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COMBINED FIRST AND SECOND SEMESTER B.TECH. (ENGINEERING) DEGREE EXAMINATION DECEMBER 2008

EN 2K 103 A – ENGINEERING PHYSICS (A)

(Common to AI, CS, EE, EC, IT, PT and IC)

Time : Three Hours   Maximum : 100 Marks

*Answer **all** questions.*

1. (a) Explain Fresnel and Frunhofer diffraction. Distinguish between the two diffractions.

   (b) Explain the function of Quarter wave and Half wave plates.

   (c) What are de Broglie waves? Derive expression for de Broglie wavelength of an electron accelerated through a p.d. of V volts.

   (d) Explain the production and detection of Ultrasound through Piezoelectric effect.

   (e) What is population inversion? Explain different methods used for pumping.

   (f) Explain the principle of semiconductor laser.

   (g) Explain the function of solar cell.

   (h) What is Josephson effect?

   (8 × 5 = 40 marks)

2. (a) (i) What is interference? Explain the interference from Plane parallel thin films.

      (ii) In an airwedge illuminated by a light of wavelength 6000 AU, 10 fringes are seen in one cm. Find angle of the wedge.

   Or

   (b) (i) Explain with suitable mathematical derivation, the formation of circularly and elliptically polarised light.

      (ii) Explain Double Refraction.

   (15 marks)

3. (a) (i) Derive Schrodinger's time independent equation and explain its application to particle in a box.

      (ii) Compute de Broglie wavelength of proton whose K.E. is equal to rest energy of electron. Mass of proton is 1836 times that of the electron.

   Or

Turn over

(b)   (i)   Explain the basic principles of NMR techniques and also describe the experimental method for detection of NMR.

       (ii)   Write the applications of Ultrasound.

<div align="right">(15 marks)</div>

4.   (a)   (i)   Write in detail an essay about fibre optic communication system and its advantages.

         (ii)   Explain absorption, spontaneous emission and stimulated emission.

<div align="center">Or</div>

   (b)   (i)   Write in detail an essay about fibre optic communication system and its advantages.

         (ii)   Transition occurs between a metastable state E_3 and an energy state E_2 just above the ground state. If emission is at 1.1 µm and $E_2 = 0.4 \times 10^{-19}$ J, Find the energy of E_3 state.

<div align="right">(15 marks)</div>

5.   (a)   (i)   Explain Hall effect. Describe how Hall coefficient can be measured experimentally. Also write the importance of Hall effect.

         (ii)   Explain the construction and working of Photo transistor and photo resistor.

<div align="center">Or</div>

   (b)   (i)   Explain with neat diagram the doping of intrinsic semiconductor and Fermi level in N-type and p-type materials.

         (ii)   Explain the construction and working of Zener diode.

<div align="right">(15 marks)</div>

<div align="right">[4 × 15 = 60 marks]</div>