Printed Pages : 4

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EAS201

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

PAPER ID : 199206

Roll No. | | | | | | | | | |

B.Tech.

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

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

SECTION - A

1 Attempt all parts of this question. **5×2=10**

Each part carries 2 marks.

(a) What do you mean by wave-particle duality?

(b) What is Laue's X-ray diffraction?

(c) Explain Meissner effect in superconductors.

(d) What do you mean by equation of continuity?

(e) What is dielectric constant?

199206] **1** [Contd...

SECTION-B

2 Attempt any three parts of this question.

Each part carries 5 marks. **5x3=15**

(a) A particle confined to move along X-axis has the wave function $\psi = ax$ between $x=0$ and $x=1$ and $\psi = 0$ elsewhere. Find the probability that particle can be found between $x= 0.35$ to $x=0.45$.

(b) The transition temperature for lead is 7.26 K. The maximum critical filed for the material is 5×10^5 A/m. Lead has to be used as a superconductor subjected to a magnetic field of 4×10^4 A/m. Find the temperature of lead and what precaution will have to be taken?

(c) The dielectric constant of medium is 4. Electric filed in the dielectric is 10^6 V/m. Calculate electric displacement and polarization. Take $\varepsilon_0 = 9 \times 10^{-12}$ F/m.

(d) If the upper atmospheric layer of earth receives 1360 W/m^2 energy form the sun, what will be the peak values of electric and magnetic fields at that layer?

(e) An X-ray photon is found to have its wavelength doubled on being scattered through 90°. Find the wavelength and energy of the incident photon.
(take $m_o = 9.0 \times 10^{-31}$ kg)

SECTION - C

Attempt any one part of all the questions of this section. Each question carries 5 marks. **5x5=25**

3 (a) Describe the experiment of Davisson and Germer for the study of electron diffraction. What are the important conclusions that could be drawn form it?

(b) Explain Heisenberg's uncertainty principle. Apply it to prove non-existence of the electron in the nucleus.

4 (a) What is hysteresis curve? Explain residual magnetism, coercive force and hysteresis loss.

(b) Discuss the Langevin's theory for diamagnetic and paramagnetic materials.

5 (a) What is Poynting vector? Discuss the work-energy theorem for the flow of energy in EM field.

(b) Discuss the propagation of EM waves in a free space.

6 (a) Explain superconductivity using BCS theory. Also discuss applications of superconductors.

(b) What are buckyballs? How can the buckyballs be created? Where are these buckyballs used?

7 (a) Obtain Bragg's law for X-ray diffraction in crystals. Show how it can be experimentally verified.

(b) Derive an expression for the energy of a particle confined in a one dimensional potential box.

Physical Constants:

Mass of electron $\quad\quad M_e = 9.1 \times 10^{-31}\,kg$

Speed of Light $\quad\quad c = 3 \times 10^8\,m/s$

Plank's constant $\quad\quad h = 6.63 \times 10^{-34}\,J\text{-}s$

Mass of Proton $\quad\quad m_p = 1.67 \times 10^{-27}\,kg$

Permeability of free space $\quad \mu_0 = 4\pi \times 10^{-7}\,H/m$

Permittivity of free space $\quad \varepsilon_0 = 8.854 \times 10^{-12}\,F/m$

Avogadro 's number $\quad\quad N = 6.023 \times 10^{23}\,per\,mole$

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