ORGANIC CHEMISTRY–II

(Common with B.Sc. & B.Sc. Biotechnc.ogy,
Industrial Microbiolgy)
Semester-V

Time Allowed : 3 Hours]   [Maximum Marks : 35

Note : The candidates are required to attempt *five* questions, selecting *two* question each from Section A and B. Section C is Compulsory.

Section - A

1. (a) Explain the principle of NMR spectroscopy. Explain shielding and deshielding of proton with suitable examples.   4

    (b) What is Spin-Spin Splitting ? How will you distinguish the following pairs of compound with PMR Spectroscopy ?   3
    $CH_2Cl – CH_2Cl$ and $CH_3 – CHCl_2$

2. (a) Define the Chemical Shift. Discuss the various factors influencing Chemical Shift.   4

    (b) Explain PMR spectrum of Ethyl Acetate.   3

3. (a) Why does λ_{max} for n $\rightarrow$ σ* transition shift to longer wavelength in moving from CH_3Cl to CH_3Br to CH_3I ?

    (b) Write a note on the following with suitable examples :
        (i) Bathochromic Shift
        (ii) Auxochrome.   4

    (c) How can UV Spectroscopy be used to distinguish between
        $CH_3 – CH = CHCOCH_3$ and $CH_2 = CH – CH_2 – COCH_3$.   1

4. (a) How does the solvent effect the transition in UV Spectrum ?   3

    (b) Calculate λ_{max} for the following :   4

    (i)

    (ii)
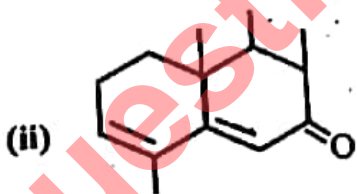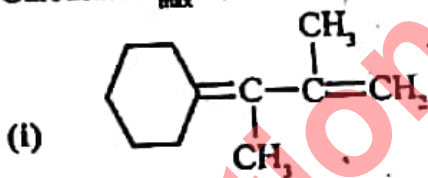
Section - B

5. (a) What is Hooke's Law ? How do the terms involved in it determine the vibrational frequency ?   2

    (b) A pale yellow compound with molecular weight 139 is slightly acidic in nature and gave the

following data :
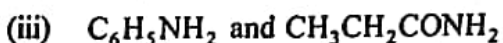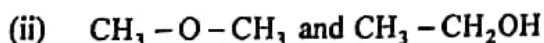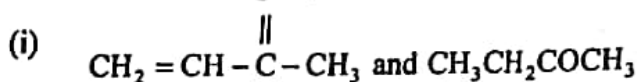
UV : 280 mµ (ϵ_{max} − 660)

IR : 3460 (s, sh), 3035 (m), 1608 (m), 1585 (m), 1560 (m), 1510 (s), 1360 (s), 1320 (s), 740 (v, s) cm⁻¹.

The band 3460 cm⁻¹ does not shift even on diluting the sample NMr : τ 2.1 (Singlet, 1 H); τ = 2.61 − 2.75 (multiple, 4H); Deduce the structure of the compound.   5
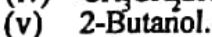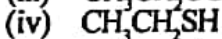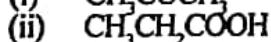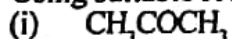
6. (a) Explain the various factors influencing IR absorption frequency with examples.   4
    (b) How will you distinguish between the following compounds on the basis of I. R. Spectrum :

    (i) $CH_2 = CH - \overset{\overset{\displaystyle O}{\|}}{C} - CH_3$ and $CH_3CH_2COCH_3$

    (ii) $CH_3 - O - CH_3$ and $CH_3 - CH_2OH$

    (iii) $C_6H_5NH_2$ and $CH_3CH_2CONH_2$ 3

7. (a) Why are organolithium compounds more polar, more stable and least reactive among other organo metallic compounds ?   2
    (b) Using suitable R MgX prepare the following compounds :
        (i) CH_3COCH_3
        (ii) CH_3CH_2COOH
        (iii) $CH_3CH_2OCH_2CH_3$
        (iv) CH_3CH_2SH
        (v) 2-Butanol.   5

8. (a) What happens when diethyl thioether is treated with :
        (i) Equimolar amount of H_2O_2
        (ii) Excess of H_2O_2
        (ii) $HgCl_2$ 3
    (b) Describe the preparation and important reaction of sulphonic acids.   4

Section - C
(Compulsory question)

9. (a) What is TMS ? Why is it used as reference in PMR ?
    (b) What is the difference between infrared and ultraviolet spectroscopy ?
    (c) State Beer-Lambert Law. Derive molar extinction coefficient from it.
    (d) Write any one famous naem reaction involving organozinc compound.
    (e) Discuss the structure of Grignard's reagent.
    (f) Why do thiothers act as stronger nucleophiles as compared with ethers ?
    (g) Define coupling constant J. Give its significance.   7×1=7