

**B 547**

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2005.

Second Semester

Computer Science and Engineering

PH 136 — SEMICONDUCTOR PHYSICS AND OPTOELECTRONICS

(Common to Information Technology)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is the physical significance of the wave function ' $\psi$ '?
2. Calculate the band gap of the LED material if the wavelength of emission is 549 nm.
3. Explain a shape memory alloy by giving an example.
4. Give any four examples for IC packaging materials.
5. Explain Franz-Keldysh and Stark effect.
6. Discuss the principle involved in optical switching.
7. A signal of 150 mW is injected into a fiber. The out coming signal from the other end is 50 mW. What is the loss in dB?
8. What is magneto optical effect?
9. Explain briefly importance of the charge-coupled devices?
10. What is the principle involved in the phase change recording?

PART B — (5 × 16 = 80 marks)

11. (i) Derive Schrodinger's wave equation for a particle in a box. (10)
- (ii) Calculate the half wave voltage for Lithium niobate at a wavelength of  $1.06 \mu\text{m}$  ( $n_0$  for  $\text{LiNbO}_3 = 2.29$  and linear electro-optic coefficient  $r = 30.8 \text{ pm V}^{-1}$ ). (6)

12. (a) (i) Discuss in detail the features of analog and digital modulators. (4)
- (ii) Describe Franz-Keldysh and Stark effect modulators. (12)

Or

(b) Write notes on :

- (i) Electro optic modulator and
- (ii) QWEAM. (8 + 8)

13. (a) (i) What are metallic glasses? (4)
- (ii) Explain in detail about their importance and applications. (12)

Or

- (b) (i) Explain high temperature superconductivity by giving an example. (4)
- (ii) What are the merits and demerits of liquid crystal display? (4)
- (iii) Explain briefly the importance and applications of shape memory alloys. (8)

14. (a) Discuss the various light sources for fiber optics and explain about advantages of the fibre optic communication. (16)

Or

- (b) (i) Explain the principles of optical fiber communication. (4)
- (ii) What are the different modes of propagation of light through fiber? (5)
- (iii) Explain the various loss mechanisms involved during signal propagation. (7)

15. (a) (i) Explain the principle involved in bubble memory devices. (4)  
(ii) Give four examples of bubble materials used in memory devices. (4)  
(iii) What are the important parts of the digital magnetic tape system? (8)

Or

- (b) (i) Discuss in detail about the holographic data storage? (12)  
(ii) Compare phase change recording and magneto-optic recording. (4)
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