B.E. DEGREE EXAMINATION, APRIL/MAY 2003.

Second Semester

Computer Science and Engineering

PH 136 — SEMICONDUCTOR PHYSICS AND OPTO ELECTRONICS

Time : Three hours   Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is covalent bond? Give the structure of a crystal having this bond.

2. What is intrinsic semiconductor? Give two examples.

3. What is shape memory-effect? Give two applications of shape memory alloys.

4. What materials are used to encapsulate IC packages? Mention their properties.

5. What is modulation and demodulation?

6. What is Franz–Keldysh effect?

7. A silica fiber has a core refractive index of 1.5 and cladding refractive index of 1.47. Determine the critical angle at the core cladding interface and numerical aperture.

8. Briefly discuss STEP and GRADED index optical fiber.

9. Explain how data are recorded on very small segment of the magnetic storage.

10. Differentiate between hard and soft magnetic materials.

PART B — (5 × 16 = 80 marks)

11. Obtain an expression for the carrier concentration in an intrinsic semiconductor. Calculate the intrinsic concentration of charge carriers at 300 K, given that $m_e^* = 0.12\, m_o$, $m_h^* = 0.28\, m_o$ and the value of band gap = 0.67 eV.

12. (a) What is superconductivity? Mention any three high temperature superconductor and what is the value of the energy gap in these materials. Briefly discuss their application in medicine, transport, power transmission and electrical engineering.

Or

(b) Explain the basic principle of LCD and describe the construction and working of PIN diodes.

13. (a) Describe with necessary theory the linear quadrate electro-optic effects in a compound semiconductor.

Or

(b) Draw a block diagram of a controller–modulator and its equivalent circuit and explain the working of the same.

14. (a) Give the principle and design of optical amplifier. What are the advantages of ERBIUM doped fiber amplifier?

Or

(b) Describe schematically the basic elements of a fiber optics communication system. What are the advantages of using fiber optics communication system? Enumerate some applications.

15. (a) What is a magnetic bubble? What are the different bubble materials used and how they are used for data storage?

Or

(b) What is holography? Distinguish between a hologram and photographic film. What are its uses and what are the different types of holographic techniques used?

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