647510 **BSCorgCC6020** **Seat No :_____**

B.Sc. Semester - 6 (*CBCS*) Examination

Oct/Nov -2020

ORGANIC CHEMISTRY AND SPECTROSCOPY (CORE)

Time: 2:00 Hours **Marks: 56**

Instructions:

1. Figures to the right indicate marks.
2. There are five questions in the question paper.
3. Answer any four of the following questions.

Q. 1 (A) Answer the following question. **[04]**

(1) Give the synthesis of tryptophan by Hydantoin method.

Q. 1 (B) Answer any two questions out of three. **[10]**

(1) Write the reaction of glycine with HONO, NOCl, HI and $LiAlH_4$.

(2) Prove the structure of thyroxin by synthetic method.

(3) (a) What is essential and non essential α-amino acids, give two examples of each?

(b) Give the synthesis of Gly-Ala by Bergmann method.

Q. 2 (A) Answer the following question. **[04]**

(1) Give the synthesis of RDX and Parathion.

Q. 2 (B) Answer any two questions out of three. **[10]**

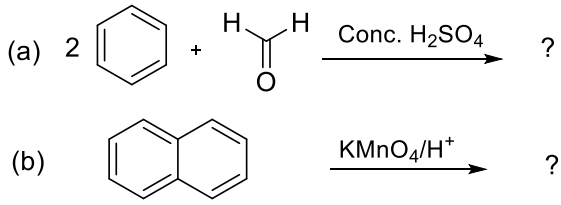
(1) Prove the structure of citral by chemical method.

(2) Give the synthesis and uses of PETN and Musk-xylene.

(3) Prove, (a) Presence and position of alcoholic –OH group and (b) Presence of one double bond and monocyclic ring of α-terpineol with appropriate reaction.

Q. 3 (A) Answer the following question. **[04]**

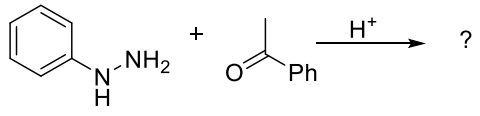
(1) Complete the following reaction,



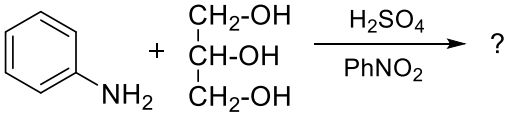
Q. 3 (B) Answer any two questions out of three. **[10]**

(1) Give any one of the syntheses of anthracene and write their reaction of nitration, oxidation and sulphonation.

(2) Complete the following reaction with proper mechanism,



(3) Complete the following reaction with proper mechanism,



Q. 4 (A) Answer the following question. **[04]**

(1) Calculate ^{1}H-NMR signals for following compounds with notification,

a) 2-bromo propane
b) 3^{o}-butyl bromide
c) Diethyl ketone
d) 1,2-dibromo-1,1- difluoro ethane

Q. 4 (B) Answer any two questions out of three. **[10]**

(1) Why TMS is used as a reference in NMR spectroscopy.

(2) Determine the structure from following NMR data:

Molecular weight:- 178 gm/mole
Element analysis: - C, 74.13 % and H, 7.92 %
NMR data:

Types of Proton	No. of Proton	Multiplicity	δ *ppm*
A	1H	Singlet	11.00
B	2H	Doublet	07.67
C	2H	Doublet	07.25
D	9H	Singlet	01.00

(3) Explain, (a) Deuterium labelling and (b) Coupling constant in NMR spectroscopy

Q. 5 (A) Determine the structure from following spectral data. **[04]**

Molecular formula:- C_4H_7N, **IR data:-** 2280 cm^{-1}

NMR data:

Types of Proton	No. of Proton	Multiplicity	δ *ppm*
A	6H	Doublet	1.10
B	1H	Septet	2.35

Q. 5 (B) Answer any two questions out of three. **[10]**

(1) Molecular Weight: 102 gm/mole

Element analysis: C, 94.1 % and H, 5.88 %,

IR-data: 3300, 3040, 2110, 1605, 1579, 1488, 1445, 760, 650 cm^{-1}

Types of Proton	No. of Proton	Multiplicity	δ *ppm*
A	1 H	Singlet	2.86
B	5 H	Complex	7.40

(2) Write a note on "General Fragmentation Modes" in mass spectroscopy.

(3) List out positional isomers of dimethyl cyclo hexane and compare stability of configuration isomer (cis/trans) of each positional isomer, with help of gauche interaction and diaxial interaction.

Spectroscopic data

U. V.

Far U.V. Region	= 100 to 200 nm
Near U. V. Region	= 200 to 380 nm
Visible Region	= 380 to 780 nm

IR:

Alkyne C-H str	3350-3300 cm^{-1}
Aromatic C-H str	3100-3000 cm^{-1}
Alkane C-H str	3000-2900 cm^{-1}
Nitrile C-N str	2300-2200 cm^{-1}
Alkyne C≡C str	2190-2100 cm^{-1}
Carbonyl C=O str	1800-1680 cm^{-1}
Alkane C-H bend	1470-1420 cm^{-1}
Ester C-O-C str	1300-1000 cm^{-1}

NMR:

Alkane C-H	0.9 – 2.5 δ_{ppm}
Alkyne C-H	2.5 – 3.9 δ_{ppm}
Alkene C-H	5.5 – 6.5 δ_{ppm}
Aromatic C-H	6.5 – 8.5 δ_{ppm}
Phenolic O-H	4.4 – 8.8 δ_{ppm}
Aldehydic C-H	8.0 – 10.0 δ_{ppm}
Acidic O-H	10.0 – 12.5 δ_{ppm}

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