

B.E/B.Tech Degree Examination, December 2020

Seventh Semester

EC16702- OPTICAL COMMUNICATION AND NETWORKS

(Regulation 2016)

Time: Three hours

Maximum : 80 Marks

Answer **ALL** questions**PART A - (8 X 2 = 16 marks)**

1. Number of modes in a step index optical fiber is directly proportional to
A) V^2 B) $1/V^2$ C) V D) Independent of V
2. What is the reason for attenuation in fiber due to extrinsic absorption?
A) Atomic defects in the composition of glass B) Impurity atoms in glass material
C) Basic constituent atoms of fiber material D) All of the above
3. In spontaneous emission, the light source in an excited state undergoes the transition to a state with _____
A) Higher energy B) Moderate energy C) Lower energy D) All of the above
4. For a photo-diode with responsivity of 0.50 A/W & optical power of about $12\mu\text{W}$, what would be the value of generated photocurrent?
A) $3\mu\text{A}$ B) $6\mu\text{A}$ C) $9\mu\text{A}$ D) $12\mu\text{A}$
5. Why refractive index of core should be greater than that of cladding?
6. Why there is limit for maximum data rate in a optical communication?
7. Differentiate the performance of LED and Laser diode.
8. List out the methods used to measure fiber refractive index profile.

PART B - (4 X16 = 64 marks)

09. (a) (i) Draw the block diagram of an optical fiber transmission link (10)
and explain the need of different components. Justify

- (ii) What is normalized frequency and its relationship to numerical aperture (6)
and number of modes.

(OR)

- (b) Derive the mode equation starting from Maxwell's equation for a step index (16)
fiber.
10. (a) Discuss in detail the different types of losses in optical fiber transmission and (16)
draw wavelength Vs attenuation graph and indicate the different regions of
operation .

(OR)

- (b) Analyze why there is pulse broadening due to intra modal dispersion in a (16) optical fiber transmission. Comment on the dispersion in single mode and multi mode fiber.

11. (a) Explain with neat diagram the construction and operation of double hetero junction surface emitting and edge emitting LED . (16)

(OR)

- (b) (i) Deduce an expression for Internal quantum efficiency of LED. (10)
Also comment on the External quantum efficiency .
(ii) Discuss the different types of fiber splicing techniques with necessary (6)
Diagrams.

12. (a) What is need for the Layered architecture of SONET/SDH? With neat diagram (16)
demonstrate SONET frame structure.

(OR)

- (b) With the help of block diagram explain the operation of Optical CDMA & (16)
Ultra High Capacity Networks.