NBW-003-0020402 Seat No. _____

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

April / May - 2017

ET - 2 : Materials Characterizations

Faculty Code : 003

Subject Code : 0020402

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**

(a) How x-rays are produced ?

(b) Why for the most diffraction experiments, a monochromatic beam of x-rays is desired ?

(c) What does peak broadening in x-ray pattern suggest ?

(d) What is the role of the electron gun in SEM ?

(e) Why STM requires a conducting surface ?

(f) Give names of Ferroelectric materials.

(g) What is lock-in amplifier ? Discuss in brief.

(h) Write a two essential criteria for a compound to absorb IR radiation.

(i) Write a statement of Beer's Law.

(j) Define charge transfer process in UV sensitive compounds.

2 Answer any **two** : **14**

(1) Discuss the basic principles of x-ray production and diffraction in detail.

(2) Explain the effect of stress on powder pattern with suitable examples.

(3) Explain influence of crystal symmetry and multiplicities of powder pattern.

3 Answer the following : 14

(1) Discuss the refinement of unit cell parameters and indexing of powder pattern in detail.

(2) Discuss Transmission Electron Microscopy with reference to basic principle, resolution and sensitivity.

OR

3 Answer the following 14

(1) Explain molecular absorptivities in UV-vis. How the absorption of UV or Visible is taking place by molecular or atomic species M ? Explain different steps. How the relaxation is taking place ?

(2) Write a short note on SQUID and its applications.

4 Answer any **two** : 14

(1) What is FTIR ? Write a note on molecular vibrations.

(2) Explain various types of polarizations in dielectric material and discuss the dielectric response at different frequency. What is dielectric loss ?

(3) Explain the UV-vis double beam instrument function with appropriate neat diagram. Differentiate single beam versus double beam.

5 Answer any **two** : 14

(1) Scanning Electron Microscopy : write a note on it.

(2) What is VSM ? Who discovered VSM ? Draw a neat block diagram of VSM and explain it.

(3) Differentiate two probe and four probe resistivity measurements. Write a brief note on four probe measurement technique.

(4) Write a short note on Ferro electricity. Also, Discuss P-E loop.
