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Question Paper Code : R 80715

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2025.

Fifth/Sixth/Seventh Semester

Electronics and Communication Engineering

CEC345 — OPTICAL COMMUNICATION AND NETWORKS

**(Common to : Computer and Communication Engineering / Electronics and
Telecommunication Engineering)**

(Regulations 2021)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Define optical fiber communication and list its advantages.
2. Distinguish between step-index and graded-index fibers.
3. Define attenuation and its types in optical fibers.
4. Define chromatic dispersion, material and waveguide dispersion
5. Define threshold condition for laser oscillation.
6. List types of optical detectors: PN, PIN, and Avalanche photodiode.
7. Define time-domain and frequency-domain dispersion measurement.
8. What is optical return loss and field measurements?
9. List optical network transmission modes and protocols.
10. Define optical ethernet, protection, restoration, and survivability.

PART B — (5 × 13 = 65 marks)

11. (a) Calculate the numerical aperture for a fiber given the refractive indices of core and cladding.

Or

- (b) Compare step-index vs. graded-index fiber for a campus network link.

12. (a) Calculate attenuation over a 10 km fiber link with given loss parameters.

Or

- (b) Determine fiber bend loss assuming a specific bend radius with illustrations.

13. (a) Compare and contrast LED vs. laser diode for short and long-haul links.

Or

- (b) Determine photocurrent for a given optical input power in a PIN photodiode.

14. (a) Determine fiber attenuation using a given input and output optical power.

Or

- (b) Evaluate optical return loss for a fiber link with connectors and splices.

15. (a) Design a WDM network with routing and wavelength assignment.

Or

- (b) Apply optical circuit-switched or packet-switched concepts to a metro network.

PART C — (1 × 15 = 15 marks)

16. (a) (i) Apply the concepts of total internal reflection, acceptance angle, and numerical aperture to design a single-mode optical fiber link for a high-speed campus network. (8)

- (ii) Explain the choice of step-index or graded-index fiber and cutoff wavelength considerations. (7)

Or

- (b) (i) Apply the characteristics of LED and laser diode sources to design a high-speed single-mode fiber link. (7)

- (ii) Explain the choice of optical detector (PIN or APD) and calculate expected photodetector current for the given optical power. (8)