II Mid Term Examination

***Even*-Semester, 2017-18**

Program: B.Tech I Year **Branch:** CSE **Year:** First

Subject with Code: Engineering Physics (AHP 1101)

Time: 1 Hour **Max. Marks:** 15

Section A

Note: Attempt all questions. **2X3= 6 Marks**

1. Define Superconductivity. At what temperature $H_c(T)=H_c(0)$ for a Superconductor?
2. Find the electrical conductivity and resistivity of germanium doped with phosphorus atoms at room temperature with data given below.
   $n_e=4\times10^{22}$ m^{-3}, $n_h=10^{16}$ m^{-3}, $\mu_e=0.40m^2/(v\text{-}s)$ and $\mu_h=0.20m^2/(v\text{-}s)$
3. Determine the displacement current density in a material having relative permittivity $\varepsilon_r=2.25$. The electric field in the material is $E=5\times10^{-6}$ $Sin(9\times10^9t)$ volt/meter($\varepsilon_0=8.85\times10^{-12}$ $coul^2/N\text{-}m^2$).

Section B

Note: Attempt all questions. **3X3= 9 Marks**

1. Calculate the current produced in a small germanium plate of area 1.0 cm^2 and of thickness 0.5mm, when a potential difference of 5 volt is applied across the faces. The concentration of free electrons (n_e) is $2\times10^{19}m^{-3}$ and mobilities of electrons and holes are $0.40m^2/(v\text{-}s)$ and $0.20m^2/(v\text{-}s)$ respectively.
2. Drive the temperature dependent conductivity in an intrinsic semi-conductor. How is band energy gap calculated?
3. Using the differential forms of Maxwell's equations, show that the electromagnetic waves travel with the speed of light in free space.

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