COURSE CODE: 18P1WPH111   MAX. MARKS: 35

COURSE NAME: COMPOUND SEMICONDUCTORS

COURSE CREDITS: 03   MAX. TIME: 2 Hr's

Note: All questions are compulsory. Carrying of mobile phone during examinations will be treated as case of unfair means.

Que 1. Suppose there is charge density ρ and current density J in particular region of space .

  (a) Write all Maxwells's equations.

  (b) Show that $E = E_0 e^{i(Kz-\omega t)}$ & $B = B_0 e^{i(K \cdot z - \omega t)}$

   Are the solutions of equation $\nabla^2 E = \mu_0 \epsilon_0 \frac{\partial^2 E}{\partial t^2}$ & $\nabla^2 B = \mu_0 \epsilon_0 \frac{\partial^2 B}{\partial t^2}$ resp.   **[4+3+3 =10]**

Que 2. Why you need electro-dynamical boundary conditions when a wave passes from one transparent medium to other. What is the physical significance of this boundary condition?   **[3+2=5]**

Que 3. A plane wave of frequency ω traveling in z direction and polarized in the x direction approaches to the interface from left to right. Show R+T =1, Where R is reflection coefficient and T is transmission coefficient   **[5]**

 Que 4. An electromagnetic wave of frequency ω and polarized along x direction is incident on atom. Such that electrons feel driving force of F=qE, E=E$_0$ cos(ωt). Write the total driving force and equation of motion for electrons. Also, plot the graph between index of refraction, and absorption coefficient as function of frequency ω. Based on graph explain, normal dispersion and anomalous dispersion. **[5+5=10]**

Que5.   **[5]**

A high resolution TEM image is shown in figure .
By looking at image

  (a) How many XRD peaks will emerge.

  (b) If you calculate particle size , by Scherer's

   Formula and stress by Wilson Hall Plot, will you get right result. Please explain in details.