Code No: 138DY **R16**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech IV Year II Semester Examinations, September - 2020
OPTICAL COMMUNICATIONS
(Electronics and Communication Engineering)

Time: 2 Hours **Max. Marks: 75**

Answer any Five Questions
All Questions Carry Equal Marks
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1.a) Prove that the total number of modes entering the Step index Fiber is $M = V^2/2$.
b) A multimode step index fiber with a core diameter of 80 μm and a relative index difference of 1.5% is operating at a wavelength of 0.85 μm. If the core refractive index is 1.48, estimate i) the normalized frequency for the fiber ii) the number of guided modes. [8+7]

2.a) Describe with neat diagram different types of optical fiber waveguides. Using ray theory explain the propagation of light inside the fiber.
b) Write a short notes on different fiber materials. [9+6]

3.a) Differentiate between Splicer and Connector. Also, explain about different types of connectors
b) A multimode graded index fiber exhibits total pulse broadening of 0.1 μs over a distance of 15 km. Estimate i) the pulse dispersion per unit length ii) the bandwidth-length product for the fiber. [9+6]

4.a) Explain different mechanisms which causes absorption.
b) Discuss the main causes of intramodal dispersion. [9+6]

5.a) Describe with aid of suitable diagram, three common technique used for mechanical splicing of optical fibers.
b) With the help of a schematic diagram, explain the design of an edge emitting LED. [6+9]

6.a) Discuss the principle of operation of LASER diodes. What are the effects of temperature on the performance of LASER diode?
b) Discuss about the reliability of LED and ILD. [9+6]

7.a) Explain the working of P-I-N photodiode. Also explain the factors that limit the speed of response of photodiode.
b) With the help of a schematic diagram, explain briefly construction and operation of APD. [8+7]

8.a) Explain link power budget for point–to-point link.
b) Discuss about overall fiber dispersion in multi-mode fibers. [9+6]

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