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II - Mid Term (Even Sem.) Examination, Even Semester 2013-14

Course: B.Tech, I-Year,

Engineering Physics - II (AHP-102)

Time: 90 Minutes **MM: 20**

Section-A

Note: Attempt all five questions. **5× 1 = 5**

I. Give one example each of donor and acceptor impurities.

II. What is the characteristic property of an intrinsic semiconductor?

III. What is the effect of temperature on the resistivity of a semiconductor?

IV. Define the transition temperature (T_c) of the superconductor.

V. Write any two properties of Bucky balls.

Section B

Note: Attempt any three questions. **3x2=6**

I. Calculate the current produced in a small germanium plate of area 1 cm^2 and of thickness 0.6 mm, when a potential difference of 6 volt is applied across the faces. The concentration of free electrons in germanium is 5 x 10^{19} electrons / m^3 and mobility of electrons and holes are 0.30 m^2 / (v-s) and 0.10 m^2 / (v-s) respectively.

II. Define mobility. Find the mobility of electron in copper wire if there are 10^{28} electrons / m^3 and conductivity of copper is 1.6 x 10^7 mho/m.

III. Distinguish Type I and Type II superconductors.

IV. Which are the different kinds of single walled nanotubes? Discuss the chemical vapour deposition technique for the production of carbon nanotubes.

Section C

Note: Attempt any three questions. **3x3=9**

I. What do you mean by Fermi level? Show that the Fermi level of an intrinsic semiconductor lies half way between conduction and valence bands.

II. Obtain the expression of temperature dependent conductivity for a semiconducting material and sketch the variation of conductivity vs temperature.

III. What is Hall effect? Obtain the expression for Hall coefficient of a semiconductor.

IV. Explain Meissner effect. Find the expression of London Penetration depth in a superconductor.