

Time : 3 Hours

Max. Marks: 75

(No additional sheet will be supplied)

**PART – A (5 x 3 = 15 marks)**

Answer any FIVE Questions

Each question carries 3 marks

Each answer should not exceed 1 page

1. Explain the Crystal Structure and Primitive cell
2. Explain Bragg's law for X-ray diffraction in Crystals
3. Obtain the Resonance condition of ESR
4. What is Mossbauer effect ? Explain
5. Explain the Relaxation mechanism in NMR
6. Explain the principle of NQR
7. Discuss X-ray fluorescence Spectroscopy
8. Give the difference between SEM and TEM

**PART – B (4 x 15 = 60 marks)**

Answer ALL Questions

Each question carries 15 marks

Each answer should not exceed 6 pages

9. a) Determine the Lattice Constant of Cubic Crystal Structures  
b) Briefly explain the powder method of Crystal Structure Analysis  
(OR)
10. a) What are Symmetry elements ? Explain  
b) Explain the concept of Reciprocal Lattice; Discuss its utility in solid state physics
11. Explain the Hyper fine structures and characteristic of 'g' value in ESR  
(OR)
12. a) Explain recoilless emission and absorption  
b) Write a note on Isomer shift and hyperfine interactions
13. a) Discuss Nuclear Spin and magnetic moment of NMR  
b) What are Bloch's equations and obtain their solutions  
(OR)

14. a) Explain the concept of integral spins and half integral spins  
b) Write a note on CW oscillator
15. a) Explain the theory and working of photoelectron spectroscopy  
b) Describe the working of transmission electron microscope

(OR)

16. Describe in detail the principle and working of EDS in the determination of elemental analysis
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