

CBCS SCHEME

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15EC82

Eighth Semester B.E. Degree Examination, November 2020

Fiber Optic and Networks

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions irrespective of modules.

Module-1

- 1 a. With relevant diagrams, explain the different types of optical fibers, considering the number of the modes and material composition of the core. (08 Marks)
- b. Describe what is implied by the term Photonic Crystal Fiber (PCF) and explain the guidance mechanism for electromagnetic modes in such optical fibers. (08 Marks)
- 2 a. Explain the ray theory of the optical fiber, with the help of neat sketch. (08 Marks)
- b. Explain mode field diameter of single mode fiber. (04 Marks)
- c. A multimode step index fiber with core diameter of $80 \mu\text{m}$ and relative index difference of 1.5% is operating at a wavelength of $0.85 \mu\text{m}$, if the core RI is 1.48. Estimate :
i) The normalized frequency for the fiber ii) The number of guided modes. (04 Marks)

Module-2

- 3 a. Discuss the followings for optical fibers :
i) Fiber bend loss ii) Material absorption. (08 Marks)
- b. Define fiber splicing. Explain electric arc fusion splicing with neat sketches. (08 Marks)
- 4 a. Describe linear scattering losses in an optical fiber. (08 Marks)
- b. A four port multimode fiber FBT coupler has $60 \mu\text{w}$ optical power launched into port 1. The measured output powers 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, the cross talk and split ratio for the device. (08 Marks)

Module-3

- 5 a. Explain the 3 factors, which affects the response time of photodiode. (08 Marks)
- b. Derive an equation for optical receiver sensitivity. (08 Marks)
- 6 a. What are the characteristic requirements of an optical source? With the help of diagram, describe the operation of surface emitting LED. (08 Marks)
- b. Explain the different amplifiers used in optical receiver. (08 Marks)

Module-4

- 7 a. Describe the principles of working of isolators and circulators with a neat diagram. (08 Marks)
- b. Briefly discuss Raman amplifiers. (08 Marks)
- 8 a. Write a note on : i) Diffraction gratings ii) MEMS technology. (08 Marks)
- b. With the aid of neat diagram, explain three possible EDFA configurations. (08 Marks)

Module-5

- 9 a. Explain public telecommunications network review with neat diagram. (08 Marks)
- b. Explain an optical packet switched network with neat diagram. (08 Marks)
- 10 a. Explain the concept of optical burst switching. (08 Marks)
- b. Explain the different types of optical networking node elements. (08 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and/or equations written eg. 42+8 = 50, will be treated as malpractice.