

Printed Pages : 3



NAS201

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

PAPER ID : 199220

Roll No.

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**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.

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- (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<sup>3</sup> 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?

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- 5 Attempt any one part of the following :
- (a) Deduce the wave equation for EM waves in conducting medium.
- (b) Using Maxwell equation  $\text{Curl } B = \mu_0 \left[ J + \frac{\partial D}{\partial t} \right]$ . Prove that  $\text{div } D = \rho$

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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