S. No. of Question Paper:

Unique Paper code: 32171602

Name of the Paper: Organic Chemistry -V

Name of the Course: B.Sc. (Hons.) Chemistry (CBCS)

Semester: VI

Duration: 2 Hours **Max marks**: 75

Instructions for Candidates

(i) **Attempt any four questions**

(ii) **All questions carry equal marks**

(iii) **Give reactions wherever possible clearly mentioning the reagents involved**

Q1.

a. How will you differentiate between the following pairs of compounds using IR spectroscopy?

i. Acetophenone and Benzaldehyde

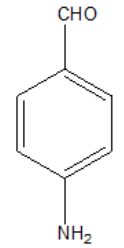
ii. Benzamide and N-methyl benzamide

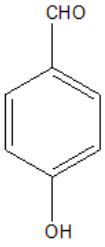
b. Which of the following compounds will show C≡C absorption band in the IR spectrum? Give reasons for your answer.

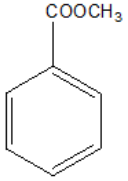
i. But-2-yne

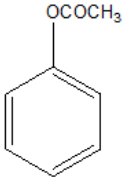
ii. Hex-1-yne

c. Which of the following compounds will show higher $\lambda_{max.}$ values for carbonyl absorption band and why?

i. 

or 

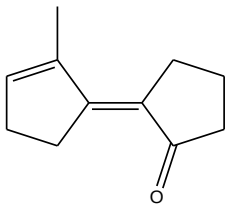
ii. 

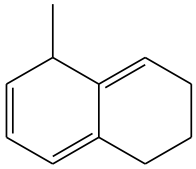
or 

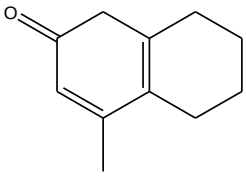
6, 6, 6.75

Q2.

a. Calculate the λ_{max} value for the following compounds giving details. (**Any two**).

i. 

ii. 

iii. 

Values for calculations:

Heteroannular diene: 214 nm

Homoannular diene: 253 nm

Increments for:

Alkyl group/ exocyclic double bond: 5 nm

Extended conjugation: 30 nm

α, β-unsaturated carbonyl compounds

Acyclic/cyclic six membered α, β-unsaturated ketone: 215 nm

Five membered cyclic α, β-unsaturated ketone: 202 nm

Alkyl group or ring residue on:

α- Position: 10 nm

β- position: 12 nm

γ or higher position: 18 nm

Homoannular diene component: 39 nm

exocyclic double bond: 5 nm

Extended conjugation: 30 nm **6**

b. What is a Bathochromic shift? Explain with the help of suitable example, the effect of extended conjugation on the π to π* transition of dienes? **6**

c. Compound (A) is a disaccharide having molecular formulae, $C_{12}H_{22}O_{11}$. Deduce the structure of (A) from the following data:

i. Acid hydrolysis of (A) yields one molecule each of D-glucose and D-Fructose.

ii. (A) is hydrolysed by maltase.

iii. (A) does not react with bromine water and does not show mutarotation

iv. Methylation of (A) followed by vigorous hydrolysis yields one mole equivalents each of

2,3,4,6–tetra-O-methyl-D-glucose and 1,3,4,6-tetra-O-methyl-D-fructose. Write all the involved reactions and give the systematic name for (A). **6.75**

Q3.

a. Aldehydic proton (-C**H**O) appears at high δ-value of 9-10. Explain with the help of suitable diagram. **4.5**

b. Draw the high-resolution NMR spectrum for $BrCH_2CHBrCOOH$ showing the splitting pattern and the J values. **4.5**

c. An organic compound with molecular formula C_8H_8O, gave following spectral data:

UV: λmax= 287 nm ξmax =20

IR: Strong bands at 1700 cm^{-1} (s) along with a band at 2720 cm^{-1}.

^{1}H-NMR: δ 2.9 (2H, d); 7.27(5H, s); 9.78(1H, t)

i. Calculate the double bond equivalents for this compound.

ii. Explain the UV, IR and NMR data and deduce the structure of the compound. **9.75**

Q4.

a. What is mutarotation? Explain with the help of mechanism, why mutarotation is catalysed by hydroxypyridine and not by pyridine alone. **6.75**

b. Write the structures of the following compounds and explain which of the following pairs are mirror images? **6**

i.α- D and β-L Fructopyranose

ii. α- D and α- L-glucopyranose

c. Explain why methyl glycoside formation is not subjected to base catalysis? Give the mechanism of the involved rearrangement. **6**

Q5.

a. Give one synthesis for Nylon 66 along with one synthesis each for the monomers.

b. Differentiate between the addition and condensation polymerization with the help of suitable examples.

c. Give the name, structure and uses of any two plasticizers. **6.75, 6, 6**

Q6.

a. What is the difference between mordant and vat dyes? Explain with suitable examples. **6**

b. Give one synthesis of Methyl orange. Explain why Methyl orange is red at pH<3.1 and yellow above pH 4.4. Give all the structures to explain your answer. **6**

c. List the characteristic properties required for any organic compound to act as a dye? **3**

d. Convert Arabinose to its Glucose. **3.75**