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15EC82

Eighth Semester B.E. Degree Examination, June/July 2024
Fiber Optics and Networks

Time: 3 hrs.   Max. Marks : 80

Note: *Answer any FIVE full questions, choosing ONE full question from each module.*

Module-1

1. a. With the help of neat diagram, explain the man blocks of an optical fiber communication link. **(10 Marks)**
   b. Explain the advantages and disadvantages and applications of optical fiber communication system. **(06 Marks)**

OR

2. a. With the neat diagram, discuss the structure of single mode and multimode step index fiber with advantages for each type. **(08 Marks)**
   b. A silica glass optical fiber has a core refractive index of 1.480 and the cladding refractive index of 1.460 ($n_1 = 1.480$, $n_2 = 1.460$) calculate critical angle, acceptance angle and numerical aperture and the number of guided modes at 1300mm if cone radius is 20µm. **(08 Marks)**

Module-2

3. a. Explain the different mechanism caused by absorption loss. **(05 Marks)**
   b. The Input power to an optical fiber is 2 mw while the power measured at the output end is 2 µw. If the fiber alternation is 0.5 db/km, calculate the length of the fiber. **(05 Marks)**
   c. What are the different types of bending losses in fiber and explain with suitable diagram. **(06 Marks)**

OR

4. a. Explain the different types of mechanical misalignment between two fibers. **(05 Marks)**
   b. What are the different types of splicing and explain V-groove optical fiber splicing technique. **(05 Marks)**
   c. What are the principles of good connector design? **(06 Marks)**

Module-3

5. a. Explain the structure of double heterostructure light emitter showing energy diagram and refractive index profile. **(06 Marks)**
   b. Explain the operation of the front-end amplifier showing pulse spreading in an optical signal that leads to intersymbol interference and generic structure of a high impedance amplifier. **(06 Marks)**
   c. A photodiode has a quantum efficiency of 65% when photons of energy 1.5×10^{-19}J are incident upon it.
      i)   At wavelength is the photo diode is operating.
      ii) Calculate the responsivity of a photo diode. **(04 Marks)**

OR

6	a.	Explain the physical principles of photodiode with suitable diagram.	(06 Marks)
	b.	Explain the receiver sensitivity with relevant expressions.	(05 Marks)
	c.	Explain the structure and operation of the single mode laser using basic architecture of a vertical-cavity surface emitting laser.	(05 Marks)

Module-4

7	a.	Explain the operational principle and implementations of WDM with diagram.	(08 Marks)
	b.	Explain polarization independent Isolator with a neat diagram.	(08 Marks)

OR

8	a.	Explain optical circulators and optical add/drop multiplexers in detail.	(06 Marks)
	b.	Explain the amplification mechanism in EDFA amplifier with the help of energy band diagram.	(10 Marks)

Module-5

9	a.	Explain IPV6 packet with extension header.	(06 Marks)
	b.	Explain ATM Protocol Architecture.	(04 Marks)
	c.	Explain the Basic operation of long-haul circuit switching Telecommunication Networks.	(06 Marks)

OR

10	a.	Explain Optical-cross connect architecture using optical space switches.	(08 Marks)
	b.	Explain Generic Structure of an optical burst switching networks.	(08 Marks)

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