Sub Code: REC075

Paper Id: 130735 Roll No:

B TECH
(SEM –VII) THEORY EXAMINATION 2019-20
Optical Communication

Time: 3 Hours *Total Marks: 70*

Note: 1. Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. Attempt *all* questions in brief. 2 x 7 = 14

a.	Define Numerical aperture of a step index fiber.
b.	What is Intra Modal Dispersion?
c.	What is the need of Cladding?
d.	What are the advantages and disadvantages of SM fiber and MM fiber?
e.	Define Mode Field Diameter (MFD).
f.	Define skew rays and merdional rays.
g.	Define Rayleigh Scattering and Mie Scattering.

SECTION B

2. Attempt any THREE of the following: 7 x 3 = 21

a.	Draw a block diagram of fiber optic communication system and describe the function of each component.
b.	With the help of a neat block diagram, explain the principle of working of point to point digital link.
c.	What do you understand by the term external quantum efficiency and internal quantum efficiency of a LED.
d.	Explain the working principle of PIN photo detector in detail.
e.	Draw the structures of single and multimode step index fibers and graded index fiber with their typical dimensions.

SECTION C

3. Attempt any *one* part of the following: 7 x 1 = 7

(a)	Explain Snell's law. What is total internal reflection? Explain with suitable diagram.
(b)	What do you understand by Inter Symbol Interference (ISI)? A multimode graded index fiber exhibits total pulse broadening of 0.1 μs over a distance of 15km. Estimate: (i) The maximum possible bandwidth without ISI. (ii) Pulse dispersion per unit length.

4. Attempt any *one* part of the following: 7 x 1 = 7

(a)	What are the losses on signal attenuation mechanisms in a fiber? Explain in detail.
(b)	Explain material dispersion and waveguide dispersion in detail

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5. Attempt any *one* part of the following: 7 x 1 = 7

(a)	Explain the working principle of LED. How the quantum efficiency of a LED is defined? List out various parameters which are needed to be optimized for getting maximum output power from the LED.
(b)	What types of materials are used for optical sources? What are the advantages of double Hetro structure. Compare surface emitting and edge emitting LED structures.

6. Attempt any *one* part of the following: 7 x 1 = 7

(a)	Explain avalanche photo diode and also explain effect of temperature on avalanche gain.
(b)	A silicon PIN photodiode incorporated into an optical receiver has a quantum efficiency of 60% when operating at a wavelength of 0.9mm. The dark current is 3 nA and the load resistance is 4 KΩ. The incident optical power is 200 nW and the post detection bandwidth of the receiver is 5 MHZ. Calculate the root mean square (rms) shot noise and thermal noise currents generated.

7. Attempt any *one* part of the following: 7 x 1 = 7

(a)	Write a note on any one of the following: a. Front end amplifier. b. Probability of error receiver sensitivity
(b)	Draw and explain the operation of Optical receiver.