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202BS004

Ph.D./M.S.(Engg.) by Research Degree Examination, April/May 2024
Organic Chemistry - II

Time: 3 hrs. Max. Marks: 100

Note: ***Answer any FIVE full questions, choosing ONE full question from each module.***

Module-1

1 a. Define the terms Molecularity and order of a chemical reaction with examples. **(06 Marks)**

b. State the Hammett equation and explain the significance of σ and ρ. **(06 Marks)**

c. Briefly explain the 1st, 2nd, 3rd and zero order reactions. **(08 Marks)**

OR

2 a. What is energy of activation and Entropy of activation? Briefly explain about isotopic labelling. **(08 Marks)**

b. Write briefly about Taft equation. **(06 Marks)**

c. Write a note on Reversible, Consecutive and Parallel reactions. **(06 Marks)**

Module-2

3 a. Explain the types of electronic transitions in UV-Visible spectrum. **(08 Marks)**

b. Comment on Chromophore and Auxochrome concept. **(06 Marks)**

c. Explain the types of stretching and bending vibrations. **(06 Marks)**

OR

4 a. Explain Woodward – fisher rules for calculating λ_{max} in conjugated dienes. **(06 Marks)**

b. Find the λ_{max} of following compounds

i) ii) iii)

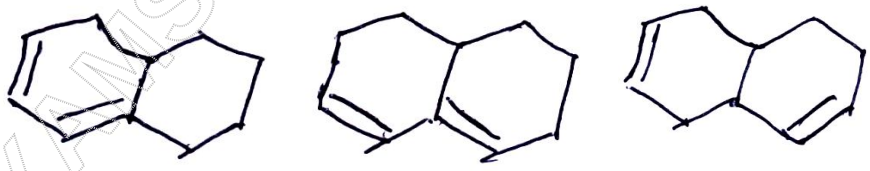

Fig Q4(b) **(06 Marks)**

c. Write a note on Finger print region? Write the characteristics frequencies of C = C (alkene) (C – Cℓ) , O-H, C = 0 groups in IR spectrum. **(08 Marks)**

Module-3

5 a. Explain the instrumentation of NMR spectro-photometer. Mention the solvents used in NMR. **(08 Marks)**

b. Explain why TMS is used as an internal standard in NMR. **(06 Marks)**

c. Write a note on Nuclear Overhauser Effect (NOE). **(06 Marks)**

OR

6 a. What is Chemical Shift? Explain the factor influencing chemical shift. **(08 Marks)**

b. Write a note on coupling constant (J) and Nuclear magnetic double resonance. **(06 Marks)**

c. Calculate the chemical shift in PPM (6) for a proton that has resonance at 126Hz downfield from TMS o spectrometer that operates at 60MHz. **(06 Marks)**

Module-4

7 a. Explain Mclafferty rearrangement of fragmentation with an example. **(08 Marks)**
b. Write a note on Nitrogen rule. **(06 Marks)**
c. Predict the structure of the compound whose peaks in the mass spectrum have machine values 86, 71, 58, 43 (100%). **(06 Marks)**

OR

8 a. Explain the fragmentation types and rules in mass spectrometry. **(08 Marks)**
b. Explain the mass spectral fragmentation of phenols. **(06 Marks)**
c. What do you mean by Base peak? Explain the instrumentation of FAB (Fast Atom Bombardment). **(06 Marks)**

Module-5

9 a. Write a note on chemical shift in ^{13}CNMR spectroscopy. **(10 Marks)**
b. Write a note on proton decoupled off resonance. **(10 Marks)**

OR

10 a. Explain the basic principle and instrumentation of FTNMR spectroscopy. **(10 Marks)**
b. Explain the applications of UV-Visible IR, ^{1}H-NMR, ^{13}CNMR and mass spectroscopic techniques in structural determinations. **(10 Marks)**

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