

CS/2110

Semester-V

GE-6- Chemistry-5-code: BHB27

5507/NH

Time: 3 hrs.

Maximum Marks: 74

Attempt any four questions. All questions carry equal marks.

- 1) A) Write Schrodinger wave equation for hydrogen atom and separate it into three equations.
B) Explain Planck's radiation law and Photoelectric effect. 8.5, 10
- 2) A) Describe the principle and explain the instrumentation of NMR spectroscopy.
B) Define the following:
(i) Chemical Shift (ii) Spin-spin splitting (iii) coupling constant
C) Discuss the peaks, which are expected to be present in the PMR spectrum of ethanol. 6.5, 9, 3
- 3) A) State Born-Oppenheimer approximation.
B) What are electromagnetic radiations? Draw the electromagnetic spectrum. Out of UV and Visible region, which has higher frequency and why?
C) Calculate degree of freedom of water and carbon dioxide molecules 6.5, 8, 4
- 4) A) Write various types of electronic transitions.
B) Describe the following:
(i) Bathochromic shift (ii) Hypsochromic shift (iii) Hyperchromic shift
(iv) Hypochromic shift. 6.5, 12
- 5) A) State Beer-Lambert's law. What are its limitations?
B) Explain the concept of chromophore and auxochrome with suitable examples.
C) Define molar absorptivity and Hooke's law. 6, 8, 4.5
- 6) A) Write the expected position of IR bands in following molecules:
(i) Ethanol (ii) Aniline (iii) 1-Bromopropane.
B) Discuss the principle and explain the instrumentation of IR spectroscopy.
C) Which region of IR spectrum is called finger print region and why? 9, 6, 3.5
- 7) A) Discuss the factors, which govern the intensities of spectral line in a rigid diatomic rotor.
B) What is meant by polarizability? Write the various factors affecting the polarizability.
C) What are selection rules for (i) rotational transitions (ii) vibration transitions of diatomic molecules? 7, 4, 7.5
- 8) A) What are quantum numbers and briefly describe their importance.
B) Write down the postulates of quantum mechanics.
C) Write Schrodinger wave equation for particle in one dimensional box. 6, 6, 6.5
- 9) A) Write down the Schrodinger wave equation and discuss its importance.
B) Describe the radial wave function and angular wave function.
C) Derive sinusoidal wave equation for Hamiltonian operator. 7, 6.5, 5