Printed Pages : 4

AS-202(C)

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

PAPER ID : 199240

Roll No.

B. Tech.

(SEM. II) THEORY EXAMINATION, 2014-15

ENGINEERING PHYSICS-II (C)

(FOR CS/IT etc.)

Time : 3 Hours] [Total Marks : 80

Note: Attempt questions from each Section as per instructions.

SECTION - A

1 Attempt all parts of this question. 2×8=16
Each part carries 2 marks.

(a) What do you mean by phase velocity and group velocity?

(b) Explain Heisenberg's uncertainty principle?

(c) Distinguish between Type-I and Type-II superconductors.

(d) What are buckyballs?

(e) What are the properties of diamagnetic materials?

(f) What is dielectric loss?

(g) What do you mean by Hall Effect?

(h) What is image processing?

SECTION - B

2 Attempt any three parts of this question. 8×3=24
Each part carries 8 marks.

(a) Find the de-Broglie wavelength of a neutron of energy 12.8MeV. Mass of neutron is 1.675×10^{-27}kg.

(b) An electron has a speed of 1.05×10^{4}m/s within the accuracy of 0.01%. Calculate uncertainty in the position of the electron.

(c) The critical field for niobium is 1×10^{5} A/m at 8K and 2×10^{5} A/m at 0K. Calculate the transition temperature of the element.

(d) An iron rod of volume 10^{-3} m^3 and relative permeability 1200 is placed inside a long solenoid wound with 5 turns per cm. If a current of 0.5 amp is passed through the solenoid, find the magnetic moment of the rod.

(e) At what temperature can we expect a 10% probability that electrons in a metal will have an energy which is 1% above E_F . The Fermi energy of the metal is 5.5 eV.

SECTION - C

Attempt any one part of all the questions of this section. Each question carries 8 marks. 8×5=40

3 (a) What are matter waves? Describe Davisson and Germer experiment for the study of electron diffraction and prove that electrons possess wave nature.

(b) Find an expression for the energy states of a particle in a one –dimensional box. Also calculate the normalized wave function.

4 (a) How are Cooper pairs formed? Explain the BCS theory of superconductor.

(b) What are carbon nanotubes? Describe a method for synthesis of carbon nanotubes.

5 (a) What do you mean by polarization in dielectrics? Explain different types of polarization and their mechanism.

(b) What is meant by Hysteresis? Explain hysteresis loss. Prove that the area of the B-H curve is equal to the hysteresis loss per unit volume of the specimen in one cycle.

6 (a) What is a solar cell? Describe its working with suitable diagram.

(b) What do you mean by Fermi level? Show that the Fermi level of an intrinsic semiconductor lies half way between conduction and valance bands.

7 (a) What is a spatial light modulator? Explain the working of liquid spatial light modulator.

(b) What do you understand by memories in computer? Describe various types of memories in detail.

Physical Constants:

Mass of electron	$m_e = 9.1\times10^{-31}$ kg
Speed of Light	$c = 3\times10^{8}$ m/s
Plank's constant	$h = 6.63\times10^{-34}$ J-s
Mass of Proton	$m_p = 1.67\times10^{-27}$ kg
Permeability of free space	$\mu_0 = 4\pi\times10^{-7}$ H/m
Permittivity of free space	$\varepsilon_0 = 8.854\times10^{-12}$ F/m
Avogadro's number	$N = 6.023\times10^{23}$ per mole