Question Paper Code | **12593**

B.E. / B.Tech. - DEGREE EXAMINATIONS, APRIL / MAY 2024

Seventh Semester

Electronics and Communication Engineering

20ECPC702 - OPTICAL COMMUNICATION

Regulations - 2020

Duration: 3 Hours   Max. Marks: 100

PART - A (10 × 2 = 20 Marks)
Answer ALL Questions

	Marks	K-Level	CO
1. State Snell's law.	2	K1	CO1
2. A step-index fiber has a normalized frequency V = 26.6 at a 1300-nm wavelength. If the core radius is 25 mm, what is the numerical aperture?	2	K2	CO1
3. Differentiate intramodal dispersion and intermodal dispersion.	2	K2	CO2
4. What are the three different causes of absorption?	2	K1	CO2
5. Why silicon is not used for making optical sources?	2	K2	CO3
6. Compare and contrast between surface and edge emitting LEDs.	2	K2	CO3
7. Define Responsivity.	2	K1	CO4
8. What are the error sources in fiber optic receiver?	2	K2	CO4
9. Define power penalty.	2	K1	CO6
10. Give the significance of Solitons.	2	K2	CO6

PART - B (5 × 13 = 65 Marks)
Answer ALL Questions

11. a) Explain the fundamental blocks of optical fiber communication link with neat block diagram.	13	K2	CO1

OR

b) Explain the ray theory behind the optical fiber communication with a special mention about the total internal reflection, Acceptance angle and Numerical Aperture.	13	K2	CO1

12. a) Discuss about a non-linear scattering losses in optical fibers.	13	K2	CO2

OR

b) What is material dispersion? How does this parameter affect the bit rate of transmission? Also derive the mathematical equation for material dispersion.	13	K2	CO2

13. a) With neat schematics explain about the structure of a surface emitting Light Emitting Diode.	13	K2	CO3

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create

12593

OR

b) Explain the working principle of laser diode and derive its rate equation.   *13 K2 CO3*

14. a) Draw the block diagram of fundamental optical receiver. Explain each block with the intermediate signals.   *13 K2 CO4*

OR

b) What are the performance measures of a digital receiver? Derive an expression for bit error rate of a digital receiver.   *13 K2 CO4*

15. a) Explain SONET layers and frame structure with diagram.   *13 K2 CO6*

OR

b) Explain about Link power budget and rise time budget.   *13 K2 CO6*

PART - C (1 × 15 = 15 Marks)

16. a) Explain in detail about various lensing schemes for coupling improvement.   *15 K2 CO5*

OR

b) An InGaAsP light source that has a refractive index of 3.540 is coupled to a step index fiber that has a core refractive index of 1.480. Assume that the source size is smaller than the fiber core and that there is a small gap between the source and fiber.   *15 K2 CO5*
(i) If the gap is filled with a gel that has a refractive index of 1.520, what is the power loss in decibels from the source into fiber?
(ii) What is the power loss if no gel is used in the small gap?