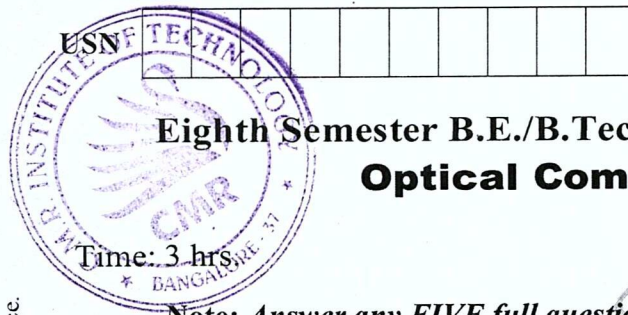


# CBCS SCHEME

18EC824



**Eighth Semester B.E./B.Tech. Degree Examination, June/July 2025**

**Optical Communication Networks**

Max. Marks: 100

**Note: Answer any FIVE full questions, choosing ONE full question from each module.**

## Module-1

- 1 a. Explain digital optical fiber link using semiconductor laser source and an avalanche photodiode (APD) detector. (06 Marks)
- b. State advantages of optical fiber communication system. (04 Marks)
- c. Derive conditions for numerical aperture of step index fiber for Meridional ray. (10 Marks)

OR

- 2 a. A silica optical fiber with a core diameter large enough to be considered by ray theory analysis has a core refractive index of 1.50 and a cladding refractive index of 1.47. Determine :
  - i) Critical angle at the core – cladding interface
  - ii) NA for the fiber
  - iii) Acceptance angle in air for the fiber. (06 Marks)
- b. Explain :
  - i) Mode field diameter (10 Marks)
  - ii) Cutoff wavelength. (04 Marks)
- c. Write short notes on step index fiber.

## Module-2

- 3 a. Explain material absorption losses in silica glass fiber. (10 Marks)
- b. Explain the structure of basic cylindrical ferrule connector. (10 Marks)

OR

- 4 a. Explain :
  - i) Rayleigh scattering (10 Marks)
  - ii) Mie scattering.
- b. Explain :
  - i) Star coupler (10 Marks)
  - ii) Optical isolator.

## Module-3

- 5 a. With the help of neat diagram explain surface emitting LED. (10 Marks)
- b. Explain :
  - i) PIN photo detector (10 Marks)
  - ii) Avalanche photodiodes.

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OR

- 6 a. With the help of neat diagram, explain Fabry – Perot resonator cavity for a laser diode. (10 Marks)
- b. Explain Noise sources and disturbances in an optical pulse detection mechanism. (10 Marks)

## Module-4

- 7 a. With the help of neat diagram explain operational principle OS WDM. (10 Marks)
- b. Illustrate the working of Erbium – Doped fiber amplifier amplification mechanism. (10 Marks)

OR

- 8 a. State and explain basic applications of optical amplifiers. (10 Marks)
- b. Explain :
  - i) Dielectric thin film filter
  - ii) EDFA co-directional pumping architecture. (10 Marks)

## Module-5

- 9 a. Explain public telecommunication networks overview. (10 Marks)
- b. Explain waveband switching networks architecture employing a multigranular optical cross connect (MG – OXC). (10 Marks)

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- 10 a. Explain :
  - i) Optical circuit switched network
  - ii) Optical packet switched network. (10 Marks)
- b. Explain :
  - i) STS – 1 Frame structure
  - ii) Optical cross – connect (OXC). (10 Marks)

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