Code: R7420401

R7

B.Tech IV Year II Semester (R07) Supplementary Examinations, March/April 2013

OPTICAL COMMUNICATIONS

(Electronics and Communication Engineering)

Time: 3 hours Max Marks: 80

Answer any FIVE questions

All questions carry equal marks

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1 (a) Discuss the advantages of optical fibre communications in detail.
(b) Write about ray theory transmission in optical fibre waveguides.

2 Discuss about various fibre materials used in optical communications in detail.

3 (a) Explain various types of connectors used for optical fibres.
(b) Write about intermodal dispersion and pulse broadening.

4 Explain splicing techniques and joint losses for multimode and single mode fibres.

5 (a) Write expression for power coupled into a step index fiber from an LED source.
(b) An LED with circular emission region of diameter 100 μm and axial radiance of 100 W/cm^2-sr at 100 mA drive current is coupled into a step index fiber of 50 μm diameter and of 0.22 numerical apertures. Compute the power coupled into this step index fiber. Compute the % difference in coupled power if the radius of the fiber is (i) Halved. (ii) Doubled.

6 (a) Describe photo carrier generation and internal multiplication processes in an avalanche photo diode.
(b) Define quantum efficiency and the responsivity of a photo detector and derive the expression for the responsivity of an intrinsic photo detector in terms of the quantum efficiency of the device and the wavelength of the incident radiation.

7 (a) Describe with relevant diagrams about the signal path through optical data link via transmitter, fiber and receiver giving the nature of the signal waveform.
(b) What is bit period? The bit frequency of the link is 10^9 Hz. On the average one error is encountered in a second. Find the value of bit error rate (BER).

8 (a) Explain intermodal and intramodal dispersion.
(b) Compare and contrast the measurement of dispersion using time domain and frequency domain measurement techniques.

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