

No. of Printed Pages : 2

Sl. No.



21PHY3C10L

M.Sc. III Semester Degree Examination, April/May - 2023

PHYSICS

Analytical Techniques and Instrumentation

(CBCS)

Time : 3 Hours

Maximum Marks : 70

Note : Answer **any five** of the following questions with Question no. **1 (Q1) Compulsory**, each question carries **equal** marks.

1. (a) Discuss the elements of analytical instruments. **4+5+5**
(b) What are Sensors and Transducers ? Explain the classification of Transducers.
(c) Discuss any one instrument calibration technique.
2. (a) With a neat schematic, describe the construction and working of IR **8+6** spectrometer.
(b) Define Raman Effect. Discuss the working principle of Raman spectrometer.
3. (a) What is Beer Lambert's Law ? Explain with equation. Explain the construction **8+6** and working of dualsource UV-VIS spectrometer.
(b) Distinguish between Fluorescence and Phosphorescence. Briefly explain the working of spectrofluorometer.
4. (a) Define X-ray Diffraction. Describe the significance of Bragg's equation and **6+8** associated instrument with relevant application.
(b) With a neat schematic, discuss the construction and working of SEM. Mention its applications.
5. (a) Distinguish between Nuclear Magnetic Resonance (NMR) and Electron Spin **6+8** Resonance (ESR).
(b) With block diagram, explain the construction and working of NaI(Tl) gamma ray spectrometer.
6. (a) Compare and contrast FTIR and FT Raman spectrometer. **6+8**
(b) Discuss the working of Atomic Absorption spectrometer with microwave induced plasma sources.



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7. (a) Describe the working principles of Scanning Tunneling Electron Microscopy. **7+7**
List its applications.
- (b) What is Thermogravimetric analysis (TGA). Discuss in detail with an example.
8. (a) What is Error ? Explain its types in analytical measurements. **5+5+4**
- (b) What is Jablonski diagram ? Explain.
- (c) What is Auger Electron Spectroscopy ? Mention its application.

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