Code No: **R1641044** **R16** **Set No. 1**

IV B.Tech I Semester Supplementary Examinations, July/Aug - 2021

OPTICAL COMMUNICATIONS

(Electronics & Communication Engineering)

Time: 3 hours **Max. Marks: 70**

Question paper consists of Part-A and Part-B
Answer ALL sub questions from Part-A
Answer any FOUR questions from Part-B
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PART–A *(14 Marks)*

1. a) Define acceptance angle and numerical aperture. [3]
   b) Define scattering losses. [2]
   c) Classify fiber alignments. [2]
   d) Explain how the temperature effects on avalanche gain. [2]
   e) What is equilibrium numerical aperture? [2]
   f) Define link power budget. [3]

PART–B *(4x14 = 56 Marks)*

2. a) A step index multi-mode fiber with a NA of 0.2 supports approximately 1000 modes at an 850nm wavelength. What is the diameter of the core? How many modes the fiber supports at 1320nm and at 1550nm. [7]
   b) List the advantages, disadvantages and applications of Optical fiber communication systems. [7]

3. a) Explain different types of bending losses in optical fiber. [7]
   b) Discuss the following parameters for optical fibers. [7]
   i)Wave guide dispersion ii)Material dispersion

4. a) With aid of simple sketches, outline major categories of fiber couplers. [7]
   b) What is fiber splicing? Explain the fiber splicing of optical fibers with relevant diagrams. [7]

5. a) Derive equations for photo detector noise current and Johnson noise current. [7]
   b) With help of neat diagrams, explain the operation of an edge emitting LED. Mention its special features and usage. [7]

6. a) Discuss about power coupling and power launching. [7]
   b) Derive the equation for the performance fidelity of an analog receiver. [7]

7. a) Derive an expression for the total system rise time budget in terms of transmitter, fiber and receiver rise time. [7]
   b) Describe the operational principles of WDM and its network containing various types of optical amplifiers. [7]