

Code: R7420401

R07

B.Tech IV Year II Semester (R07) Supplementary Examinations January 2014

OPTICAL COMMUNICATIONS
(Electronics and Communication Engineering)

Time: 3 hours

Max Marks: 80

Answer any FIVE questions
All questions carry equal marks

- 1 (a) Discuss about step index and graded index fibres in detail.
(b) Write about V number and mode with reference to cylindrical fibres.
- 2 Explain in detail the various causes of signal distortion in optical fibres.
- 3 (a) Explain the concept of material and wave guide dispersion.
(b) Discuss about single mode fibre connectors and its losses.
- 4 Explain the structures of LED's and discuss briefly about quantum efficiency and power bandwidth product.
- 5 (a) Consider an LED that has a circular emitting area of radius $35\text{ }\mu\text{m}$ and a Lambertian pattern with $150\text{ W}/(\text{cm}^2.\text{sq})$ axial distance at a given drive current. Compare the optical powers coupled into two step index fibres, one of which has core radius of $25\text{ }\mu\text{m}$ with $\text{NA} = 0.20$ and the other has $50\text{ }\mu\text{m}$ with $\text{NA} = 0.20$.
(b) Write short notes on equilibrium numerical aperture.
- 6 (a) Define the quantum efficiency and the responsivity of a photo detector. Derive an 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.
(b) Determine the wave length at which the quantum efficiency and the responsivity are equal.
- 7 (a) Give an account of fiber optic link power budget with an example.
(b) What is bit period? The bit frequency of the link is 10^7 Hz . On the average one error is encountered in a second, find the value of BER (Bit error rate).
- 8 (a) Explain intermodal and intramodal dispersion.
(b) Compare and contrast the measurement of dispersion using time domain and frequency domain measurement technique.
