537

B.E. / B.Tech.(Chemical Engineering) / B.Tech. : First Semester (Old Course)

Applied Physics-I : 1 S 2

P. Pages : 2
Time : Two Hours

AW - 3533
Max. Marks : 40

Notes : 1. Due credit will be given to neatness and adequate dimensions.
2. Assume suitable data wherever necessary.
3. Diagrams and chemical equations should be given wherever necessary.
4. Use of pen Blue/Black ink/refill only for writing the answer book.

List of constants:
i) Electron mass m = 9.1×10^{-31} kg
ii) Electron charge e = 1.6×10^{-19} C.
iii) Velocity of light c = 3×10^{8} m/s
iv) Planck's constant h = 6.63×10^{-34} J.s.

1. a) Derive an Expression for conductivity in intrinsic semiconductor. **4**

b) Explain the classification of conductor, semiconductor and insulator on the basis of conduction band, valence band and energy band gap. **4**

c) What is LED? Explain why LED emits light. **3**

d) LED emits yellow light of wavelength 5880A°. Calculate the energy band gap for the material. **3**

OR

2. a) Explain the working of Transistor in CE mode with suitable diagram. **4**

b) Define : **3**
i) Depletion Layer.
ii) Photo diode.
iii) LDR.

c) Explain the formation of energy bands in solid with help of band theory of solid. **4**

d) Calculate the mobility of electron in copper, if electrons per unit volume is 8.496×10^{22} cm^3 and resistivity of copper is 1.7×10^{-6} ohm-cm. **3**

3. a) What is packing fraction? Calculate the packing fraction in BCC and FCC structure. **4**

b) What is Bravais lattices? Write in tabular form. **4**

c) Define liquid crystal. State any four applications of liquid crystal. **3**

d) KCl crystal which has FCC lattice structure has a density of 1980 kg/m^3. If its molecular weight is 74.55 amu. Find it's lattice constant. **2**

OR

4. a) What are Miller indices? Explain the procedure for finding Miller indices of a plane. 4

b) What is coordination number? Show that the coordination number for BCC and FCC structure is 8 and 12 rept. 3

c) Explain Schottky defect and Frenkel defect with suitable diagram. 4

d) Distinguish between crystalline solid and amorphous solid. 2

5. a) Describe Davission – Germers experiment of electron diffraction. Discuss how it explain the wave nature of electron. 6

b) Show that De-Broglie wavelength of a particle of rest mass mo and kinetic energy K which is not negligible compared with moc^2 is given by. 4

$$\lambda = \frac{hc}{\sqrt{K\left(K + 2moc^2\right)}}$$

c) Show that electron does not present inside the nucleus using Heisenberg's uncertainty principle. 3

OR

6. a) Derive Planck's law of black body radiation. 6

b) The uncertainty in position of electron is 5×10^{-10} m. Find the uncertainty in it's momentum. 3

c) State and Explain Einstein's photoelectric equation. 4

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