PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

BSc DEGREE EXAMINATION MAY 2025
(Sixth Semester)

Branch – **CHEMISTRY**

INSTRUMENTAL METHODS OF CHEMICAL ANALYSIS

Time: Three Hours Maximum: 50 Marks

SECTION-A (5 Marks)
Answer **ALL** questions
ALL questions carry **EQUAL** marks (5 x 1 = 5)

1 What is the formula to calculate error in measurement?
(i) Error = Observed Value - Expected Value
(ii) Error = Expected Value - Observed Value
(iii) Error = True Value - Measured Value
(iv) Error = Measured Value - True Value

2 What is the "fingerprint region" in FTIR spectrum?
(i) 1800-1600 cm^{-1} (ii) 1500-500 cm^{-1}
(iii) 4000-3000 cm^{-1} (iv) 3000-2500 cm^{-1}

3 What is the wavelength range for the ultraviolet region?
(i) 200-400 nm (ii) 400-700 nm
(iii) 700-900 nm (iv) 1000-1500 nm

4 Which of the following interactions causes the splitting of NMR signals into multiplets?
(i) Spin-spin coupling (ii) Chemical shift
(iii) J-coupling (iv) Proton exchange

5 Which of the following is a common application of polarography?
(i) Determination of pH (ii) Analysis of trace metals
(iii) Gas chromatography (iv) Spectrophotometry

SECTION - B (15 Marks)
Answer **ALL** Questions
ALL Questions Carry **EQUAL** Marks (5 x 3 = 15)

6 a Explain the advantages of presenting data in tables.
OR
b Explain the usefulness of DTA in thermal analysis of calcium acetate monohydrate.

7 a Discuss the differences between IR and Raman spectroscopy?
OR
b List out the significances of the fingerprint region in an IR spectrum.

8 a Criticize the limitations of Beer-Lambert's law.
OR
b Interpret the Franck–Condon principle.

9 a Narrate the definition of chemical shift, explain how it is measured in parts per million.
OR
b Analyze the significances of "g" factors in ESR spectroscopy?

10 a Summarize the advantages of dropping mercury electrode?
OR
b Illustrate the concept of limiting current in polarography and its significance in electroanalytical measurements.

Cont...

SECTION -C (30 Marks)

Answer **ALL** questions
ALL questions carry **EQUAL** Marks (5 x 6 = 30)

11 a Identify the various types of errors and discuss strategies to minimize them.

OR

b Discuss the principles and applications of TGA.

12 a Sketch the block diagram of FTIR spectrometer.

OR

b Examine the various applications of FTIR spectroscopy.

13 a Sketch and explain the UV-Vis spectrometer.

OR

b Explain the various applications of UV-Vis spectroscopy.

14 a Outline the components of an NMR spectrometer and describe the function of each part.

OR

b Summarize the various applications ESR spectroscopy.

15 a Discuss the factors affecting the current-voltage curve in polarography and explain their influence on the polarographic analysis.

OR

b Explain the concept of organic and pulse polarography.

Z-Z-Z END