Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 52461

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2017

Seventh Semester

Electronics and Communication Engineering

EC2402 – OPTICAL COMMUNICATION AND NETWORKING

(Regulations 2008)

[Common to PTEC2402 – Optical Communication and Networking for BE (Part-Time) Sixth Semester – ECE – Regulations 2009]

Time : Three Hours

Maximum : 100 Marks

Answer ALL questions.

PART – A

(10×2=20 Marks)

1. What are the conditions for total internal reflection ?

2. A silica optical fiber with a large core diameter has a core refractive index of 1.5 and a cladding refractive index of 1.47. Determine the acceptance angle in air for the fiber.

3. Mention the factors that cause Scattering losses.

4. Define dispersion in optical fibers.

5. Enlist the advantages of LED.

6. Why are semiconductor based photo detectors preferred to other types of photo detectors ?

7. Define quantum limit.

8. Define the probability of error.

9. Mention the key features of WDM.

10. Calculate the number of independent signals that can be sent on a single fiber in the 1525-1565 nm bands. Assume the spectral spacing as per ITU-T recommendation G.692.

PART – B (5×16=80 Marks)

11. a) i) Explain about the transmission of light through step index fiber with neat diagrams. (8)

ii) A fiber has a core radius of 25 micrometer, core refractive index of 1.48 and relative refractive index difference (Lambda) is 0.01. If the operating wavelength is 0.84 micrometer, find the value of normalized frequency and the number of guided modes. Determine the number of guided modes if refractive index difference is reduced to 0.003. (8)

(OR)

b) i) Write notes on skew rays. (7)

ii) With suitable diagrams, explain briefly about the Modes in a planar guide. (9)

12. a) i) Examine absorption losses in optical fibers. (10)

ii) A continuous 12 Kms long optical fiber link has a loss of 1.5 dB/km. Propose a proper solution to find the minimum optical power that must be launched into the fiber to maintain the optical power level of 0.3 μwatt at the receiving end. Find the required input power. If the fiber has a loss of 2.5 dB/km. Distance L = 12 km; attenuation = 1.5 dB/km; P(0) = 0.3μw. (6)

(OR)

b) i) What is meant by 'fiber splicing' ? Explain splicing of optical fibers. (8)

ii) Write a brief note on fiber alignment and joint loss. Describe the various types of fiber connectors and couplers. (8)

13. a) i) Draw and explain the Double based Hetero structure LED. (8)

ii) Draw the schematic diagram of a injection laser with a Fabry-Pérot cavity and explain. (8)

(OR)

b) i) With suitable diagrams, explain the construction and operation of Avalanche photodiodes. (8)

ii) Compare PIN and APD. (8)

14. a) i) Discuss the different noise sources and disturbances in optical receivers. (8)

ii) Draw and explain the circuit diagram of any two types of pre-amplifiers used in a receiver. (8)

(OR)

b) Write detailed notes on the following :

i) Fiber diameter measurement (16)

ii) Fiber cut off wavelength measurement. (16)

15. a) Explain in detail Broadcast and select WDM Networks. (9)

(OR)

b) i) What are solitons ? Explain. (7)

ii) Explain in detail about SONET frame structure.

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