Or

(b) (i) Discuss in detail PMR spectrum of ethyl acetate and ethyl bromide. 8

 (ii) Discuss second order ^{1}H NMR spectra. 8

5. (a) (i) Discuss fragmentation mode of petanone-2 and benzophenone. 8

 (ii) Explain isotope effect for determining molecular formula. 4

 (iii) Write a note on α-cleavage is mass spectrometry. 4

Or

(b) (i) Derive the expression which explain the velocity of mass to charge ratio. 8

 (ii) Write down the fragmentation mode of the following compound : 8

 (A) Pentanal-1

 (B) Hexanone-2

 (C) Acetone

 (D) Dimethyl ester.

2018

Time : 3 hours

Full Marks : 80

Answer from **both** the Sections as directed

The figures in the right-hand margin indicate marks

Candidates are required to answer in their own words as far as practicable

(APPLICATION OF SPECTROSCOPY)

SECTION – A

1. Answer any *four* of the following : 4 × 4

 (a) Discuss the effect of solvent polarity on $n - \pi^*$ and $\pi - \pi^*$ transition, with suitable examples.

 (b) Why is CCl_4 used as a solvent in IR spectroscopy ? How dissymmetry is useful in IR active molecules ? Explain.

(2)

(c) Write characteristics peaps of cinnamic acid in IR spectrum and also explain.

(d) Define and describe the chromophore and auxochrome.

(e) What are the essential requirement for NMR active nuclei ?

(f) Discuss the α-charge in alcohols and ketones.

Or

Answer all questions from the following : 2×8

(a) Discuss $\pi - \pi^*$ transition.

(b) How does λ_{max} depend on solvent polarity ? Explain.

(c) Differentiate between symmetrical and asymmetrical stretching of CO_2 molecule.

(d) Why KBr is used for pallet maping for determining the IR spectrum

(3)

(e) How many different types of H are present in the following compounds :

(i) $CH_3 CH_2 CH_2 Br$

(ii) $Cl - CH_2 - CH_2 - Cl$

(f) Explain the ^1H NMR splitting pattern and chemical shift values of the following compound :

$$CH_2 = CH - CHO$$

(g) Write fragmentation ions formed in 1-pentanal.

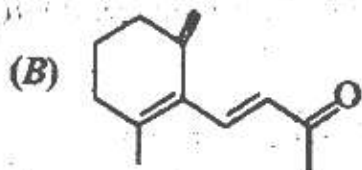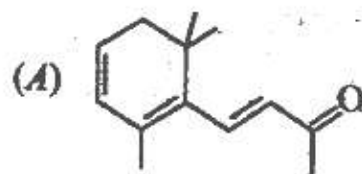(h) Why metastable ion peak is broad in nature ?

SECTION – B

Answer all questions : 16×4

2. (a) (i) Explain different type of absorption in UV-visible spectroscopy. Differentiate absorption and emission phenomenon using Jablonski diagram.   12

(ii) Calculate the λ_{max} of the following compounds :   4

(A)

(B)

Or

(b) (i) How the structure of organic compounds is determined by ultraviolet spectroscopy. Explain giving two examples.   8

(ii) Discuss the law of absorption in UV spectroscopy.   6

(iii) Write down the salient feature of Woodward Fieser rule for homoannular and heteroannular dienes.   2

3. (a) (i) Highlight the principle of I.R. spectroscopy.   8

(ii) How do you identify aromatic and open chain hydrocarbon by IR spectrum.   8

Or

(b) (i) How would you distinguish to the following sets of compounds using IR spectra :   8

(A) Primary, secondary and tertiary amide

(B) Benzoic acid and Benzamide.

(ii) Discuss mode of vibrations in IR spectroscopy.   8

4. (a) (i) Write short notes on the following :   16

(A) Spin-spin splitting

(B) Nuclear over Hauser effect

(C) ^{13}C NMR broad band spectra

(D) ^{1}H-NMR spectra of cinnamic acid.