

Roll No. ....

Total Pages : 4

1788/M

M-35/2051

**X-RAY DIFFRACTION AND OTHER  
TECHNIQUES**

Paper-431

Semester-IV

Time allowed : 3 Hours] [Maximum Marks : 55

**Note:** The candidates are required to attempt two questions of from Section A carrying 8 marks each and Section B carrying 8½ marks each and the entire Section C consisting of 11 questions carrying 2 marks each.

**SECTION-A**

1. What is the cause of Schottky defects? Derive an expression for the number of Schottky defects in a crystal. 8

2. Write an explanatory note on Electron Diffraction scattering by gases. 8
3. (a) Describe rotating crystal method for X-Ray diffraction of a crystal. 4
- (b) Estimate spacing formula for tetragonal and orthorhombic crystals. 4
4. Describe Laue's method of X-Ray diffraction from a Crystal. Also derive Laue's derive equation. Discuss also its significance. 8

**SECTION-B**

5. Discuss principle and theory of Nuclear Quadrupole Resonance (NQR) spectroscopy. How it can be utilized for the study of charge transfer complexes? Explain by taking suitable example. 8½
6. (a) Discuss theory of Mössbauer Spectroscopy. 4½
- (b) What is circular dichroism? How does it work? 4

7. (a) What is meant by Absolute Configuration?  
Estimate Absolute Configuration using  
ORD by taking suitable example. 4
- (b) Write an explanatory note on Theory of  
Polarized Light. 4½

8. Write a note on the followings :

- (a) Mössbauer Spectroscopy of biological  
systems. 4
- (b) The Goldansbii-Karaygin Effect. 2½
- (c) Chemical Isomer Shift. 2

- (v) What is Cotton Effect?
- (vi) Write structure of  $\text{CaF}_2$ .
- (vii) Describe indexing pattern of Cubic Crystal.
- (viii) Write Bragg's equation and explain the  
various terms involved in it.
- (ix) How do isomer shift vary with  
electronegativity?
- (x) Define Lattice Energy.
- (xi) What are Millar Indices? Explain.

### SECTION-C

11×2 = 22

9. Answer in short of the following :

- (i) What are Mössbauer active nuclei?
- (ii) What are Ferromagnetic substances?
- (iii) Explain the term "Fermi Energy."
- (iv) Define Interfacial angle.