MBU-003-020402 Seat No. _____

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

April / May - 2018

Physics : ET - II

(Materials Characterizations)

(Old Course)

Faculty Code : 003
Subject Code : 020402

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 Answer the following any seven : **14**

(i) How one can determine particle size using X-ray ?

(ii) How X-ray is produced ?

(iii) Write an expression demonstrate relation between resistivity and temperature.

(iv) Differentiate SEM and TEM. What is STEM ?

(v) What is lock-in amplifier ? Where is it used ?

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

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

(viii) Differentiate DTA and DSC.

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

(x) Give names of Ferroelectric material crystals.

2 Answer any two : **14**

(1) Explain the effects of stress on powder pattern with suitable examples.

(2) Discuss X-ray emission spectrum of copper in detail.

(3) Discuss scanning tunneling microscopy in detail.

3 Answer the following : **14**

(1) Discuss transmission electron microscopy with reference to basic principle, resolution and sensitivity.

(2) Explain : A powder pattern is a crystal's fingerprint.

OR

3 Answer the following : **14**

(1) Explain FTIR spectrophotometer function with block diagram.

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

4 Answer any two : **14**

(1) Draw a block diagram of typical TGA set up. Explain each part in detail.

(2) Differentiate two and four probe resistivity measurement. Describe van der pauw method of resistivity measurement.

(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) Write a short note on Ferro electricity. Also discuss P-E loop.

(2) Write a brief note on molecular vibrations in FTIR.

(3) Scanning electron microscopy : Write a note on it.

(4) Write a brief note on VSM.
