



Date: 28-11-2022

Dept. No.

Max. : 100 Marks

Time: 09:00 AM - 12:00 NOON

PART-A

Answer ALL Questions.

(10 x 2 = 20 Marks)

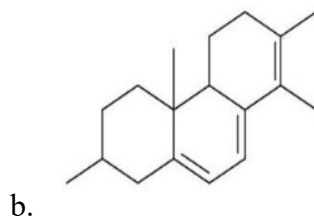
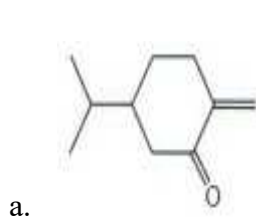
- 1) Write the differences between absorption and emission spectra.
- 2) List the various forms of energies associated with dry ice.
- 3) What are chromophores? Cite examples.
- 4) Mention the limitations of Beer – Lambert's law.
- 5) Calculate the number of vibrational degrees of freedom for N₂O.
- 6) What are Stokes' lines?
- 7) How many proton NMR signals are obtained for neo-pentane?
- 8) Draw EPR spectrum of methyl radical.
- 9) Define molecular ion peak and base peak in mass spectroscopy.
- 10) How will you identify carbonyl group using mass spectrometry?

PART-B

Answer any EIGHT Questions.

(8 x 5 = 40 Marks)

- 11) Describe the factors affecting line width and intensity of spectral lines.
- 12) Explain the significance of signal to noise ratio on resolution of spectrometer.
- 13) State the principle of flame photometry and mention any two applications of it.
- 14) Calculate the λ_{\max} for the following compounds using Woodward – Fieser rule.



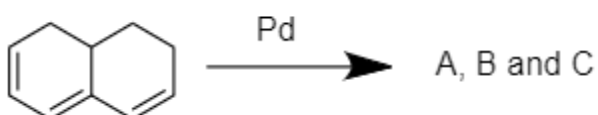
- 15) How are o-nitrophenol and p-nitrophenol differentiated using IR spectroscopy?
- 16) Draw the block diagram and explain the instrumentation of Raman spectrometer.
- 17) Explain the classification of geometrical isomers using NMR spectroscopy with an example.
- 18) Describe the instrumentation of NMR spectrometer with neat diagram.
- 19) Calculate and draw the number of EPR lines obtained for benzene radical.
- 20) Explain McLafferty rearrangement with an example.
- 21) Give the significance of isotopic peaks and meta-stable peaks in mass spectroscopy.
- 22) Explain the fragmentation pattern of primary, secondary and tertiary alcohols.

PART-C

Answer any FOUR Questions.

(4 x 10 = 40 Marks)

- 23) a) Relate the different regions of the electromagnetic spectrum with spectrometry. (6)
b) Calculate the energy associated with radiation having the wavelength of 400 nm. (4)
- 24) a) Explain the effect of solvent on the absorption maxima in UV-Visible spectroscopy. (6)
b) Define the following terms i) Bathochromic shift ii) Hypsochromic shift (4)
- 25) a) Describe the factors affecting fundamental vibrational frequencies in IR spectroscopy. (6)
b) Explain the mutual exclusion principle with an example. (4)
- 26) a) Predict the number of H^1 NMR signals in i) naphthalene ii) anthracene iii) phenanthrene. (6)
b) Deduce the structure of the organic compound with molecular formula $C_6H_{10}O_2$ which gave following H^1 NMR signals at δ (ppm): 4.2 (2H, s), 3.5 (2H, q), 2.3 (3H, s), and 1.3 (3H, t). (4)
- 27) a) Explain the fragmentation via retro-Diels Alder reaction in mass spectroscopy. (5)
b) Mass spectra of an organic compound with formula C_8H_8O gave following m/z peaks at 120, 105 and 77. Find the structure of the organic compound. (5)
- 28) a) A triene on mono hydrogenation in the presence of Pd gave three different dienes separated using chromatography. Identify the products using Woodward Fieser's rule. (5)



- b) Determine the force constant of $-O-H$ bond if stretching frequency is 3600 cm^{-1} . (5)

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