

C 57513

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Name.....

Reg. No.....

**COMBINED FIRST AND SECOND SEMESTER B.TECH. (ENGINEERING)  
DEGREE EXAMINATION, JUNE 2009**

**EN 04 103 A—ENGINEERING PHYSICS (A)**

(2004 Admissions)

[AI, CS, EE, EC, IT, IC, BM, BT, PT]

Time : Three Hours

Maximum : 100 Marks

Answer all questions.

**Part A**

- I. 1. Distinguish between  $n$ -type and  $p$ -type semiconductors.
2. Describe the principle and working of a photodiode.
3. Distinguish between Frensel and Fraunhofer diffraction.
4. A soap film of refractive index  $4/3$  and of thickness  $1.5 \times 10^{-4}$  cm is illuminated by white light incident at an angle of  $60^\circ$ . The light reflected by it is examined by spectroscope in which it is found a dark band corresponding to wavelength of  $5 \times 10^{-5}$  cm. Calculate the order of interference of the dark band.
5. Explain the properties of LASER.
6. The Numerical Aperture of an optical fiber is 0.2 when surrounded by air. Determine the refractive index of its core, given the refractive index of the cladding 1.59. Also find the acceptance angle when the fiber is in water. Assume the refractive index of water as 1.33.
7. What do you mean by expectation values ?
8. What are the properties of ultrasonic wave ?

(8 × 5 = 40 marks)

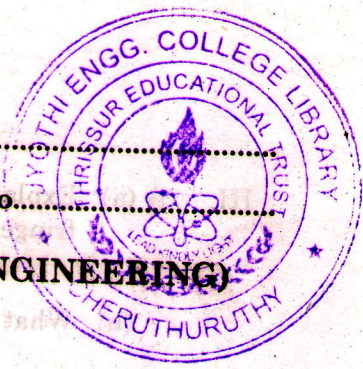
**Part B**

- II. (i) (a) Explain the working of a transistor in common emitter configuration with its characteristics. (9 marks)
- (b) Define Fermi energy level. Where would you expect its position in (1)  $n$ -type semiconductor (2)  $p$ -type semiconductor. (6 marks)

Or

- (ii) (a) Discuss BCS theory of superconductivity. (10 marks)
- (b) What are the properties of superconductors ? (5 marks)

Turn over





III. (i) (a) Explain the construction and working of Michelson interferometer. Discuss the types of fringes observed in Michelson interferometer.

(10 marks)

(b) What is an air wedge ? How can it be used to determine the thickness of a hair ?

(5 marks)

Or

(ii) (a) Develop the theory for positions of maximum and minimum intensity for the diffraction pattern due to a straight edge.

(10 marks)

(b) Define dispersive power of a grating and show that it is directly proportional to number of lines per cm.

(5 marks)

IV. (i) (a) Describe the construction and working of a Nicol prism.

(8 marks)

(b) What are quarter wave and half wave plates ? Describe their applications.

(7 marks)

Or

(ii) (a) Briefly explain the construction and working of He-Ne Laser.

(10 marks)

(b) Draw the block diagram of an optical fiber communication system. What are its advantages.

(5 marks)

V. (i) (a) Discuss Planck's hypothesis and derive the Planck's equation for black body radiation.

(10 marks)

(b) Calculate de-Broglie wavelength for a beam of electrons whose energy is 45 eV.

(5 marks)

Or

(ii) (a) What are ultrasonic waves and how it is generated ?

(10 marks)

(b) List the important applications of ultrasonics.

(5 marks)

[4 × 15 = 60 marks]