1079

B. Engg. (Electronics & Comm. Engg.)
7th Semester
EC-708: Fiber-Optics Communication Systems

Exam. Code: 0931
Sub. Code: 6889

Time allowed: 3 Hours

Max. Marks: 50

NOTE: Attempt _five_ questions in all, including Q. No. 1 which is compulsory and selecting atleast two questions from each Section.
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1.
a) Differentiate WDM and DWDM.
b) Define Numerical Aperture. Correlate NA and relative refractive index difference.
c) Why light travels within a cladding faster than it does within a core? Explain with suitable mathematical support.
d) "V number depends on the operating wavelength." Write an expression to justify the statement?
e) The refractive index of a material used for fabricating an LED is 3.2. Calculate its external quantum efficiency.

(2×5)

Section-A

2. Explain the block diagram of optical communication system explaining the different components of each block. Discuss the various advantages of Optical Fiber Communication. (10)

3. (a) Differentiate the skew and meridional rays with the help of suitable diagram.
(b) Calculate the limitation in transmission length caused by fiber loss if A=0.2dB/km, P_{in} = 0.029mW, and P_{out} = 0.001mw, where A is fiber attenuation, P_{in} is light power launched into the fiber, and P_{out} is power coupled to a photodiode.
(c) What is Splicing? Discuss the various types of splicing techniques. (3,3,4)

4. (a) Calculate chromatic dispersion in a singlemode fiber at the 1550nm operating wavelength with $\Delta\lambda$ = 1nm, $D(\lambda)$= 15ps/nm.km and L = 1km.
(b) How is the data rate of the fiber link related to total dispersion? Differentiate material and waveguide dispersion.
(c) What is Four Wave Mixing? Enlist the various means to reduce FWM. (2, 4, 4)

Section B

5. (a) Differentiate absorption, spontaneous emission and stimulated emission. (5,5)
(b) Discuss the rise time budget with suitable example.

6. (a) Define the Quantum efficiency and responsivity of a photodetector. Derive an expression for the responsivity of an intrinsic photodiode in term of the quantum efficiency of the device and the wavelength of the incident radiation. Also find the wavelength at which quantum efficiency and responsivity are equal. (6,4)
(b) What is fiber grating? Discuss its applications.

7. (a) Define Eye Diagram. How it is significant in performance analysis of a system. Explain the following terms with the help of a suitable labeled eye diagram: rise time, eye height and jitter. (6,4)
(b) Write short note on Photonic Microwave.

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