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P.E.S. College of Engineering, Mandya - 571 401
(An Autonomous Institution affiliated to VTU, Belgaum)
Seventh Semester, B.E. - Electronics and Communication Engineering
Semester End Examination; Dec. - 2015
Optical Fiber Communication

Time: 3 hrs   *Max. Marks: 100*

Note: Answer any **FIVE** full questions, selecting at least **TWO** full questions from each part.

PART - A

1 a. Derive an expression for maximum acceptance angle of an Optical fiber.   6

   b. A step index multimode fiber with a numerical aperture of 0.20 supports approximately 1000 modes at 850 nm wave length,

     (i) What is the diameter of its core?

     (ii) How many modes does the fiber support at 1550 nm?   6

   c. With neat sketch, describe the vapour phase axial deposition method of drawing optical fibers.   8

2 a. Explain the different types of Bending loss in Optical fibers.   6

   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 attenuation is 0.5 dB/km calculate the length of the fiber.   6

   c. With the help of a neat diagram, explain surface emitting LED.   8

3 a. Sketch and explain the following splicing techniques:

     (i) Electric Arc fusion splicing

     (ii) V-Groove splicing

     (iii) Elastic tube splicing   9

   b. Sketch and explain expanded beam connectors. What are its disadvantages?   5

   c. Consider an LED with a circular emitting area of radius 36 μm and a Lambertian emission pattern with 151 W. Compare the optical power coupled into two step index fibers.   6

4 a. Sketch and explain the working of Avalanche photodiode.   8

   b. With the help of a neat schematic diagram, explain the working of optical receiver.   8

   c. A given APD has quantum efficiency of 65% at wave length of 900 nm. If 0.5 μW of optical power produces a multiplied photo current of 10 μA find multiplication factor M.   4

PART - B

5 a. Sketch and explain :

     (i) Multichannel Amplitude modulation   (ii) Sub - carrier multiplexing.   12

   b. With a neat diagram, explain power loss model for point to point link.   8

6 a. Explain the feature of WDM.   8

   b. With a schematic diagram explain the working principle of star coupler and 2 x 2 fiber coupler.   12

7 a. Explain briefly, semiconductor optical amplifier (SOA) and doped fiber amplifier (DFA). 8

   b. Explain the following LAN topologies in optical networks :

     i) Linear bus

     ii) Ring topology   6

     iii) Star topology

   c. An EDFA amplifier produces $Ps_{out} = 27$ dBm for an in out level of 2 dBm at 1542 nm.

     i) Find Amplifier gain   6

     ii) What is the minimum pump power required.

8 a. Describe the following :

     (i) SONET/SDH Rings

     (ii) SONET/SDH Networks   12

     (iii) Frame format of SONET/SDM.

   b. With neat sketches, explain optical Add/drop multiplexing. 8

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