D 23137 (Pages : 2) Name.....

Reg. No.....

SEVENTH SEMESTER B.TECH. (ENGINEERING) DEGREE EXAMINATION, DECEMBER 2011

EC 04 703—OPTICAL COMMUNICATION SYSTEM

Time : Three Hours Maximum : 100 Marks

Answer **all** *questions.*

I. (a) With the cross-sectional views of the transverse electric field vectors for the four lowest-order modes in a step-index fibers.

(b) What is Numerical Aperture (NA) ? Briefly explain.

(c) For GaAs at 300 K,

Electron rest mass $m = 9.11 \times 10^{-31}$ kg.

Effective electron mass $m_e = 0.068$ m.

$= 6.19 \times 10^{-32}$ kg.

Effective hole mass $m_h = 0.56$ m.

$= 5.10 \times 10^{-31}$ kg.

Band-gap energy $E_g = 1.42$ eV

Calculate the intrinsic carrier Concentration x_i.

(d) Define Responsivity and Sensitivity.

(e) Write short note on Shot noise.

(f) Briefly describe the non-linear effects in fiber propagation.

(g) Briefly explain Raman amplifier.

(h) What is saturation induced cross talk ?

($8 \times 5 = 40$ marks)

II. (a) (i) Explain in detail about dispersion in single mode fibers. (8 marks)

(ii) Write a short note on mode Coupling. (7 marks)

Or

(b) What are the losses in optical fibers ? Explain them in detail.

III. (a) Explain the modulation Capability and transient response.

Or

(b) Discuss in detail about the various laser diode structures, their principle of operation and radiation patters.

Turn over

IV. (a) With block diagram, explain the fundamental Concept of a Coherent lightwave system.

Or

(b) Derive an expression for the BER of :

(i) OOK Homodyne system. (7 marks)

(ii) PSK Homodyne system. (8 marks)

V. (a) Explain in detail about Kerr effect, Porillouin Scattering and their applications.

Or

(b) Explain in detail about :

(i) Semiconductor amplifier. (7 marks)

(ii) Erbium doped fiber amplifier. (8 marks)

[4 × 15 = 60 marks)