QP Code : 76115

(3 Hours) **[Total Marks : 75**

N.B.: (1) **All** questions are **compulsory.**
(2) **Figures** to the **right** indicate **full** marks.
(3) All questions carry **equal** marks.
(4) Use of **logarithmic table\ Non-programmable** calculator is allowed.

1. Explain any **five** of the following :- 15
   (a) Structure of Cr_2O_3
   (b) Grain boundaries
   (c) types of Liquid crystals
   (d) Zone refining technique
   (e) Applications of dielectrics
   (f) Spin glasses
   (g) Colour centres
   (h) Normal modes of viabrations in carbonate ion

2. (a) Explain $MgAl_2O_4$ structure. 5

   OR

   (a) Discuss point defects in metals with suitable example and derive its mathematical expression. 5
   (b) What are Pyrochlores ? Give structural features of it. 5

   OR

   (b) Describe Edge and Screw dislocations. 5
   (c) Give an informative note on corner sharing octahedral structure of ReO_3. 5

3. (a) Explain Bridgman and Stockbergar method for single crystal growth from melt. 5

   OR

   (a) Give short note on Carburizing and non-carburizing processes. 5

   OR

   (b) Discuss the different factors which influence on reactions of solids. 5

   OR

   (b) Describe the Skull method for the preparation of Inorganic materials. 5
   (c) Elaborate on substitutional and interstitial solid solutions with examples. 5

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4. (a) Explain Band theory with suitable examples of metals, non-metals and semi-conductors. 5

OR

(a) Give short note on Hoping conduction. 5

(b) Discuss the magnetic properities of Perovskites. 5

OR

(b) Elaborate on Hysteresis loop. 5

(c) Describe Thomson and Peltier effects, 5

5. (a) Discuss the working of Ruby Laser. 5

OR

(a) Prove that Td = Eg + T2g 5

(b) Give Selection Rules for IR and NMR spectroscopy. 5

OR

(b) Elaborate on Coordinate and phosphor models. 5

(c) On the basis of M. O. theory explain the bonding in $B_6H_6^{-2}$. 5

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