



DAI-003-0498004

Seat No. _____

B. Sc. / M. Sc. (Applied Physics) (Sem. VIII)
(CBCS) Examination

April - 2022

Advanced Experimental Techniques for Materials
Characterization : Paper - VIII
(New Course)

Faculty Code : 003

Subject Code : 0498004

Time : $2\frac{1}{2}$ Hours]

[Total Marks : 70

- Instructions :** (1) All questions are compulsory.
(2) Numbers in the right margin indicate marks.

- 1 Attempt any seven short questions : (two marks each) 14
- (1) What are the continuous and characteristics radiation in X-ray production ?
 - (2) How the image of grains is produced in scanning electron microscopy ?
 - (3) What are the major components in TEM ?
 - (4) What is TGA ?
 - (5) Write down the use of Rutherford Backscattering spectroscopy.
 - (6) Draw a typical M-H loop for a ferromagnetic substance and explain it.
 - (7) Define magnetoresistance ?
 - (8) What is Hypsochromic (Blue) shift in UV spectroscopy ?
 - (9) Write the principle of IR spectroscopy ?
 - (10) What are the Stoke and Antistoke lines in Raman spectra ?

- 2** Write the answer of any two questions : **14**
- (1) Discuss different methods for X-ray diffraction, different geometry and instrumentation for material characterization.
 - (2) What is Neutron diffraction technique ? Explain in brief.
 - (3) Compare : optical microscopy, Tunneling Microscopy and Scanning electron microscopy.
 - (4) Explain Atomic Force Microscopy in detail.
- 3** Write the answer of any two questions : **14**
- (1) Explain : Kinematic factor K in Rutherford Backscattering spectroscopy.
 - (2) Write a detailed note : Differential Scanning Calorimetry.
 - (3) Explain power compensated DSC.
 - (4) Write a detailed note : Differential Thermal Analysis.
- 4** Write the answer of any two questions ; **14**
- (1) (a) Why generally semiconductors are used for Hall Effect measurements ?
(b) Write down the application of Hall Effect.
 - (2) Write a detailed note : Magnetic susceptibility.
 - (3) Discuss Vender Pauw technique for resistivity measurement.
 - (4) What is Saturation Magnetization ? Why saturated magnetization decreases with increasing temperature?
- 5** Write the answer of any two questions : **14**
- (1) How will you calculate the optical band gap using UV-Vis spectra ? And write the applications of UV-Vis spectroscopy.
 - (2) Write down advantages and disadvantages of IR spectroscopy.
 - (3) Explain Beer-Lambert law for absorption spectroscopy.
 - (4) Write a detailed note on X-ray photoelectron spectroscopy with advantages and disadvantages.