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

B.Sc. Semester - 6 (*CBCS*) Examination
March/April-2025 (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) **Match the following pair:** **(04)**

Types of carbonyls		Wave numbers	
1	Ester	a	1680 cm^{-1}
2	Amide	b	1710 cm^{-1}
3	Ketone	c	1840 cm^{-1}
4	Aldehyde	d	1740 cm^{-1}
		e	1760 cm^{-1}

Que-1(B) **Answer the following (Any Two)** **(10)**

1) Explain: Structure and Aromaticity of Pyrrole.
2) Explain: Overtone band & Fermi-Resonance.
3) Explain: Types of pericyclic reactions with one example of each.

Que-2(A) **Answer the following:** **(04)**

Determine the molecular structure by using following data.

Molecular formula: C_8H_6

IR Data: 3300, 3040, 2110, 1605, 740, 690 cm^{-1}

NMR Data:

a) Singlet δ 2.86 (1H)
b) Complex δ 7.40 (5H)

Que-2(B) **Answer the following (Any Two)** **(10)**

1) Explain the synthesis, properties and Uses of TNT and Musk xylene.
2) Prove the structure of citral.
3) Give the oxidation and reduction reaction of Naphthalene.

Que-3(A) **Answer the following:** **(04)**

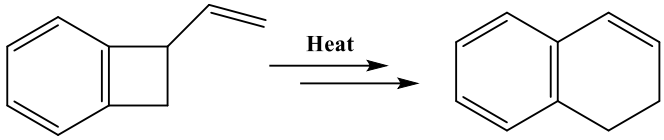
Explain: Wolfram method in interconversion of carbohydrate.

Que-3(B) **Answer the following (Any Two)** **(10)**

1) Determination the size of ring in glucose by iodic(VII) acid method.
2) Explain the synthesis and Uses of Baygon and Parathion.
3) Explain with examples: Auxochrome and Chromophore.

Que-4(A) **Answer the following:** **(04)**

Explain the following Conversion.



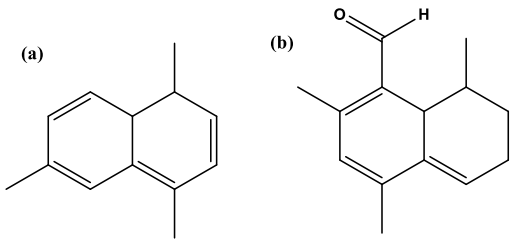
Que-4(B) **Answer the following (Any Two)** **(10)**

1) Give the reason: pyridine is more basic than Pyrrole but less basic than aliphatic amine.
2) Explain: Types of Fundamental vibration modes in IR spectroscopy.
3) Determine the molecular structure by using following data.

   Molecular formula: $C_{10}H_{12}O$

   IR Data: 3040, 2945, 2840, 2760, 1735, 1655, 1440, 1385, 1365, 845 cm^{-1}

Que-5(A) **Calculate λ_{max} of following structures:** **(04)**



Que-5(B) **Answer the following (Any Two)** **(10)**

1) Determine the molecular structure by using following data.

   Molecular weight: 264 gm/mol, C=36.3%, H=3.1%, Br=60.6%

   IR Data: 3030, 2965, 840 cm^{-1}

   NMR Data:

   a) Singlet δ 4.56 (4H)
   b) Complex δ 7.31 (4H).

2) Explain: Types of electronic transitions.
3) Explain in brief: mutarotation in glucose.

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Spectroscopy Data

NMR Data:

(1) Alkane proton 0.9-3.0 δ_{ppm}
(2) Alkene proton 5.8-6.9 δ_{ppm}
(3) Alkyne proton 2.6-3.8 δ_{ppm}
(4) Aromatic proton 6.5-8.5 δ_{ppm}

IR Data:

(1) Alkane C-H str 3000-2900 cm^{-1}
(2) Alkene C-H str 3100-3000 cm^{-1}
(3) Alkyne C-H str 3300-3380 cm^{-1}
(4) Aromatic C-H str 3100-3000 cm^{-1}
(5) Alkene C=C str 1670-1550 cm^{-1}
(6) Alkyne $c \equiv c$ str 2200-2100 cm^{-1}
(7) Aldehyde C-H str 2900-2600 cm^{-1}
(8) Carbonyl C=O str 1800-1670 cm^{-1}
(9) Alkane C-H bending 1470-1350 cm^{-1}
(10) Aromatic C-H bending 820, 710 cm^{-1} m-disub. Ar. Ring
(11) Aromatic C-H bending 720, 690 cm^{-1} mono sub. Ar. Ring
(12) Aromatic C-H bending 850 cm^{-1} p-disub. Ar. Ring
(13) Aromatic C-H bending 750 cm^{-1} o-disub. Ar. Ring

UV Data:

(a) Diene System:
Simple diene: 217nm
Homo diene: 253nm
Hetero diene: 215nm
Exocyclic double bond: 05nm
Ring residue: 05nm
Alkyl Substitution: 05nm
(b) Enone System:
Z=-OH/-OR: 195nm,
Z=-H: 210nm
Exocyclic double bond: 05nm

Position	α	β	γ	δ
Ring residue	10	12	18	18