



**MID SEMESTER TEST II**

**Autumn 2024-25 (Jan 2025)**

Name of Program-PhD

Course Name-DSE - Chemistry

Course Code – CH20P104

Max. Duration: 1.5 hrs.

Max. Marks: 30

**SECTION - A**

1. Objective Type Questions (ALL QUESTIONS ARE COMPULSORY) (5 X 1 = 5)

- a Which of the following component of mass spectrometry deals with resolving the ions into distinct mass components according to their mass-to-charge ratio?
- (i) Ion source (ii) Analyzer tube  
(iii) Analyzer (iv) Detector system
- b Which of the following isotope has a magnetic spin?
- (i)  $^{12}\text{C}$  (ii)  $^{16}\text{O}$   
(iii)  $^4\text{He}$  (iv)  $^{31}\text{P}$
- c What are the different frequencies obtained as NMR peaks are called?
- (i) Biological shifts (ii) Chemical shifts  
(iii) Chemical peaks (iv) Physical shifts
- d When located in an applied magnetic field, how many possible orientations do a spin half nuclei have?
- (i) 2 (ii) 4  
(iii) 1 (iv) 3
- e Which of the following is not an auxochrome?
- (i) -OH (ii) -SH  
(iii) -OR (iv) -O<sub>2</sub>

**SECTION – B**

2. Short Answer Type Questions (Attempt **any THREE**) (3X5 =15)

- a. What are the advantages of Mass Spectrometry?
- b. How is chemical shift calculated?
- c. State the Beer-Lamber law.
- d. Sketch the Morse curve.
- e. What is photoelectron spectroscopy?

**SECTION – C**

3. Long Answer Type Questions (Attempt **any ONE**) (1X10 =10)

- a. Briefly explain the Emission Spectrum.
- b. Explain the basic principles of Nuclear Magnetic Resonance (NMR) spectroscopy.
- c. Discuss Mössbauer spectroscopy.