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Question Paper Code: 47402

B.E. / B.Tech. DEGREE EXAMINATION, MAY 2018

Seventh Semester

Electronics and Communication Engineering

14UEC702-OPTICAL COMMUNICATION AND NETWORKS

(Regulation 2014)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. Snell's law is

(a) $n_1 \sin\phi_1 = n_2 \sin\phi_2$

(b) $n_1 \cos\phi_1 = n_2 \cos\phi_2$

(c) $n_1 \tan\phi_1 = n_2 \tan\phi_2$

(d) $n_1 \cot\phi_1 = n_2 \cot\phi_2$

2. The cutoff normalized frequency of single mode fiber is

(a) $V_C = 2.504$

(b) $V_C = 2.045$

(c) $V_C = 2.450$

(d) $V_C = 2.405$

3. Scattering loss occurs due to

(a) Microscopic variations

(b) Compositional fluctuations

(c) Semi-permanent joint

(d) All of the above

4. Fiber splicing is a type of

(a) Temporary joint

(b) Permanent joint

(c) Semi-permanent joint

(d) None of the above

5. Single mode laser sources are used for
(a) Short distance communication (b) Medium distance communication
(c) Long distance communication (d) All of the above
6. RAPD is
(a) Rise through avalanche photo diode (b) Repeat through avalanche photo diode
(c) Reach through avalanche photo diode (d) Reduce through avalanche photo diode
7. The advantages of preamplifier is
(a) Low bandwidth (b) High bandwidth (c) Low gain (d) Low dynamic range
8. A common method for determining the total fiber attenuation per unit length is
(a) Interferometric method (b) Cut-back method
(c) Time domain method (d) Frequency domain method
9. The transfer of information from source to destination through a series of intermediate nodes is
(a) Topology (b) Routing (c) Switching (d) Network
10. A call is blocked between the two nodes if there is
(a) No free wavelength (b) Free wavelength
(c) Limited number of wavelengths (d) None of the above

PART - B (5 x 2 = 10 Marks)

11. A silicon optical fiber with a core diameter large enough to be considered by ray theory analysis has a core refractive index of 1.50 and cladding refractive index of 1.47. Find the critical angle of the core-cladding interface.
12. What is meant by ISI?
13. Define quantum efficiency.
14. What are the methods used to measure the fiber refractive index profile?
15. Define the term soliton.

PART - C (5 x 16 = 80 Marks)

- 16.(a) (i) A silica optical fiber with a core diameter large enough to be considered by ray theory analysis has a core refractive index of 1.50 and a cladding refractive index of 1.47. Determine a) the critical angle at the core-cladding interface b) the numerical aperture of the fiber c) the acceptance angle in air for the fiber. (8)
- (ii) Give a brief note on the various modes of a planar guide. (8)

Or

- (b) Describe and derive the modes in planar guides (16)
17. (a) (i) When the mean optical power launched into an 8km length of fiber is $120\mu\text{W}$, the mean optical power at the fiber output is $3\mu\text{W}$. Determine (8)
- a) The overall signal attenuation or loss in decibels through the fiber assuming there are no common connectors or splices
 - b) The signal attenuation per kilometer for the fiber
 - c) The overall signal attenuation for a 10km optical link using the same fiber with splices at 1km intervals each giving attenuation of 1dB
 - d) The numerical aperture input/output power ratio
- (ii) write short notes on fiber bend loss (8)

Or

- (b) What is meant by fiber splicing? Explain in detail about the types of fiber splicing with neat diagram. (16)
18. (a) Explain the structure of surface emitting and edge emitting LEDs. (16)

Or

- (b) Explain the structure and working operation of APD. (16)

19. (a) What is the role of preamplifier in optical receiver? Explain the different types of Pre amplifiers. (16)

Or

(b) Give a detailed account of fiber dispersion measurements. (16)

20. (a) Explain in detail about the wavelength routed networks. (16)

Or

(b) Discuss any three non-linear effects on network performance. (16)