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(Pages : 2)

Name.....

Reg. No.....

COMBINED FIRST AND SECOND SEMESTER B.TECH. (ENGINEERING) DEGREE EXAMINATION, DECEMBER 2006

EN 2K 103 (A)—ENGINEERING PHYSICS (A)

(Common to A1, 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) Describe the construction and working of Nicol prism.

(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) A superconducting tin has a critical temperature of 3.7 K in zero magnetic field and critical field of 0.0306 Tesla at 0 K. Find the critical field at 2 K.

(g) What are energy bands ?

(h) What is Josephson effect ?

(8 × 5 = 40 marks)

2. (a) (i) Explain with relevant theory the formation of fringes in airwedgep.

(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 the method of detection for elliptically polarized light.

(15 marks)

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

(ii) Determine the wavelength associated with an electron having energy 0.025 MeV.

Or

(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 in SONAR.

(15 marks)

Turn over

4. (a) (i) What is gas laser ? Explain the construction, working and application of He Ne laser with relevant diagrams.

(ii) Explain the principle of semiconductor laser.

Or

(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 sate E_2 just above the ground state. If emission is at 1.1 μm and $E_2 = 0.4 \times 10^{-19}$ J, fine the energy of E_3 state.

(15 marks)

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

(ii) Define Fermi level and Fermi energy.

Or

(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.

(15 marks)

(4 × 15 = 60 marks)