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BIELE-008

B.Tech. – VIEP – ELECTRONICS AND COMMUNICATION ENGINEERING (BTECVI)

Term-End Examination

00936 **December, 2014**

BIELE-008 : OPTO ELECTRONICS COMMUNICATION SYSTEMS

Time : 3 hours *Maximum Marks : 70*

Note : *Attempt any **seven** questions. All questions carry equal marks.*

1. (a) Give a block diagram of basic optical fibre communication system. List the advantages of optical fibre communication systems. 5

(b) Define the following terms related to optical fibres : 5

(a) Cone of acceptance

(b) Acceptance angle

2. (a) Give Maxwell's equations governing propagation of light waves through optical fibre. 5

(b) Compare 'step-index' and 'graded index' optical fibre. 5

3. (a) Give the classification of optical fibre depending upon fibre mode and refractive index variation. *5*

(b) Calculate the maximum radius allowable for a single mode fibre with $n_1 = 1{\cdot}53$, $n_2 = 1{\cdot}5$ operating at a wavelength of 1300 nm. *5*

4. (a) Define the following terms related to optical fibre : *5*

(i) Absorption loss

(ii) Scattering loss

(b) An LED with a spectral width of 17 nm is used as an optical source. The optical fibre is of 20 km length. Due to material dispersion, the pulse spreads at the output at 1·76 ns/km. Calculate the amount of material dispersion. *5*

5. Discuss the following terms related to optical source Light Emitting Diode (LED) : *10*

(a) Excitation process

(b) Recombination process

(c) Photon extraction process

6. (a) Briefly discuss process of photodetection. *5*

(b) Give physical principles and working principles of P-I-N photodetector. *5*

7. Calculate the maximum 3 dB bandwidth for a silicon P-I-N photodiode with a 25 μm depletion layer width and with a carrier velocity of 3×10^4 ms^{-1}. *10*

8. Write short notes on the following : *10*

   (a) LASER Diode

   (b) Avalanche Photodetector

9. Discuss the following terms associated with optical communication receivers : *10*

   (a) Low impedance pre-amplifier

   (b) High impedance pre-amplifier

   (c) Trans impedance pre-amplifier