Roll No. ..... Total Pages : 3

BT-7/D09 **8928**

OPTICAL COMMUNICATION

Paper : ECE-405(E)

Time : Three Hours] [Maximum Marks : 100

Note : Attempt *five* questions in all, selecting at least *one* question from each unit.

UNIT–I

1. (a) Give schematic of a conventional silica fibre structure. What are the advantages of fibre with cladding of slightly lower refrective index compare to core refrective index over a fibre without cladding ? 10

   (b) Calculate critical angle and numerical aperture for a step index silica fibre that has a core refrective index $n_1 = 1.48$ and cladding refractive index $n_2 = 1.46$. 10

2. (a) What do you mean by Waveguide modes? Draw sinusoidal mode field pattern in a planer dielectric waveguide for $m = 1, 2$ and 3. 10

   (b) Discuss various types of misalignment at fibre joints and give details of how these are controlled in a febre connector. 10

UNIT–II

3. (a) How do scattering losses arise in an oplical fibre ? Discuss relative contributions of Inelastic scattering over Elastic scattering. 10

(b) What are the Leaky modes and how it contributes to the losses in the fibre ? Discuss its significance compared to other losses in fibre. 10

4. (a) What are Intermodal are Ultramodal dispersion in an optical fibre describe in brief ? 10

(b) For a typical multimode slip index fibre having core diameter 50 μm and refrective index 1.46 and cladding refrective index 1.44 working at wavelength $\lambda = 0.85$ μm, calculate frequency parameter V and total number of modes M. 10

UNIT–III

5. (a) Discuss application of Semiconductor laser in optical communication. Show typical laser spectrum for a gain guidcd laser diode and sketch variation of its output power with current in such laser diode. 10

(b) What is relative advantage of Single mode laser diode over Multimode laser diodes in optical communication? How do temperature effects output characteristics of single mode laser diode ? 10

6. (a) Give a schematic block diagram for a coherent transmission-receiver system. Mention difference between homodyne and heterodyne coherent receivers. 10

(b) Give characteristic of Avalanche Photodiode (APD). Discuss effect of temperature on the Avalanche multiplication factor. 10

UNIT–IV

7. (a) What is the difference between a Devider/Combiner and a Coupler ? Show that more complex couplers can be made from combination of 2×2 couplers. 10

(b) Discuss source selection and power budgeting in an optical link design. 10

8. (a) What is Wavelength Division Multiplexing (WDM) ? Discuss its application and advantages in brief. 10

(b) Discuss working of Optical amplifiers. What contributions it has made in modern optical communication ? 10