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 model dispersion. **(10 Marks)**

b. Explain linear and non-liner scattering loses 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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