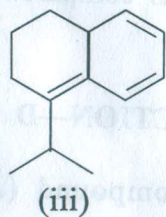


8. (a) The UV spectrum of acetone shows two peaks at $\lambda_{\max} = 280 \text{ nm}$ ($\epsilon_{\max} = 15$) and $\lambda_{\max} = 190 \text{ nm}$ ($\epsilon_{\max} = 100$) :

- (i) Identify the electronic transition for each
(ii) Which one of these is more intense ? 2
- (b) Using Woodward Fieser rules calculate the λ_{\max} for the following :



6

Exam. Code : 107405

Subject Code : 1748

B.Sc. Biotechnology 5th Semester

PHYSICAL

(Organic & Inorganic Aspects of Spectroscopy-A)

Paper—BT-7

Time Allowed—3 Hours] [Maximum Marks—40

Note :— Attempt **FIVE** questions in all, selecting at least **ONE** question from each section. The fifth question may be attempted from any section. All questions carry equal marks.

SECTION—A

1. (a) Arrange the following in order of increasing wavelength :
- Visible radiation, gamma rays, x-rays, ultraviolet rays, visible and infra-red radiations. 2
- (b) How can you split white light into its component radiations ? What is the range of wavelength in case of visible light ? 2
- (c) What do you understand by Born-Oppenheimer approximation ? 4

2. (a) Explain Frank Condon Principle. 5
 (b) Differentiate between Fluorescence and Phosphorescence. 3

SECTION—B

3. (a) How does the polarity of a solvent effect π to π^* transitions ? 4
 (b) What do you understand by the terms ?
 (i) Chromophore
 (ii) Auxochrome. 4
4. (a) What is molar extinction coefficient ? How it is useful in the chemical analysis ? 4
 (b) Explain Beer-Lambert Law. What are its limitations ? Give its applications. 4

SECTION—C

5. (a) How does hydrogen bonding effect the vibrational frequency ? 2
 (b) What do you mean by finger print region ? 2
 (c) What are the various solvents that are generally used in infra-red spectroscopy ? How does the change in polarity of the solvent affect the position of absorption ? 4

6. Explain giving reasons why :
 (i) The $\nu_{C=O}$ frequency of absorption for β -lactone is higher as compared to γ -lactone ?
 (ii) α, β -unsaturated ester absorbs at a higher wave length as compared to a saturated analogue ?
 (iii) A compound in the vapour state absorbs for a particular bond (stretching frequency) at a higher wave number as compared to that it is in the solid state ? 8

SECTION—D

7. (a) An organic compound (A) with molecular formula C_3H_9N shows infra-red absorptions at : 3012 cm^{-1} (m), 3423 cm^{-1} (s), 3236 cm^{-1} (m) and 1615 cm^{-1} (m); when the compound A is treated with nitrous acid, we get a compound B which shows a strong peak at 3430 cm^{-1} . What are A and B and explain the reaction involved ? 4
 (b) How would the infra-red spectrum of $C_6H_5CH_2NH_2$ and $CH_3-CO-N(CH_3)_2$ differ ? 4