647510 **BSc6CheC602x** **Seat No :_____**

B.Sc. Semester - 6 (*CBCS*) Examination
March/April-2024 (NEW COURSE)
Organic Chemistry and Spectrocopy (Core (New))

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)**

(1) What is degree of freedom? Calculate vibrational degree of freedom for CO_2 and H_2O.

Que-1(B) Answer the following questions. (Any two) **(10)**

(1) Explain Hantzsch pyridine synthesis.

(2) Draw π-Molecular orbitals of 1,3-Butadiene system. Show symmetry, number of nodes, HOMO and LUMO in ground and excited states.

(3) Write a note on fundamental modes of vibration in IR spectroscopy.

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

(1) Conversion: Anthracene from benzene.

Que-2(B) Answer the following questions. (Any two) **(10)**

(1) Give Synthesis of (I) PETN from Acetaldehyde

(II) 2-Isopropoxyphenyl methylcarbamate from catechol

(2) Prepare 3,7-dimethylocta-2,6-dienal from 1,3-dibromo-3-methylbutane.

(3) A Nitrogen containing organic compound have Mol.wt: 107 gm/mole gives following data.

Elemental percentage:

C:78.5%, H:8.4%, N=13.0%

NMR signals

Types of proton(s)	No. of proton(s)	Multiplicity	δ ppm
a	3H	s	2.35
b	2H	s	4.00
c	2H	d	6.34
d	2H	d	6.81

IR frequencies.

$3440_{(d)}$, 3010, 2929, 2870, 1623, 1510, 1451, 1270, 810 cm^{-1}.

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

(1) Prepare carbendazim from o-phenylenediamine and write its use.

Que-3(B) Answer the following questions. (Any two) **(10)**

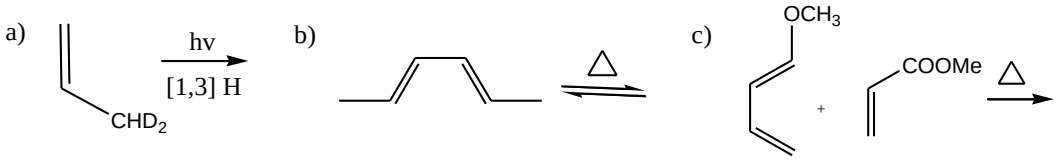
(1) Write reactions-only which proves presence of 5-OH, Carbonyl group, carbonyl group as aldehyde and a linear chain of 6-carbon atoms in glucose in the shortest possible way.

(2) Write reactions involved in the methylation method used to prove pyranose structure of glucose.

(3) Explain briefly: Types of electronic transitions observed in molecules with reference to U.V. and Visible spectroscopy.

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

(1) Complete the following three pericyclic transformations.



Que-4(B) Answer the following questions. (Any two) **(10)**

(1) Write any five synthesis methods for pyrrole.

(2) Write any five oxidation reactions for Naphthalene and give names to all the obtained products.

(3) Give points to prove that glucose contains cyclic structure.

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

(1) Deduce the structure of an organic molecule having M.F.: $C_6H_{12}O$ and gives following spectral data.

NMR Signals

Types of proton(s)	No. of squares	Multiplicity	δ ppm
a	17.89	s	1.1
b	5.95	s	2.2

IR frequencies:

2951, 2870, 1716, 1390, 1366 cm^{-1}

Que-5(B) Answer the following questions. (Any two) **(10)**

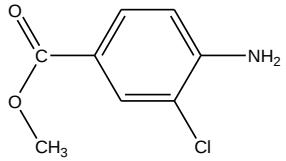
(1) Write a note on factors affecting to absorption frequency of carbonyl group in IR spectroscopy.

(2) Give synthesis of Terpenylic acid from ethyl acetoacetate.

(3) Answer the following

a) Give difference between Red shift and Blue shift in UV spectroscopy.

b) Calculate λmax for the following molecule.



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Spectral Data

NMR: δ values

0.9-1.2	Alkyl groups	2.0-2.5	Ar-R groups,
2.0-2.5	CO-R, 4.0 NH_2 ,	6-8	Ar-H

IR: ν cm^- $3440_{(d)}$ -NH2

3100-3000	C-H stretching arenes
2900-3000	C-H stretching alkanes,
1650-1750	C=O str
1550-1650	N-H bending1623, 1510,1451
1380-1350	C-H stretching isopropyl/tert.butyl
1200-1350-	C-N stretching for aromatic
810	p-Di substitution

UV: λ

Base value	Enone -C=C-CO-Z,		Arone Ar-CO-Z	
-Simple Diene	=217	215	Arone Z=C	246
Homo annular diene	=253	205	Z=H	250
Heteroannular diene	=215	210/	Z= OH/OR	230
		Z=H 210		
		Z=OH/OR 195		

Substituent:

Cl: 00

NH_2: ortho-13,meta-13 para-58