

L-7/2050

X-RAY DIFFRACTION AND OTHER TECHNIQUES-431
(Semester-IV)

Time : Two Hours]

[Maximum Marks : 55

Note : Attempt any *four* questions. All questions carry equal marks.

- I. What is meant by Frenkel defects ? Derive an expression for the number of Frenkel defects in a crystal.
- II. (a) Describe the characteristics of X-rays. How these rays are detected ? Explain.
(b) Derive expression for spacing formula of tetragonal and orthorhombic crystals.
- III. (a) Comment of the intensities of diffracted beams scattered by an electron and a unit cell.
(b) Derive Wierl equation. How will you use it in interpreting data of electron diffraction ?
- IV. (a) What are Miller indices ? How are they determined ?
(b) Describe powder method for x-ray diffraction of a crystal.

- V. Describe electric quadrupole interactions in Mossbauer spectroscopy. Also discuss the applications of Mossbauer spectroscopy.
- VI. What is meant by Optical Rotary Dispersion (ORD) ? How it can be utilized for conformation and equilibrium studies ? Also predict absolute configuration using ORD by taking a suitable example.
- VII. Write a note on the followings :
- (a) Neutron diffraction technique.
 - (b) Mossbauer spectroscopy of Biological systems.
- VIII. (a) Discuss principle and theory of NQR spectroscopy.
- (b) Write an explanatory note on second order Doppler shift and recoilless fraction.
- IX. Answer in short :
- (a) Write structure of ZnS.
 - (b) Define Antiferromagnetic substances.
 - (c) What is meant by centre of symmetry ?
 - (d) Explain spectral line width.
 - (e) Explain the term "Fermi Energy".
 - (f) How do colour centres arise ?
 - (g) Explain the term "Paramagnetic Relaxation".

- (h) Describe indexing pattern of Non-cubic crystal.
 - (i) Define space groups.
 - (j) How do isomer shift vary with electronegativity ?
 - (k) Define plane defects.
-