



PAQ-003-1015006 Seat No. _____

B. Sc. (Sem. V) (CBCS) (W.I.F. 2016) Examination

October / November - 2018

Chemistry : C - 502

(Organic Chemistry & Spectroscopy) (New Course)

Faculty Code : 003

Subject Code : 1015006

Time : $2\frac{1}{2}$ Hours]

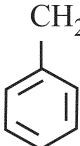
[Total Marks : 70

- Instructions :** (1) All questions are compulsory.
(2) Right side indicates marks of questions.
(3) Do not do any rough work in question papers.

- 1 (a) Give answer of the following questions : 4
- (i) $R - \text{COOH} \xrightarrow{\text{A}} \text{RCOCl} \xrightarrow[\text{C}]{\text{B}} R - \text{CH}_2\text{COOH}$
- (ii) Write the structure of Sodium azide.
- (iii) Write the structure of Coniine.
- (iv) Write the structure of L(-) Hygrinic acid.
- (b) Give answer of the following questions : (any one) 2
- (i) Write the structures of Soda lime and Lithium Aluminium Hydride.
- (ii) Complete reaction : Nicotine $\xrightarrow{\text{CrO}_3}$.
- (c) Give answer of the following questions : (any one) 3
- (i) Give method of preparation of triphenyl phosphine.
- (ii) Explain Hoffmann Exhaustive methylation method.
- (d) Give answer of the following questions : (any one) 5
- (i) Explain curtius rearrangement with mechanism.
- (ii) Explain constitution of Papavarine.

- 2 (a) Give answer of the following questions : 4
- (i) Write structure of : D(-) Fructose.
- (ii) Complete it : Glucose + Hydroxyamine \rightarrow .
- (iii) Complete it : Isobutylene + Benzene $\xrightarrow[E_{utect}]{Na, K}$.
- (iv) Write the structure of Adrenaline.
- (b) Give answer of the following questions : (any one) 2
- (i) Write structures of :
- (a) Gluconic acid
- (b) Fructosazone
- (ii) Synthesis of : Dulcin.
- (c) Give answer of the following questions : (any one) 3
- (i) Explain step-up reaction (Killani method)
- (ii) Write the structures of :
- (a) Ibuprofen
- (b) P-Anisyl Urea
- (c) Chrysodine - G.
- (d) Give answer of the following questions : (any one) 5
- (i) Discuss the reactions of D(+) Glucose react with H_2NOH , Br_2 , HI/P and HNO_3 .
- (ii) Give synthesis of :
- (a) Atenolol
- (b) Orange - II
- 3 (a) Give answer of the following questions : 4
- (i) Write the structure of : Pyrazole.
- (ii) Write the structure of : Dioxane.
- (iii) Define : Spectroscopy.
- (iv) Define : Beer's Law.

- (b) Give answer of the following questions : (any **one**) **2**
- (i) Write the structure of :
- (a) Imidazole
- (b) Thiazole
- (ii) Why β - Carotene is coloured ?
- (c) Give answer of the following questions : (any **one**) **3**
- (i) Synthesis of : Isoxazole.
- (ii) Define it : (a) Frequency (b) Transmittance.
- (d) Give answer of the following questions : (any **one**) **5**
- (i) Synthesis of : (a) Pyrimidine (b) Morpholine.
- (ii) Write a note on "Franck-Condon Principle."
- 4 (a) Give answer of the following questions : **4**
- (i) Which point group present in H_2O_2 . (Cis Planner)
- (ii) Which point group present in HCN.
- (iii) Which point group present in H_2O .
- (iv) Define : Symmetry.
- (b) Give answer of the following questions : (any **one**) **2**
- (i) Give the names of symmetry elements.
- (ii) Discuss point group present in Boric acid (planner) detail.
- (c) Give answer of the following questions : (any **one**) **3**
- (i) Explain multiplication table for C_2V point group.
- (ii) Discuss improper rotation axis with example.
- (d) Give answer of the following questions : (any **one**) **5**
- (i) Discuss multiplication table for C_3V point group.
- (ii) Discuss the symmetry elements and point group present of following :
- (a) NH_3
- (b) BF_3 (Planner)
- (c) C_2H_6 (Staggered) Ethane

- 5 (a) Give answer of the following questions : 4
- (i) Give full name of IR.
 - (ii) Give the range of IR region in cm^{-1} .
 - (iii) Give the types of bending vibration.
 - (iv) Why methanol is not good solvent in IR ?
- (b) Give answer of the following questions : (any one) 2
- (i) Define : Selection rules, shortly.
 - (ii) Define : IR Spectroscopy.
- (c) Give answer of the following questions : (any one) 3
- (i) Write a note on : Finger Point Region.
 - (ii) Define : Fermi resonance.
- (d) Give answer of the following questions : (any one) 5
- (i) Derive the structural formula of the compound from the following results :
 M. F. : $\text{C}_9\text{H}_{11}\text{NO}$
 IR : $2820\text{--}2740 \text{ cm}^{-1}$ (doublet), 1645, 1600, 1567, 1528, 808, 720 cm^{-1} .
 - (ii) Write expected infrared peaks for the following compounds :
 - (a) Propanal : $\text{CH}_3\text{CH}_2\text{CHO}$
 - (b) Benzyl Alcohol : 

Spectral Data

U.V. :

Empirical rules for Dienes :

(A) Homoannular (b) Heteroannular
 $\lambda = 253 \text{ nm.}$ $\lambda = 215 \text{ nm.}$

Increments for double bond extending conjugation	30 nm.	30 nm.
Exocyclic double bond	5	5
Alkyl substitution or ring residue	5	5
Homocyclic Diene components	39	39
Polar groups :		
- OCOCH ₃	0	0
- OR	6	6
- Cl, -Br	5	5
- NR ₂	60	60

(C) Simple Diene :

Parent $\lambda = 217 \text{ nm.}$

Polar groups :

Alkyl subst for ring residue	5 nm
-Cl, -Br	17
-OH	5
-OR	5
-NR ₂	60
-SR	30

(D) Empirical Rules for Enones and Dienones :

(a) Z = C	λ
(1) 6 membered ring or acyclic	215
(2) 5 membered ring	202
(b) Z = H	207
(c) Z = OH or OR	193
(d) Acyclic dienone	245
Increment for :	
Double bond extending conjugation	30
Alkyl group of ring residue	α 10
	β 12
	γ or higher 18
Exocyclic double bond position	5
Homocyclic diene component	39

Polar groups	α	β	γ	δ' other
-Cl	15	12	.	.
-OH	35	30	50	50
-OR	35	30	17	31
-NR ₂	.	93	.	.
-O	.	75	.	.
-NHCOR	.	95	.	.
-OCOCH ₂	6	6	.	6
-SR	.	85	.	.
-Br	25	30	.	.
-NO ₂	.	95	.	.

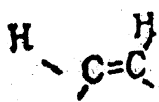
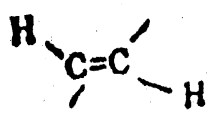
(e) Empirical Rules for Benzoyl Derivative :

Parent Chromophor :	mm
Z = alkyl or ring residue	246
Z = H	250
Z = -OH or -OR	230

Increment for each substituent :	O	m ₀	P
Alkyl or ring residue	3	3	10
-OH; -OCH ₃ -OR	7	7	25
-O	11	20	78
-Cl	0	0	10
-Br	2	2	15
-NH ₂	13	13	58
-NHCOCH ₂	20	20	45
-NHCH ₃	.	.	73
-N(CH ₂) ₃	20	20	85

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 ² .	2100-2260(s)
Alkene (Bending)	-C-H	1340(w)
	-C(C ₂ H ₃) ₃	1430-1470(m) & 1880-1385(s)
	-C(CH ₂) ₃	1365 (8)
Aldehyde	-C-H	2820-2000(w)&2650 2760(s)
Aldehyde	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
Alcohols, Ethers, esters		
Carboxylic acids, Anhydride	C-O	1800-1000(s)

Alcohols, phenols :		
Free	O-H	3650-3600(sh)
bonded	O-H	3500-3200(b)
Carboxylic acids		
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		690(s)
disubstituted Cis.		
disubstituted Trans.		960-970(s)
Aromatic substitution :		
Type C-H out of plane bending		range cm
No. of adjacent H atom.		750(s) & 700(s)
5		750
4		780
3		830
2		850
1		