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(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : **199220**

Roll No. [ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ]

# B. Tech.

## (SEM. II) THEORY EXAMINATION, 2014-15
### ENGINEERING PHYSICS - II

Time : **2 Hours]**                    [Total Marks : **50**

**Note:** Attempt All Section's Question as per the given instruction.

### Section - A

Attempt all parts of this question. Each part carries 2 marks :

1  (a)  What are Miller indices? How are they calculated?

(b)  What are polar and non polar molecules?

(c)  What is hysteresis loss ?

(d)  What is Fermi level?

(e)  Explain the concept of displacement current.

### Section - B

Attempt any three parts of this question. Each part carries 5 marks :

2  (a)  A superconducting tin has a critical temperature of 3.7 K at zero magnetic field and a critical magnetic field 0.0306 tesla at 0 K. Find the critical magnetic field at 2 K.

(b) Calculate the change in magnetic moment of a circulating electron in an applied field of 2 tesla acting perpendicular to the plane of the orbit. Given $r = 5.29 \times 10^{-11}$ m for the radius of the orbit.

(c) Calculate the magnitude of Poynting vector at the surface of the Sun. Given that power radiated by sun = $3.8 \times 10^{26}$ watts and radius of the sun = $7 \times 10^8$ m.

(d) In a p-type semiconductor the Fermi level is 0.3 eV above the valence band at temperature 300 K. Determine the new position of Fermi level for temperature 400 K.

(e) Copper has a density of 8.96 gm/cm$^3$ and an atomic weight of 63.5. Calculate the distance between two nearest copper atoms in BCC structure. (Avogadro's number = $6.023 \times 10^{23}$ per kg-mole)

## Section - C

Attempt all question of this section. Each question carries 5 marks.

3 Attempt any one part of the following :

(a) What are Miller indices? How they are calculated?

(b) Define atomic packing factor. Calculate APF in case of SC, BCC and FCC.

4 Attempt any one part of the following :

(a) Discuss the frequency dependence of dielectric constant.

(b) What is the hysteresis curve? Explain residual magnetism and coercive force?

5 Attempt any one part of the following :

(a) Deduce the wave equation for EM waves in conducting medium.

(b) Using Maxwell equation Curl $B = \mu_0 \left[ J + \dfrac{\partial D}{\partial t} \right]$. Prove that div D = ρ

6 Attempt any one part of the following :

(a) Derive an expression for the conductivity of a semiconductor containing both free electrons and holes in terms of the concentration n and p and the mobility $\mu_e$ and $\mu_h$.

(b) What are type I and type II superconductors? Explain.

7 Attempt any one part of the following :

(a) What do you mean by Meissner effect? Explain how Meissner effect proves the superconductor is a perfect diamagnetic material.

(b) Show that a Fermi level in an intrinsic semiconductor lies half way between the top of valence band and bottom of conduction band.

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