35131

M.Sc. DEGREE EXAMINATION, OCTOBER/NOVEMBER 2019.

THIRD SEMESTER

Material Science and Nanotechnology

Paper I — CHARACTERIZATION TECHNIQUES

Time : Three hours Maximum : 75 marks

(No additional sheet will be supplied)

PART A — (5 × 3 = 15 marks)

Answer any FIVE questions. Each question carries 3 marks.

Each answer should not exceed 1 page.

1. Discuss various types of detectors.
2. What are different types of electronic transitions.
3. Give the energy expressions for Vibrational transitions and explain.
4. What are the progressions and sequences in Vibrational spector.
5. Explain about the rule of mutual exclusion principle.
6. Differentiate between Raman Spectra and IR spectra.
7. What is reciprocal lattice? Explain.
8. What is Bragg's Law? Explain in detail.

PART B — (4 × 15 = 60 marks)

Answer ALL questions. Each question carries 15 marks.

Each answer should not exceed 6 pages.

9. Discuss the instrumentation involved in studying the atomic absorption spectra. How do you study the trace metals in oils.

Or

10. Explain the principle and working of UV–VIS double beam spectrophotometer with a neat optical layout.

11. Discuss in detail about rotational vibration spectra of polyatomic molecules with an examples.

Or

12. Explain about the FTIR spectrometer along with different parts and its block diagram.

13. Write an essay on classical and quantum theories of Raman effect.

Or

14. How do you study the Raman effect? Give the experimental techniques and instrumentation.

15. Explain about rotating crystal methods for studying the X-ray diffraction.

Or

16. What is the relation between direct lattice and reciprocal lattice. Discuss abut reciprocal of simple cubic, BCC and FCC lattices.
