B.E. Seventh Semester (Electronics / Electronics & Telecommunication / Electronics Communication Engineering) (C.B.S.)

Optical Communication

P. Pages : 2

Time : Three Hours

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0087

Max. Marks : 80

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Notes :
1. All questions carry marks as indicated.
2. Solve Question 1 OR Questions No. 2.
3. Solve Question 3 OR Questions No. 4.
4. Solve Question 5 OR Questions No. 6.
5. Solve Question 7 OR Questions No. 8.
6. Solve Question 9 OR Questions No. 10.
7. Solve Question 11 OR Questions No. 12.
8. Due credit will be given to neatness and adequate dimensions.
9. Assume suitable data whenever necessary.
10. Illustrate your answers whenever necessary with the help of neat sketches.
11. Use of non programmable calculator is permitted.

1. a) Describe with the aid of simple ray diagram. **8**
   i) The multimode step index fiber.
   ii) The single mode step index fiber.
   Compare the advantages and disadvantages of these two types of fiber for use as an optical channel.

   b) Discuss the advantages of optical fiber. **5**

OR

2. a) Define numerical Aperture Derive the expression for N A. and hence prove that N.A. = $\sin \theta_a$ where θ_a = acceptance angle. **7**

   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 interface of 1.47. then determine. **6**
   i) Critical angle at the core-cladding interface.
   ii) The NA for the fiber.
   iii) Acceptance angle in the air for the fiber.

3. a) Explain double crucible method for fiber fabrication with neat diagram. **7**

   b) Discuss the different mechanisms responsible for attenuation in optical fibers. **6**

OR

4. a) Discuss the following losses in optical fibers. **7**
   i) Bending loss
   ii) Absorption loss.

   b) Determine the maximum transmission distance for a fiber link if fiber attenuation is 0.5 dB/kM input power is lmw and output power is 50 μw . **6**

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5.	a)	What is splicing? Explain the basic splicing techniques used.	**7**
	b)	With the aid of simple sketches outline the major categories of multiport optical fiber coupler.	**7**

<div align="center">**OR**</div>

6.	a)	Explain the mechanism of population inversion in case of semiconductor LASER with the help of energy level diagram.	**7**
	b)	Derive an expression for internal quantum efficiency of LED.	**7**

7.	a)	Explain with the help of neat diagram. Reach through Avalanche Photo Diode (RAPD).	**7**
	b)	A Photodiode has a quantum efficiency of 65% when photon of energy 1.5×10^{-19}J are incident upon it. calculate. i) At what wavelength is the photodiode operating? ii) The incident optical power required to obtain a photo current of 2.5 μA, when the photodiode is operating.	**6**

<div align="center">**OR**</div>

8.	a)	Explain the factors affect the speed of response of a photodiode.	**7**
	b)	Write short note on Analog receivers.	**6**

9.	a)	Draw and explain the basic elements of analog link.	**7**
	b)	Write short note on carrier-to-noise ratio.	**6**

<div align="center">**OR**</div>

10.	a)	Explain what are the different system considerations for digital link.	**7**
	b)	Draw optical power loss model for a point – to – point link. and explain link power budget.	**6**

11.	a)	Explain operational principle of WDM.	**7**
	b)	Explain the general applications of optical amplifiers.	**7**

<div align="center">**OR**</div>

12.	a)	Explain in detail Erbium Doped Fiber Amplifier. (EDFA).	**7**
	b)	Explain the Frequency domain Intermodal dispersion measurements.	**7**

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