



**PT-003-1204003**

Seat No. \_\_\_\_\_

**M. Sc. (Physics) (Sem. IV) (W.E.F. 2016)**

**Examination**

**August - 2020**

**ET-07 : Materials Characterization**

**Faculty Code : 003**

**Subject Code : 1204003**

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

[Total Marks : 70

- Instructions :** (1) All questions carry equal marks.  
(2) Full marks are indicated at the right end of each question.  
(3) Symbols have their usual meanings.

- 1 Answer Any Seven of the following : 14**
- (a) What is "White radiation"?
  - (b) What is the d-spacing formula for the orthogonal crystals ?
  - (c) Why the X-ray powder pattern is known as a crystal's fingerprint ?
  - (d) Which kind of information can be derived through SEM image?
  - (e) What is the principle of TEM ?
  - (f) What is P-E loop? Explain in brief.
  - (g) What is lock-in amplifier? Where is it used?
  - (h) Write two essential criteria for a compound to absorb IR radiation.
  - (i) Define charge transfer process in UV sensitive compounds.
  - (j) What are the limitations of two probe resistivity?
- 2 Answer Any Two of the following :**
- (a) Discuss the basic principles of X-ray production **7**  
How monochromatic X-rays are achieved ?
  - (b) Discuss the effect of stress on powder pattern. **7**
  - (c) Discuss the effect of crystal size on powder pattern. **7**

- 3 (a) Explain the influence of crystal symmetry and multiplicities on powder pattern. 7
- (b) Discuss the Transmission Electron Microscopy (TEM) with special reference to Resolution, Sensitivity and Sample Preparation. 7
- OR**
- 3 (a) Explain various types of polarizations in dielectric material and discuss the dielectric response at different frequency. What is dielectric loss? 7
- (b) Write a short note on SQUID and its applications. 7
- 4 Answer any **Two** of the following :
- (a) State the principle of TGA. Write a brief note on the instrument of TGA. 7
- (b) Discuss UV-viz technique in detail. 7
- (c) Write a brief note on molecular vibrations in FTIR. 7
- 5 Write a Short-note on any **Two** of the following :
- (a) STM and SFM 7
- (b) Scanning Electron Microscopy (SEM) 7
- (c) Explain DSC in context of principle, types and applications. 7
- (d) Write a note on VSM and its applications. 7
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