KUMARAGURU
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Register Number:……………………..

B.E DEGREE EXAMINATIONS: APRIL 2015

(Regulation 2009)

Seventh Semester

ELECTRONICS AND COMMUNICATION ENGINEERING

ECE120: Optical Communication

Time: Three Hours   **Maximum Marks: 100**

Answer all the Questions:-

PART A (10 x 1 = 10 Marks)

1. In which of the following wavelength silica fiber exhibits minimum attenuation?

   a) 850nm   b) 1310nm

   c) 1550nm   d) 1100nm

2. Calculate the modal birefringence of optical fiber of beat length 8 cm at 1300nm.

   a) 2.63×10^{-5} b) 5.63×10^{-5}

   c) 7.63×10^{-5} d) 1.63×10^{-5}

3. Which type of fiber supports more bandwidth?

   a) Multimode fiber   b) graded index fiber

   c) single mode fiber   d) step index fiber

4. The cut-off value of V number of an SMF is

   a) 1.405   b) 2.405

   c) 3.405   d) 5.405

5. Optical 3-dB point occurs at

   a) 0.500   b) 0.707

   c) 1.414   d) 2.000

6. Effective cut-off wavelength is the wavelength at which R (λ) = _____.

   a) 0.2dB   b) 0dB

   c) 0.4dB   d) 0.1dB

7. The average no. of electron-hole pairs created by a carrier per unit distance traveled is

   a) Charging rate   b) Drift rate

   c) Diffusion rate   d) Ionization rate

8. GaAlAs materials are suitable for the wavelength

a) 850nm
b) 1300nm
c) 1500nm
d) 1600nm

9. The system margin provided during power budgeting of an optical link

a) 60dB
b) 6dB
c) 16dB
d) 0.6dB

10. The line rate of SONET STS-1signal is

a) 61.84Mbps
b) 81.84Mbps
c) 71.84Mbps
d) 51.84Mbps

PART B (10 x 2 = 20 Marks)

11. What is the purpose of cladding for an optical fiber?

12. Define numerical aperture.

13. What are the causes for intra modal dispersion?

14. What is polarization mode dispersion?

15. Differentiate LEDs and Laser diodes.

16. What is a fiber splice?

17. What is photodiode dark current?

18. Define external quantum efficiency.

19. Mention few advantages of WDM technology.

20. What is a soliton pulse?

PART C (5 x 14 = 70 Marks)

21. a) Discuss the mode theory of circular waveguides explaining the overview of   14 modes, key modal concepts and the linearly polarized modes

(OR)

b) What are meridional rays? Derive an expression to find the total no. of reflections and the total distance traveled by the meriodonal rays over a length 'L' of a fiber.

22. a) What is attenuation? Explain the three basic attenuation mechanisms in detail.

(OR)

b) Explain the material and waveguide dispersions which are the basic causes for intra modal dispersion.

23. a)   Explain how a DH structure helps in confinements in various LED structures.

(OR)

b)   Explain the lencing schemes used for coupling improvement.

24. a)   Explain the structure and operation of PIN & APD photo detectors with neat diagrams.

(OR)

b) (i)   Explain the various noises in photo detector that affects the detection system.   (8)

     (ii)   A pin photo detector has the following parameters at a wavelength of 1300nm: (6) ID = 4nA, = 0.90, RL = 1k & the surface leakage current is negligible. The incident optical power is 300nW and the receiver bandwidth is 20MHz. Find the various noise terms of the receiver.

25. a)   Perform the link power and rise time budget analysis for an optical network to test its viability.

(OR)

b) (i)   Explain in detail the operational principles of WDM.   (8)

     (ii)   Write short notes on SONET.   (6)

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