



M.Sc. III Semester Degree Examination, April/May - 2024

PHYSICS

Analytical Techniques and Instrumentation

(NEP)

Time : 3 Hours

Maximum Marks : 70

Note : Answer **any five** of the following questions with question **No. 1 (Q.1) Compulsory**, each Question carries **equal** marks.

1. (a) What are Sensors and Transducers ? Explain the classification and performance characteristics of transducers. **9**
(b) Explain the calibration curve method in analytical instruments. **5**
2. (a) Discuss the construction and working of an optical null infrared spectrophotometer. **9**
(b) Write a note on sample handling techniques in infrared spectroscopy. **5**
3. (a) State and explain Beer-Lamberts law. **5**
(b) Explain the construction and working of a double-beam UV-Visible absorption spectrometer. **9**
4. (a) State Bragg's law and mention the applications of X-ray diffraction analysis. **5**
(b) Describe the principle and working of Transmission Electron Microscopy (TEM) with a neat diagram. **9**
5. (a) Describe the use of Differential Scanning Calorimetry (DSC) in analyzing the physical properties of materials with temperature. **5**
(b) Discuss the construction and working of a Nuclear Magnetic Resonance (NMR) spectrometer. **9**
6. (a) With a neat sketch, explain the Jablonski diagram. **5**
(b) Define the Raman Effect and discuss the principle and working of a Raman spectrometer. **9**



7. (a) Write the differences between SEM and TEM techniques. **5**
- (b) With a neat block diagram, explain the construction and working of a NaI(Tl) gamma-ray spectrometer. **9**
8. (a) Explain the direct-coupled plasma excitation source in atomic emission spectroscopy. **5**
- (b) Write a brief note on the instrumentation of impedance analyzer. **5**
- (c) Write the differences between IR and Raman spectroscopic techniques. **4**

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