F. E. (Semester - II) Examination 2013
Engineering Physics
(2012 Pattern)

[Time : 2 Hours]   [Max. Marks:50]

Instructions :
   1) Answer all the questions.
   2) Black figures to the right indicate full marks.
   3) Neat Diagram must be drawn wherever necesary.
   4) Electronic Pocket calculator is allowed.
   5) Assume suitable data, if necessary.

Constants : $h = 6.63 \times 10^{-34}$J-s
            $m_e = 9.31 \times 10^{-31}$kg.
            $e = 1.6 \times 10^{-19}$C
            $c = 3 \times 10^8$m/s

Q.1 a) Explain the formation Newton's ring with diagram and drive   [06]
       the diameter of bright ring.
    b) Discuss the use of ultrasonics for flaw Detection   [03]
    c) A auditorium of volume 5500m^3 is found to have reverberation   [03]
       time 2.5 secs. The sound absorbing surface of the auditorium has an area of
       750m^2. Calculate the average absorption coefficient of the auditorium.

OR

Q.2 a) Define magnetostriction effect. Explain how magnetostriction   [06]
       oscillator is used to produce ultrasonic waves with the help of
       neat circuit diagram.
    b) Explain with diagram how interference Principle is used to design   [03]
       anti reflection caoting.
    c) Monochromatic light from He-Ne laser source (λ=6328A^0) is incident   [03]
       normally on a diffraction grating having 6000lines/cm. Find the angle
       at which one would observe second order maximum.

Q.3a) Define Double refraction. Explain Huygen's Theory of Double   [06]
      refracting crystal with diagram.
   b) Define Fermi level. Plot the variation of Fermi level with the   [03]
      increase of temperature for n-type and p-type semiconductor.

c) Calculate the conductivity of Ge sample if the donor impurity is added to an extent of one part in 10^8 Ge atoms at room temperature. (Data Given : $N_a=6.023\times10^{23}$ atoms/gm-mole. At. Wt. of Ge=72.6 Density of Ge=5.32gm/cc. ,$\mu=3800$ cm^2/v-s.) [03]

OR

Q.4a) Define Hall effect. Derive the expression of Hall coefficient, Hall Voltage and discuss their applications. [06]

b) Explain the process of recording Hologram with the help of LASER. [03]

c) At what angle of incidence should a beam of sodium light be directed upon the surface of diamond crystal to produce complete polarized light (Data Given: Critical angle for diamond=24.5^0). [03]

Q.5a) Derive Schroedinger time independent wave equation. [06]

b) Define phase velocity, Group velocity and Derive their expressions. [04]

c) Calculate the De-Broglie wavelength associated with 1 Mev proton($m_p=1.67\times10^{-27}$ kg). [03]

OR

Q.6a) Explain Heisenberg Uncertainty Principle and prove this principle using single slit Diffraction experiment. [06]

b) Calculate the energy and momentum of an electron confined in a rigid box of width 2A^0 for lowest energy state. [04]

c) Does the matter waves are electromagnetic waves? Explain. [03]

Q.7 a) Explain the synthesis of nanoparticles through colloidal route with diagram . [06]

b) Differentiate between Type-I and Type –II Superconductor with diagram [04]

c) Explain two applications of Superconductivity. [03]

OR

Q.8 a) Explain Meissner effect and Critical magnetic field for superconductivity. [06]

b) Explain the optical and electrical properties of nanoparticles. [04]

c) Explain the applications of nanoparticles in medical and electronic industry. [03]