

University Roll No. :

B.Tech I Year II Semester

II Mid Term Examination, 2016-17

Subject: Engineering Physics

Paper Code : AHP 1101

Timings: 1½ Hours

Max. Marks : 20

Section A

Note: Attempt all questions.

1X5= 5

1. Where does lie the Fermi energy level in Intrinsic semiconductor?
2. The mobility of electrons in a conductor is $4 \times 10^{-3} \text{ m}^2 \text{ V}^{-1} \text{ sec}^{-1}$. Calculate the drift velocity of the electron in the presence of electric field of strength 100 Vm^{-1} .
3. What is the size range of nanomaterials?
4. Write the relation between E, D and P.
5. At what temperature is $H_c(T) = 0.19 H_c(0)$ for Pb having $T_c = 7.2 \text{ K}$?

Section B

Note: Attempt any three questions

2X3= 6

1. Calculate the current produced in a small germanium plate of area 1 cm^2 and of thickness 0.5 mm , when a potential difference of 2 volt is applied across the faces. Given concentration of free electrons in germanium is $2 \times 10^{19} \text{ m}^{-3}$ and mobilities of electrons and holes are $0.40 \text{ m}^2 / (\text{V-s})$ and $0.10 \text{ m}^2 / (\text{V-s})$ respectively.
2. An electric field of 200 volt / m is applied to a sample of n-type semiconductor whose Hall coefficient is $- 0.01 \text{ m}^2 \text{ coulomb}^{-1}$. Calculate the current density in the sample assuming mobility of electrons equals to $0.25 \text{ V}^{-1} \text{ s}^{-1}$.

(P.T.O.)

3. A parallel plate capacitor with plate area of 5 cm^2 and plate separation of 5 mm has a voltage of $50 \sin 10^3 t$ applied to its plates. Calculate the displacement current assuming $\epsilon = 2\epsilon_0$.
4. What is meant by penetration depth (skin depth)? Determine the frequency for which depth of penetration for a conducting medium is 0.08 mm if $\mu = \mu_0 = 4\pi \times 10^{-7} \text{ H/m}$ and $\sigma = 2 \times 10^7 \text{ mho/m}$.

Section C

Note: Attempt any three questions.

3X3=9

1. Distinguish between Intrinsic and Extrinsic semiconductors .Obtain the expression for temperature dependence of conductivity for an intrinsic semiconductor.
2. Explain the Hall Effect. Derive the formula for Hall coefficient (R_H).
3. Show that the Electromagnetic waves travel in free space with the speed of light (c).
4. What does Poynting vector signify? Prove the Poynting theorem.