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Total No. of Questions : 8]

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[4261]-2**F. E. Examination - 2012****ENGINEERING PHYSICS****(2012 Course)****Time : 2 Hours]****[Max. Marks : 50****Instructions :**

- (1) Assume suitable data, if necessary.
- (2) Neat diagrams must be drawn wherever necessary.

- Q.1)** (A) Prove that in Newton's Ring by reflected light the diameter of bright ring are proportional to the square root of the odd natural number. [06]
- (B) Explain any one application of Ultrasonic Waves. [03]
- (C) The average reverberation time of a hall is 1.5 sec. and the area of the interior surface is 3340m². If the volume of the hall is 13000m³. Find the absorption coefficient. [03]

OR

- Q.2)** (A) Explain how piezoelectric effect can be used for generating Ultrasonic Waves ? [06]
- (B) Define fringe width for wedge shaped film, obtain an expression for it. [03]
- (C) Find the half angular width of the central maxima in the fraunhofer diffraction pattern of slit having width 10×10^{-5} cm. When illuminated by light having wave length 5000 A°. [03]

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Q.3) (A) State the Phenomena of Double Refraction. Hence explain Huygen's Wave Theory of Double Refraction. [06]

(B) Draw energy band picture for P-N junction in case of (i) Zero Bias (ii) Forward Bias (iii) Reverse Bias. [03]

(C) A silver wire is in the form of a ribbon 0.5cm wide and 0.1 mm thick. When a current of 2A passes through the ribbon perpendicular to 0.8 Tesla Magnetic Field. Calculate the Hall Voltage produced.

(Given : Density of Silver = 10.5 gm/cc, Atomic Weight of Silver = 108, Avogadro's No. 6.02×10^{23} gm/mole) [03]

OR

Q.4) (A) Derive an expression for Conductivity in Semiconductor. [06]

(B) Explain any one application of Laser. [03]

(C) How should the Polarizer and Analyzer be oriented to reduce intensity of beam to (i) 50% (ii) 0.25 of its original intensity? [03]

Q.5) (A) Define Phase Velocity and Group Velocity. Hence obtain the relation between V_p and V_g for DeBroglie Wave. [06]

(B) Explain the physical significance of ψ and $|\psi|^2$. [04]

(C) An electron is bounded by an infinite potential well of width 2×10^{-8} cm. Calculate the lowest two permissible energies of an electron.

(Given : $h = 6.64 \times 10^{-34}$ J-sec., $m = 9.1 \times 10^{-31}$ kg) [03]

OR

Q.6) (A) Derive Schrodinger's Time Independent Wave Equation. [06]

(B) State DeBroglie's Hypothesis. Hence obtain the relation for DeBroglie's Wave Length in terms of Energy. [04]

(C) The position and momentum of 1 keV electron are simultaneously measured. If its position is located within 1A° . Find the percentage of uncertainty in its momentum.

(Given : $h = 6.64 \times 10^{-34}$ J-sec., $m = 9.1 \times 10^{-31}$ kg) [03]

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Contd.

- Q.7) (A) Explain the Phenomena of Super-conductivity. Explain Type - I and Type - II Super-conductors. [06]
- (B) Explain any two applications of Nano-technology. [04]
- (C) Explain any two properties of Nano-particle. [03]

OR

- Q.8) (A) Explain Synthesis of Metal Nano-particle by Collidal Route Method. [06]
- (B) Explain BCS Theory of Super-conductivity. [04]
- (C) State and explain :
- (a) Meissner Effect
- (b) Persistent Current [03]

