



DO-003-1204003

Seat No. _____

M. Sc. (Sem. IV) (CBCS) Examination

March / April - 2022

Physics : ET-7

(Materials Characterizations)

Faculty Code : 003

Subject Code : 1204003

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

[Total Marks : 70

Instructions : (1) All questions carry equal marks and compulsory.
(2) Figures to the right indicate marks.

- 1** Answers the following (any **SEVEN**) **14**
- (i) What is SQUID ? Discuss the role of gradiometer in SQUID.
 - (ii) Define "CHROMOPHOROUS".
 - (iii) What do you mean by ultra vacuum UV?

 - (iv) Write a two essential criteria for a compound to absorb IR radiation.
 - (v) What is P-E loop? Explain in brief.
 - (vi) Describe Dynamic TGA, Isothermal TGA and Quasistatic TGA.
 - (vii) What are K_{α} and K_{β} transitions?
 - (viii) Why Lead (Pb) is very effecting material for shielding x-ray equipment and absorbing stray radiation?
 - (ix) Which kind of materials can be studied through STM & SFM?
 - (x) If the sample is an insulating which kind of coating is required in taking SEM?

- 2 Answer any **TWO** 14
- (1) Describe TGA and write brief note on instrument of TGA.
 - (2) Describe basic principle of FTIR. Write a note on molecular vibrations.
 - (3) Discuss UV-viz technique in detail.

- 3 Answer the following : 14
- (1) Explain various types of polarizations in dielectric material and discuss the dielectric response at different frequency. What is dielectric loss?
 - (2) Enlist IR sources and types of transducers used in FTIR, explain in brief.

OR

- 3 Answer the following : 14
- (1) Explain SEM with reference to the physical basis and primary modes of operation in detail.
 - (2) Discuss TEM with special references to resolution, sensitivity and sample preparation.

- 4 Answer any **TWO** : 14
- (1) Discuss the basic principles of x-ray generation. How filtering and shielding materials are selected?
 - (2) Explain the effect of crystal size on powder pattern.
 - (3) Discuss the influence of crystal symmetry and multiplicities on powder pattern.

- 5 Answer any **TWO** : 14
- (1) Describe Van der Pauw method of resistivity measurement.
 - (2) Write a note on VSM and its applications.
 - (3) Effect of stress on a powder pattern.
 - (4) Write short note on STM and SFM.