Printed Pages : 4

EEC-701

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 131701

Roll No.

B.Tech

(SEM. VII) (ODD SEM.) THEORY EXAMINATION, 2014-15

OPTICAL COMMUNICATION

Time : 3 Hours] [Total Marks : 100

Note : Attempt **all** questions.

1. Attempt any four questions. **4x5=20**

(a) A silica optical fiber with a core diameter large enough to be considered by ray diameter large enough to be considered by ray theory analysis has a core refractive index of 1.5 and cladding refractive index of 1.47. determine

(i) Critical angle at core cladding interface

(ii) NA for the fiber

(iii) Acceptance angle

(b) An optical fiber has numerical aperture of 0.344. what is the acceptance angle for meridional rays ?calculate the acceptance angle for skew rays which change direction by 100° at each reflection.

(b) What are spontaneous emission and simulated emission? Explain the principle of laser action.

(c) Explain and derive Einstein relation.

(d) Differentiate between surface emitter LED and edge emitter LED.

(e) Explain the process of population inversion.

4. Attempt any two questions. **2x10=20**

(a) Explain the working of PIN photodiode. A p-i-n photodiode has a quantum efficiency of 55% at a wavelength of 0.9 micrometer. Calculate:

(i) Its responsivity at 0.9 micrometer

(ii) The received optical power if the mean photocurrent is 10^{-8} A.

(iii) The corresponding number of received photons at this wavelength.

(b) Draw and discuss the explain avalanche photodiode receiver and derive expression for SNR.

(c) Draw the block diagram of optical receiver. What are the various sources of noise in the receiver?

5. Attempt any four questions. **4x5=20**

(a) Explain link power budget. A 5km length optical fiber link has a fiber cable which has attenuation of 4 db km^{-1} and connector losses at the source and detector are 4 and 3.5. considering no dispersion on the link, calculate the total channel loss.

(b) Explain OTDR.

(c) What are the basic requirement of WDM ?

(d) In power budget analysis determine the expression for average power launched for any transmitter and channel loss.

(e) Discuss optical power penalties.
