

Time: 3 hours

Max. Marks = 60

Note: 1. all questions are compulsory.

2. All questions carry equal marks.

Q. 1 (A) Comments on significance of radius ratio rule & effect of polarization on crystal? 5 M

(B) State reasons for preference for a particular structure in AB with suitable example? 4 M

(C) Define the tolerance factor & charge neutrality in ternary compounds ABO_3 type. 3 M

OR

(D) Compare the covalent structures of Sphalerite & Wurtzite type crystals? 4 M

(E) Differentiate the structures of NaCl & CsCl crystal with respect to unit cells & unit lattices? 4 M

(F) Comments on the factor's deviation structures of $FeTiO_3$. 4 M

Q. 2 (A) What is mean by crystal defects? Give its possible kinds with suitable examples. 5 M

(B) Comments kind of normal & inverse, -3 and 4-2 spinel types of compounds? 4 M

(C) Write a note on lineage boundary & grain boundary. 3 M

OR

(D) Discuss the thermodynamics aspects of Schottky & Frankel defects. 5 M

(E) Explain the electronic features of non-stoichiometric oxides with suitable example? 4 M

(F) What are the viable factors that causes distortions in the spinel structures? 3 M

Q. 3 (A) State the similarities and differences in Glasses & Ceramics? 5 M

(B) What is microscopic composite? How are they different than other composites? 4 M

(C) Is composites of dispersion & strengthened are same, if not give its difference with suitable examples. 3 M

OR

- (D) What are refractories? Give its preparation & applications with examples? 4 M
- (E) Comments on Glassy state, glass formers and Glass Modifiers? 4 M
- (F) What is nano-crystalline phase? Give preparation & special properties of such phase. 4 M
- Q. 4 (A)** Is Mesomorphism same as polymorphism? Is it following pure solid and/or pure liquid characteristics or at all distinct in its nature? 4 M
- (B) Comments on difference between smectic A & smectic C phases? 4 M
- (C) Is planer & schlieren textures appear same, if not give its difference with suitable examples. 4 M

OR

- (D) State the lyotropic phases & their description of ordering in liquid crystals? 4 M
- (E) Comments on aspects of homeotropic texture of liquid crystals with example? 4 M
- (F) Discuss the optical properties of liquid crystals? 4 M
- Q. 5 (A)** Draw the unit lattice and unit cell involved in Li_2O . 1.5 M
- (B) Give structure of Perovskite crystal 1.5 M
- (C) Define charge neutrality principles. 1.5 M
- (D) What is mean by perfect & imperfect crystals? 1.5 M
- (E) Define the glass transition temperature. 1.5 M
- (F) Name any two examples of Ceramics and Clays. 1.5 M
- (G) Sketch the structure of any thermotropic liquid crystal. 1.5 M
- (H) Give the idea of dielectric susceptibility & dielectric constants. 1.5 M