Roll No. .....

Total Pages : 3

322214

May-2026

B.Sc. (CHEMISTRY) II SEMESTER

Instrumentation Skills–II (BCHT–SE–208)

Time : 3 Hours] [Maximum Marks : 75

Instructions :

1. *It is compulsory to answer all the questions (1.5 marks each) of Part-A in short.*
2. *Answer any **four** questions from Part-B in detail.*
3. *Different sub-parts of a question are to be attempted adjacent to each other.*

PART–A

1. (a) Determine the fundamental modes of vibration of CO_2. (1.5)

   (b) How cis and trans isomers can be identified with the help of ultraviolet spectroscopy? (1.5)

   (c) Write two reagents and their functions. (1.5)

   (d) What is molar absorption coefficient? (1.5)

   (e) Why auxochrome is called colour enhancing group? (1.5)

   (f) Explain equivalence point vs end point. (1.5)

   (g) What is wave number and its unit? (1.5)

(h) Explain the effect of solvent on electronic transitions. (1.5)

(i) Write name and reaction of self-indicator. (1.5)

(j) Write the difference between absorption and emission spectra. (1.5)

PART–B

2. (a) Explain electromagnetic spectrum. Give regions of electromagnetic radiations in the order of increasing frequency and importance of these frequencies with respect to spectroscopy. (10)

   (b) Explain the principle of coulometric titration. How does it differ from volumetric titration? (5)

3. (a) What is finger print spectra in IR spectroscopy ? Explain its significance. (5)

   (b) Describe different types of electronic transitions with suitable examples in each category. Write the factors effecting these transitions. (10)

4. Write different types of molecular vibrations associated with the IR region? What is the selection rule for having IR spectra? Describe briefly applications of IR spectra. (15)

5. (a) What are effects of H-bonding, conjugation and resonance on absorption frequencies? (5)

   (b) What is Karl Fischer Titration? How estimation of water content can be done by this? Mention factors, applications and its limitations. (10)

6. (a) Explain the principle of redox titration and describe types of redox titrations showing chemical reactions. (10)

   (b) What is Born-Oppenheimer approximation? (5)

7. Write notes on following with examples: (15)

   (a) Chromophore.

   (b) Bathochromic shift.

   (c) Hysochromic shift.

   (d) Hyperchromic shift.

   (e) Hypochromic shift.