Printed Pages : 5

AS-202 (M)

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

PAPER ID : 199242

Roll No.

B. Tech.

(SEM. II) THEORY EXAMINATION, 2014-15

ENGINEERING PHYSICS-II (M)

(For ME/AU/MT/CH/CE/EV/TE/TT/FT/TC 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 are Bravais lattices?

(h) What do you mean by packing factor?

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 12.8 MeV. Mass of neutron is 1.675×10^{-27} kg.

(b) 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.

(c) An iron rod of volume 10^{-3} m^3 and relative permeability1200 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.

(d) Calculate the number of atoms per unit cell of a metal with lattice parameter 2.9Å, molecular weight 55.85, density 7870 kg-m^{-3} and Avogadro number 6.02×10^{26} (kg-mol)$^{-1}$.

(e) A platinum thermometer has a resistance of 100 Ω at 25° C. (a) find its resistance at 65° C if the platinum has a resistance temperature coefficient of 0.00392 / °C (b) If the temperature has a resistance of 150 Ω, calculate the temperature.

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 are Miller indices and how are they calculated? Give some applications of miller indices?

(b) What is Bragg's law? Obtain Bragg's equation for x-ray diffraction in crystals. Explain how the formation of Laue's spot in x-rays diffraction was explained by Bragg.

7 (a) What do you mean by ultrasonic waves? Discuss any one method of its production.

(b) Describe the working of a rotary oil pump for producing low pressures. How are these pressures measured?

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