647510 **MSC4PhyE403A** **Seat No :_____**

M.SC.(Phy.) Semester - 4 (*CBCS*) Examination
April/May-2023 (NEW COURSE)
Materials Characterization (Elective)

Time: 2:30 Hours **Marks: 70**

Instructions:

1. All questions are compulsory.
2. Figures to the right indicate marks.

Q.1. Answers the following any SEVEN **[14]**

(i). Define exothermic and endothermic process in context of DTA.
(ii). How X-ray are produced?
(iii). Give names of Ferroelectric material crystals.
(iv). What are the d-spacing formulae for Cubic and Tetragonal crystals ?
(v). Differentiate STM and AFM
(vi). Write a full form of SQUID. What is the threshold value of SQUID?.
(vii). Write a statement of Beer's Law.
(viii). What do you mean by ultra vacuum UV?
(ix). Write a two essential criteria for a compound to absorb IR radiation.
(x). Why TEM has high spatial resolution?

Q.2. Answer any TWO **[14]**

(1) Discuss DTA & DSC in detail. Differentiate merits.
(2) Explain UV-viz technique in detail.
(3) Write a note on molecular vibrations in FTIR.

Q.3. Answer the following **[14]**

(1) Explain SEM with reference to the physical basis and primary modes of operation in detail
(2) Describe: A powder pattern is a crystal's fingerprint.

OR

Q.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) Write a short note on VSM and its applications.

Q.4. Answer any TWO **[14]**

(1) Write a short note on TGA. Also, explain how is it useful?
(2) Enlist IR sources and types of transducers used in FTIR, explain in brief..
(3) Write a detail note on TEM. Also, differentiate SEM and TEM.

Q.5. Answer any TWO **[14]**

(1) Discuss SFM in detail.
(2) Write a note on SQUID and its applications.
(3) Write a short note on Ferro electricity. Also, Discuss P-E loop.
(4) Refinement of Unit Cell Parameters and Indexing of power patterns

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