45072

M.Sc. DEGREE EXAMINATION, APRIL 2015.

FOURTH SEMESTER

Physics

Paper II — ANALYTICAL 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. Write a note on different crystal systems.

2. Briefly discuss the principle involved in neutron diffraction.

3. Explain the principle in ESR spectroscopy.

4. What is Mossbauer effect? Explain.

5. Describe the chemical shift in NMR spectroscopy.

6. Discuss the applications of NQR.

7. Explain the principle of photo acoustic spectroscopy.

8. Give the differences between TEM and SEM.

PART B — (4 × 15 = 60 marks)

Answer ALL questions.

Each question carries 15 marks.

Each answer should not exceed 6 pages.

9. (a) Explain the concept of reciprocal lattice.

(b) Discuss the indexing method for the interpretation of powder photographs.

Or

10. (a) Describe the construction and working of a neutron spectrometer.

(b) Discuss how neutron diffraction is useful in the study of magnetic materials.

11. (a) Explain spin-spin and spin-lattice interactions.

(b) Using a block diagram discuss the working of ESR spectrometer. Give its applications.

Or

12. (a) What is recoilless emission and absorption?

(b) Describe any method of formation of Mossbauer nuclides.

13. (a) Using a block diagram, discuss the working of a proton NMR spectrometer.

(b) Discuss how T1 an T2 couplings can be estimated using this technique.

Or

14. (a) Explain the principle of NQR.

(b) Describe the experimental set-up of a NQR spectrometer and explain its components.

15. (a) What is the importance of spectroscopic techniques in characterization of materials?

(b) Discuss the salient features of photoelectron and photoacoustic spectroscopy.

Or

16. (a) Discuss the principle used in TEM.

(b) Describe the instrumentation and working of a TEM using the appropriate diagram.

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