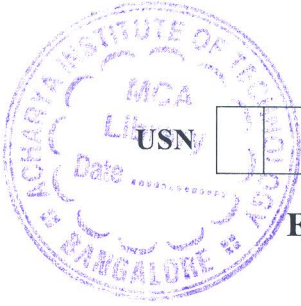


# CBCS SCHEME



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17EC82

## Eighth Semester B.E. Degree Examination, Jan./Feb. 2023 Fiber Optics and Networks

Time: 3 hrs.

Max. Marks: 100

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

### Module-1

- 1 a. Explain the advantage and applications of optical fiber communication. (10 Marks)  
b. Derive an expression for numerical aperture. (10 Marks)

OR

- 2 a. Explain the types of photonic crystal fibers. (10 Marks)  
b. 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) The critical angle at the core – cladding interface  
ii) The numerical aperture for the fiber  
iii) The acceptance angle in air for the fiber. (05 Marks)  
c. Distinguish between step index and graded index fibers. (05 Marks)

### Module-2

- 3 a. Define dispersion. Explain intermodal and intra modal dispersion. (10 Marks)  
b. Explain linear and non-linear scattering losses in optical fibers. (10 Marks)

OR

- 4 a. Illustrate optical fiber end preparation. Explain any two types of fiber splices. (10 Marks)  
b. Outline different types of optical fiber couplers and their functions. (10 Marks)

### Module-3

- 5 a. Explain the structure of double heterostructure light emitter showing energy diagram and refractive index profile. (10 Marks)  
b. Explain the physical principles of photodiode. (10 Marks)

OR

- 6 a. Derive an equation for optical receiver sensitivity. (10 Marks)  
b. Explain different types of front-end amplifiers. (10 Marks)

### Module-4

- 7 a. Illustrate the principle of working isolators and circulators with diagrams. (10 Marks)  
b. With the aid of diagram, explain three possible EDFA (Erbium – Doped Fiber Amplifiers) configurations. (10 Marks)

OR

- 8 a. Explain with diagram a typical WDM (Wavelength Division Multiplexing) network containing various types of optical amplifiers. (10 Marks)
- b. Interpret general applications of optical amplifiers. (10 Marks)

Module-5

- 9 a. Explain different types of optical networking Node elements. (10 Marks)
- b. Illustrate with diagram, optical network deployment. (10 Marks)

OR

- 10 a. Illustrate the concept of optical burst switching. (10 Marks)
- b. Explain public telecommunication network hierarchy showing optical cross-connect in the long haul Optical Add/Drop Multiplexer (OADMs) in the metropolitan and an optical fiber access network. (10 Marks)

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