Graphic Era HILL UNIVERSITY
Established by an Act of the State Legislature of Uttarakhand (Adhiniyam Sankhya 12 of 2011)
University under section 2(f) of UGC Act, 1956

Sessional I (Even) Semester Examination March 2025

Roll no.....

Name of the Course: B. Pharma
Semester: VIII
Name of the Paper: Advance Instrumentation Techniques
Paper Code: BP811ET

Time: 1.5-hour **Maximum Marks: 30**

Note:
(i) This question paper contains three sections
(ii) All the sections are compulsory

Section-A

Multiple Choice Questions – Attempt all questions **(10 X 1 = 10 Marks)**

1. Which nucleus is most studied in NMR spectroscopy? a. 12C b. 13C c. 16O d. 35Cl **2. Chemical shift in NMR is measured in:** a. Hz b. Tesla c. ppm d. Gauss **3. Which of the following is NOT a factor affecting chemical shift?** a. Electronegativity b. Shielding effects c. Temperature d. Fragmentation **4. Spin-spin coupling in NMR leads to:** a. Increase in peak intensity b. Multiplet formation c. Broadening of peaks d. Disappearance of peaks **5. Which ionization technique is commonly used in Mass Spectrometry?** a. UV radiation b. Electron Impact (EI) c. X-ray diffraction d. NMR irradiation	**CO1**
6. In Thermogravimetric Analysis (TGA), weight loss is plotted against: a. Time b. Temperature c. Absorbance d. Wavelength	**CO2**

Sessional I (Even) Semester Examination March 2025

7. Differential Scanning Calorimetry (DSC) measures: a. Weight loss b. Change in heat flow c. Absorbance spectrum **d.** X-ray intensity **8. Which of the following is NOT a thermal analysis technique?** a. TGA b. DTA c. DSC **d.** XRD **9. Bragg's Law is used in:** a. NMR Spectroscopy b. Mass Spectrometry c. X-ray Diffraction d. UV Spectroscopy **10. Which detector is commonly used in XRD?** a. Flame Ionization Detector b. Scintillation Counter c. Electron Multiplier d. Infrared Sensor	

Section B

Short Questions: Attempt any two questions **(2X 5 = 10 Marks)**

1. Explain the principle of Nuclear Magnetic Resonance (NMR) spectroscopy and the factors affecting chemical shift. (CO1)
2. Describe the different ionization techniques used in mass spectrometry, focusing on Electron Impact (EI) and MALDI. (CO1)
3. Differentiate between Thermogravimetric Analysis (TGA), Differential Thermal Analysis (DTA), and Differential Scanning Calorimetry (DSC). (CO2)

Section C

Long questions: Attempt any one question **(1X10 = 10 Marks)**

1. Describe the various ionization techniques in Mass Spectrometry and their significance in pharmaceutical analysis. (CO1)
2. Explain the principles, instrumentation, and pharmaceutical applications of TGA, DTA, and DSC. (CO2)