PVP 12

Code: EC7T1

IV B.Tech - I Semester – Regular / Supplementary Examinations
November 2016

OPTICAL COMMUNICATIONS
(ELECTRONICS & COMMUNICATION ENGINEERING)

Duration: 3 hours Max. Marks: 70

Answer any FIVE questions. All questions carry equal marks

1.

a) With the help of block diagram, explain about general optical fiber communication system. 7 M

b) Write the applications of optical fiber communication systems. 7 M

2.

a) Define total internal reflection. Explain how it helps in guiding signal in waveguide. 7 M

b) A silica optical fiber with a core diameter large enough to be considered by ray theory analysis has a core refractive index of 1.5 and a cladding refractive index of 1.47 . Calculate the numerical aperture, critical angle at core-cladding interface, acceptance angle in air for the fiber. 7 M

3.

a) Discuss about nonlinear scattering losses in Optical fiber. 7 M

b) A long single-mode optical fiber has an attenuation of 0.5dBkm^{-1} when operating at a wavelength of 1.3 μm. The fiber core diameter is 6 μm and the laser source bandwidth is 600 MHz. Compare the threshold optical powers for stimulated Brillouin and Raman scattering within the fiber at the wavelength specified. 7 M

4.

a) Explain various fiber splicing techniques. 7 M

b) The end faces of two optical fibres with core refractive indices of 1.5 are perfectly aligned and have a small gap between them. This gap is filled with a gel having refractive index of 1.3. Find the Optical losses in dB at this joint. 7 M

5.

a) Define population inversion. Differentiate stimulated and spontaneous emissions in optical sources. 7 M

b) Calculate the ratio of the stimulated emission rate to the spontaneous emission rate for an incandescent lamp

operating at a temperature of 1000k. Assume average operating wavelength as 0.5μm. 7 M

6.

a) Write about P-i-N photodiodes in optical communications. 7 M

b) When $3X10^{11}$ photons each with a wavelength of 0.85μm are incident on a photodiode. On an average $1.2 X 10^{11}$ electrons are collected at the terminals of the device. Determine the Quantum efficiency and Responsivity of the photodiode at 0.85μm. 7 M

7. Draw the block diagram of basic optical fiber receiver system and explain about each block in detail. 14 M

8.

a) Draw and explain about setup for measurement of dispersion of pulse in time domain. 7 M

b) Write in detail about optical Time Domain Reflectometry. 7 M