Model Question Paper

SEVENTH SEMESTER B.TECH DEGREE EXAMINATION

(2013 Scheme)

Electronics And Communication Engineering

13.702 OPTICAL COMMUNICATION(T)

Time:3 hours Max.Marks:100

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PART A

(Answer all questions from PART A)

1. Differentiate between graded index and step index fiber
2. A multimode step index fiber with core diameter 60μm and relative refractive index of 1% is operating at 0.80μm.Determine normalized frequency parameter of the fiber.
3. Define LED efficiency. What is the power coupled in to a step index multimode fiber whose core refractive index is 1.48 and cladding refractive index is 1.46 if LED radiates 100μwpower.
4. An optical fiber with attenuation of 0.25dB/Km is used for 20Km transmission. The light power launched in to the fiber is 2 mW.What is the output power?
5. Differentiate between optical sources LED and ILD.
6. Differentiate between optical isolator and optical circulator.
7. A 2x2 coupler has an input optical power level of 200μW.The output powers at the other three ports are P1=90μW, P2=85μW and P3=6.3nW.Find coupling ratio and return loss for this coupler.
8. Compare Avalanche photodiode and PIN photodiode.
9. Define quantum limit of detection and receiver sensitivity.
10. Define responsivity of photodiode.Photons of energy $1.53x10^{-19}$ J are incident on a photodiode which has a responsivity of 0.65 A/W.If the optical power level is 10μW,find the photocurrent generated.

(10x2=20 Marks)

PART B

(Answer any one question from each module and each question carries 20 marks)

MODULE 1

11. a) Express the pulse spreading time caused by modal dispersion in terms of relative refractive index.
    b) Calculate the pulse spreading due to modal dispersion and the maximum number of bits/second,that can be transmitted over 1 Km with a step index fiber if NA=0.2 and n1=1.486.
12. a)List the major causes of attenuation in an optical fiber and explain.
    b)Explain intramodal and intermodal dispersion in optical fiber.

MODULE 2

13. InGaAsP LED operating at 1310nm has radiative and non- radiative recombination times of 30 and 100ns respectively.The current injected is 40mA.Calculate,
    i)bulk recombination lifetime ii)internal quantum efficiency
    iii)internal power level.
14. Explain the working principle of injection LASER diode and surface emitting LED.

MODULE 3

15. a)Explain the working of EDFA with suitable diagram.
    b)An EDFA is pumped at 980nm with a 30 mW pump power. If the gain at 1550nm is 20dB,what are the maximum input and output powers?
16. a)Explain the working principle of OTDR and its uses.
    b)Draw the diagram of coherent detection system and explain.Compare coherent detection and IMDD systems.

MODULE 4

17. Draw the block diagram of soliton communication link.What are the design constraints in soliton communications link.
18. a)Explain the concept of demultiplexing function using a fiber grating and an optical circulator.
    b)Explain with diagrams the method of multiplexing four wavelengths using fiber Bragg grating and circulators.