

# CBCS SCHEME

15EC82



## Eighth Semester B.E. Degree Examination, June/July 2023 Fibre Optics and Networks

Max. Marks: 80

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

### Module-1

- 1 a. With relevant diagrams, explain the different types of optical fibers. Considering the number of modes and material composition of the core. (08 Marks)
  - b. Consider the core of an optical fiber made up of Silica, with refractive index of 1.8 and cladding index is 2% less than core. Calculate :
    - (i) NA
    - (ii) Acceptance angle
    - (iii) Critical angle
    - (iv) Refractive index of cladding (08 Marks)
- OR**
- 2 a. Explain mode field diameter of single mode fiber. (04 Marks)
  - b. Explain briefly about the fiber materials used in optical communication. (06 Marks)
  - c. Discuss ray theory modes for multimode step index and graded index fiber. (06 Marks)

### Module-2

- 3 a. Explain:
    - (i) Linear scattering losses (08 Marks)
    - (ii) Non-linear scattering losses (08 Marks)
  - b. List and sketch different types of splicing techniques and connectors. (08 Marks)
- OR**
- 4 a. Explain different absorption mechanisms in optical fibers. (08 Marks)
  - b. A four part multimode fiber FBT coupler has 60  $\mu\text{W}$  optical power launched into port 1. The measured output port at ports 2, 3 and 4 are 0.004, 26.0 and 27.5  $\mu\text{W}$  respectively. Determine the excess loss, insertion losses between input and output ports, cross talk and split ratio for device. (08 Marks)

### Module-3

- 5 a. Explain Fabry Perot Resonator Cavity of laser with a neat diagram. (08 Marks)
  - b. Explain the different amplifiers used in optical receiver. (08 Marks)
- OR**
- 6 a. What are the characteristic requirements of an optical source? With the help of neat diagram, describe the operation of surface emitting LED. (08 Marks)
  - b. Briefly discuss possible sources of noise in optical fiber receiver. (08 Marks)

### Module-4

- 7 a. Explain optical isolators and circulators. (08 Marks)
- b. Briefly discuss Raman amplifiers. (08 Marks)

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OR

- 8 a. Explain the amplification mechanism in EDFA amplifier with the help of energy band diagram. (10 Marks)
- b. Write a note on :
- (i) Diffraction gratings
  - (ii) Tunable light sources
- (06 Marks)

Module-5

- 9 a. Explain public telecommunication network review with neat diagram. (08 Marks)
- b. Explain an optical packet switched network with neat diagram. (08 Marks)

OR

- 10 a. Explain the concept of optical burst switching. (08 Marks)
- b. Explain the different types of optical networking node elements. (08 Marks)

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