LAST MOMENT TUITIONS

Applied Physics-1

May 17

First Year *(Semester 1)*

Total marks: 60
Total time: 2 Hours

INSTRUCTIONS
(1) Question 1 is compulsory.
*(2) Attempt any **three** from the remaining questions.*
(3) Draw neat diagrams wherever necessary.

I. Solve any five of the following

(a) Draw the unit cell of HCP structure and work out the no. of atoms per unit cell. (3)

(b) The mobility of holes is 0.025m^2/V-sec. What would be the resistivity of n-type Si if the Hall coefficient of the sample is 2.25 x $10^{-5}m^3$/C. (3)

(c) What is the principle of solar cell? Write its advantages and disadvantages. (3)

(d) An electron is confined in a box of dimension 1A° .Calculate minimum uncertainty in its velocity. (3)

(e) Explain the factors on which reverberation time depends. (3)

(f) Explain cavitation effect. (3)

(g) What is Maglev? How it can have very high speed? (3)

2 (a) Draw the following (1,-1,3),(2,0,0),[0,0,-1]
An electron is accelerated through 1200 volts and is reflected from a crystal. The second order reflection occurs when glancing angle is 60°. Calculate the inter planar spacing of the crystal. (8)

(b) Explain the concept of Fermi level. Prove that the Fermi level exactly at the centre of the Forbidden energy gap in intrinsic semiconductor. (7)

3. (a) Find the following parameters for DC (Diamond Cubic) structure : (8)

i) It,of atoms per unit cell
ii) Co-ordination No.
iii) Nearest atomic distance
iv)Atomic radius
v)APF

(b) Define drift current, diffusion current and P — N junction. The electrical conductivity of a pure silicon at room temperature is 4 x 10^{-4}mho/m. If the mobility of electron is 0.14 m^2/V-S and that of hole is 0.04m^2/V-S. Calculate the intrinsic carrier density. (7)

4. (a) Distinguish between Type I & Type II superconductors. (5)

(b) A classroom has dimensions 10 x 8 x 6 m^3. The reverberation time is 3 sec. Calculate the total absorption of surface and average absorption. (5)

(c) Explain the principle. construction and working of a Magnetostriction Oscillator (5)

5. (a) Write Fermi Dirac distribution function. With the help of diagram, explain the variation of Fermi level with temperature in n-type semiconductors. (5)

(b) Derive Schrodinger's time dependent wave equation for matter waves. (5)

(c) Find the depth of sea water from a ship on the sea surface it the time interval of two seconds is required to receive the signal back. Given that : temperature of sea water is 20°C, salinity of seawater is 10 gm/lit (5)

6. (a) Define the term critical temperature. Show that in the superconducting state the material is perfectly diamagnetic. (5)

(b) In a solid the energy level is lying 0.120eV below the Fermi level. What is the probability of this level not being occupied by an electron? (5)

(c) What is the wavelength of a beam of neutron having : (5)

i) an energy of 0.025eV?

ii) an electron and photon each have wavelength of 2A°. What are their momentum and energy? ma= 1.676 x 10^{-27}kg, h=6.625 x 10^{-34} J-sec.