



**MBU-003-1204003** Seat No. \_\_\_\_\_

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

**April / May - 2018**

**Physics : ET - 07**

**(Materials Characterization)**

**(New Course)**

**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 assigned to each question are indicated on R.H.S.
  - (3) Symbols have their usual meanings.

**1** Answer any seven of the following : **14**

- (a) What are  $K_{\infty}$  and  $K_{\beta}$  transitions ?
- (b) Why for most diffraction experiments, a monochromatic beam of X-rays is desired ?
- (c) What is meant by "Indexing" of powder pattern ?
- (d) Differentiate STM and SIM.
- (e) What is the principle of TEM ?
- (f) What is TGA ? Describe dynamic TGA, isothermal TGA and quasistatic TGA.
- (g) Write a full form of SQUID. What is the threshold value of SQUID ?
- (h) What do you mean by IR-active compound ? Explain with examples.
- (i) Differentiate two probe and four probe resistivity. Write advantages of four probe.
- (j) Draw cole-cole plot, explain in brief.

- 2** Answer any two of the following :
- (a) Explain the basic principles of X-ray production and diffraction. **7**
  - (b) Discuss the effects of stress on a powder pattern with suitable examples. **7**
  - (c) Discuss : Structure determination from powder patterns. **7**
- 3** (a) Discuss the effect of crystal size on powder pattern. **7**
- (b) Discuss transmission electron microscopy with reference to resolution, sensitivity and specimen preparation. **7**
- OR**
- 3** (a) Enlist different sources used in UV-VIS instrument. Explain each in brief. **7**
- (b) Explain FTIR spectrophotometer function with block diagram. **7**
- 4** Answer any two of the following :
- (a) Explain various types of polarizations in dielectric material and discuss the dielectric response at different frequencies. What is dielectric loss ? **7**
  - (b) Write a brief note on SQUID and its applications. **7**
  - (c) Explain DTA in context of principle, types and applications. **7**
- 5** Answer any two :
- (a) What is FTIR ? Write a note on molecular vibrations. **7**
  - (b) Write a note on van der pauw method of resistivity. **7**
  - (c) Write a note on scanning electron microscopy (SEM). **7**
  - (d) Write a note on working of STM and SFM. **7**