Total No. of Questions :4]

SEAT No. :

P1872

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[5323]-56
M.Sc. - II (Inorganic Chemistry)
CH - 431 : MATERIAL SCIENCE
(2008 Pattern) (Semester - IV)

Time : 3 Hours] ***[Max. Marks : 80***

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of logarithmic table and calculator is allowed.***

Q1) Attempt any **FOUR** of the following : **[20]**

a) What is diffusion? Explain the types of diffusion mechanism in solids.

b) Derive the expression $X = \frac{C}{T - \theta}$.

c) Describe the different layers in the cross section of a tree stem with function of each layer.

d) Explain the types of superconductors.

e) What are Biomaterials? How they are classified?

Q2) Attempt any **FOUR** of the following : **[20]**

a) What is Portland cement? What are different types of Portland cement?

b) What are nanomaterials? Name the various methods for synthesis of nanomaterials. Why these methods are important?

c) What are the different types of magnetism?

d) What is concrete? How it is prepared? Explain proportion of concrete mixture.

e) What is Luminescence? Explain different types of Luminescences.

P.T.O.

Q3) Solve any **FOUR** of the following : **[20]**

a) Saturation magnetisation of FCC Iron is 1700kA/m^2. Calculate the net magnetic moment per Iron atom in crystal. Given lattice parameter of FCC Iron is 2.87°A.

b) Calculate the energy gap in Silicon given that it is transparent to radiation of wavelength greater than 11000°A.

c) Mobility of electrons and holes in sample of intrinsic Ge at room temperature are 3600cm^3/Vsec and 1700cm^3/Vsec. respectively. If electron and hole densities are equal to $2.5 \times 10^3/cm^3$. Calculate the conductivity.

d) In an n-type semiconductor the fermilevel lies 0.3eV below the conduction band at room temperature. If the temperature is increased at 330°k. Find the position of fermilevel. [Room temp. = 300°K].

e) In 'Si' energy gap is 0.75 eV. What is wavelength at which start absorption of light?

Q4) Write a short note on any **FOUR** : **[20]**

a) Working of n-p junction

b) Ferroelectrical materials

c) Glass transition temperature

d) Photoconductivity

e) Macrodefect free cement

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