647510 **BSCorgCC5020** **Seat No: _____**

B.Sc. Semester - 5 (CBCS) Examination

Oct/Nov. - 2018

ORGANIC CHEMISTRY AND SPECTROSCOPY (CORE)

Time: 2:30 Hours **Marks: 70**

Instructions:

1. All questions are compulsory.
2. Figures to the right indicate marks.

Que-1 (A) Answer the following question. (04)

Explain step-up reaction (Sowden method).

(B) Answer any two questions. (10)

(1) Explain determination of ring size of glucose by methylation method.
(2) Explain step-down reaction (Ruff's method).
(3) What is carbohydrate? Discuss the classification of carbohydrates.

Que-2 (A) Answer the following question. (04)

Give point group of (1) SO_2 (2) $[PtCl_4]^{2-}$ (3) NH_3 (4) H_3BO_3

(B) Answer any two questions. (10)

(1) What is plane of symmetry? Explain different types of plane of symmetry with examples.
(2) Prove that in eclipsed ethane $S_n^k \# E$ but $S_n^{2k} = E$, When n is odd number.
(3) Construct multiplication table for C_2Vpoint group.

Que-3 (A) Answer the following question. (04)

Give preparation and uses of (a) Dulcin (p - phenethyl urea) (b) p – Anisyl urea

(B) Answer any two questions. (10)

(1) Give preparation and uses of (a) Atenolol (b) Orange-II.
(2) Discuss structure and aromaticity of pyridine.
(3) Give any two synthesis (a) Pyrole (b) Furan (c) Thiophine.

Que-4 (A) Answer the following question. (04)

Differentiate following pair of compounds using IR spectroscopy,

(a) Propanoic acid and methylethanoate.
(b) P – Methylcyanobenzene and p – aminobenzaldehyde.

(B) Answer any two questions. (10)

(1) Explain in detail: Fundamental modes of vibrations in IR spectroscopy.
(2) Discuss factors affecting on frequency of >C=O band in IR spectroscopy (any five).
(3) Discuss curtius rearrangement.

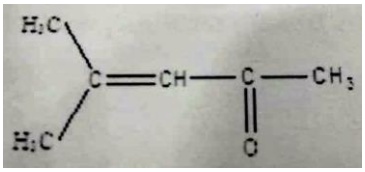
Que-5 (A) Answer the following question. (04)

Discuss in detail: chromophore and auxochrome.

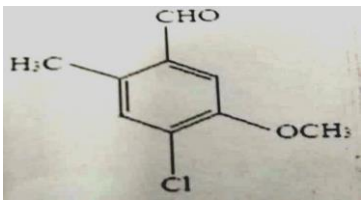
(B) Answer any two questions. (10)

(1) Explain constitution of coniine.
(2) Explain Hofmann exhaustive methylation method.
(3) Calculate λ_{max} for the following molecules,

(i)



(ii)



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Spectral Data

U.V.:

Empiricul rules for Dienes :

	(A) Homoannular λ = 253 nm.	(B) Heteroanuular λ = 215 nm.
Incerments for double bond extending conjugation	30nm.	30nm.
Exocyclic double bond	5	5
Alkyl subsituation or ring residue	5	5
Homocyclic Diene components polar groups:	39	39
- OCOCH3	0	0
- OR	6	6
- Cl, -Br	5	5
- NR_2	60	60

(C) Simple DIene :

Parent λ = 253 nm.

Polar groups:

Alkyl subst for ring Residue	5 nm
- Cl, -Br	17
- OH	5
- OR	5
- NR2	60
- SR	30

(D) Empirical Ruies for Enones and Dienones :

	λ
(a) Z = C	
(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
Incerement for :	
Doyble bond extending conjugation	30
Alkyl fropp of ring residue	α 10
	β 12
λ or higher	18
Exocyclic double bond postion	5
Homocyclic diene component	39

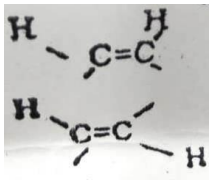
Polar groups	α	β	λ	δ' other
- CI	15	12	-	-
- OH	35	30	50	50
- OR	35	30	17	31
- NR_2	-	93	-	-
- O	-	75	-	-
- NHCOR	-	95	-	-
- $OCOCH_2$	6	6	-	6
- SR	-	85	-	-
- Br	25	30	-	-
- NO_2	-	95	-	-

(E) Empirical Rules for Benzoyl Derivative :

Parent Chromohor :	Mm
Z = alkyl or ring residule	246
Z = H	250

Increment for each substituent	o	m	p
Alkyl or ring residue	3	3	10
-OH; -OCH_3 -OR	7	7	25
- OH	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)
Alkeyene	=C-H		3200-3300(s)
Aromatic	ArC-H		3010-3100(m)
Aromatic ring	C=C		1600-1600(v) (two to three)
Alkene	>C=C<		1610-1680(v)
Alkyene	-C=C^2.		2100-2260(s)
Alkene (Bending)	-C(C2H3)3		1430-1470(m) & 1380-1385(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, Ehers, esters, Carboxylic acids, Anydride	C-O		1800-1000(s)
Alchols, 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	1640-1550(m)
Bnding		-N-H	1640-1550(m)
Nitrile		-C=N	2210-2280(s)
Ether		-O-	1070-1150(s)
Alkene bending Disulstitued Cis.			-690(s)
Disulstitued 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