45072

M.Sc. DEGREE EXAMINATION, MARCH/APRIL 2020.

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. What are point groups and space groups?

2. Differentiate between electron diffraction and neutron diffraction.

3. Obtain the resonance condition in ESR.

4. Explain briefly : Recoilless emission.

5. What is meant by chemical shift? Explain briefly.

6. What are the fundamental requirements in NQR?

7. Briefly explain about photo electron spectroscopy.

8. What is the basic principle in atomic force microscopy?

PART B — (4 × 15 = 60 marks)

Answer ALL questions.

Each question carries 15 marks.

Each answer should not exceed 6 pages.

9. Explain the experimental method of determination of crystal structure by powder diffraction.

Or

10. What are different crystal systems? Describe the method of construction of reciprocal lattice of a b.c.c structured crystals.

11. Explain the principle of E.S.R. Write the experimental details of E.S.R detection.

Or

12. What is Mossbauer effect? How do you study the Mossbauer effect experimentally?

13. Derive the Bloch equations of motion in N.M.R and obtain the expressions for susceptibility.

Or

14. What is N.Q.R? Explain the N.Q.R detection using super regenerative oscillator.

15. Write in detail about instrumentation involved in X-ray fluorescence spectroscopy.

Or

16. Differentiate between SEM and TEM. Give some applications of SEM.