$	1430-1470(m) & 1380-1385(s)
	$-C(CH_2)_3$	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