

--	--	--	--	--	--	--	--	--	--

Seventh Semester B.E. Degree Examination, June/July 2011

Optical Fibre Communication

Time: 3 hrs.

Max. Marks:100

Note: Answer any FIVE full questions, selecting at least TWO questions from each part.

PART – A

- 1
 - a. Discuss briefly the inherent advantages of optical fibers over conventional copper systems. (06 Marks)
 - b. Describe the different types of optical fiber waveguide structures, using ray theory with neat diagrams. Explain the light propagation. (08 Marks)
 - c. Briefly discuss modified chemical vapor deposition (MCVD) process of fabrication of optical fiber, with neat diagrams. (06 Marks)

- 2
 - a. Describe the different types of attenuation mechanism for an optical fiber. (08 Marks)
 - b. Derive an equation for material dispersion and waveguide dispersion in an optical fiber. (08 Marks)
 - c. A 30 km long optical fiber has an attenuation of 0.4 dB/km at 1310 nm, with input decibel power level referred to 1 mW. Find out the optical power output, if 200 μW of optical power is launched into the fiber. (04 Marks)

- 3
 - a. With a neat diagram, explain the working of an edge-emitting double-heterojunction LED structure. (08 Marks)
 - b. Discuss the different types of noise which occur in photo detectors. (08 Marks)
 - c. An InGaAs pin-photodiode has the following parameters at a wavelength of 1300 nm.
 - i) Quantum efficiency = 0.90
 - ii) Plank's constant = 6.625×10^{-34} J.S.
 - iii) Electron charge = 1.6×10^{-9} C. (Assume velocity = 3×10^8 m/sec)
 Assume surface leakage current negligible. Find out the primary photo detector current. (04 Marks)

- 4
 - a. Explain the different types of fiber splicing techniques, with neat diagrams. (06 Marks)
 - b. With the principal requirements of a good connector design, explain basic coupling mechanism used in Butt-Joint and expanded-beam connectors. (10 Marks)
 - c. A GaAs optical source with refractive index of 3.6 is coupled to a silica fiber that has a R.I. of 1.48. If the fiber end and the source are in close physical contact, find out the Fresnel reflection (R) and power loss in dB. (04 Marks)

PART – B

- 5
 - a. With a neat diagram, explain the working of optical receiver. (08 Marks)
 - b. Discuss briefly, how the eye diagram is powerful measurement tool for assessing the data-handling ability in a digital transmission system. (08 Marks)
 - c. Differentiate between Heterodyne and Homodyne coherent detection schemes, with respect to probability of error function of a BER. (04 Marks)

- 6 a. Discuss the basic elements of an analog link and the major noise contributors of an analog link, with a neat diagram. (08 Marks)
- b. With a simplex point-to-point link, explain the key system requirements which are needed in analyzing a link and how to fulfill these requirements. (08 Marks)
- c. Explain the polarization mode dispersion penalty in power penalties of a digital link. (04 Marks)
- 7 a. With a neat diagram, explain the working of dielectric thin film filters. (08 Marks)
- b. With basic operational principles of WDM, explain the working of typical WDM network and mention WDM standards. (08 Marks)
- c. Explain MEMS technology, with a simple diagram. (04 Marks)
- 8 Write short notes on:
- a. Optical amplifiers (10 Marks)
- b. SONET/SDH (10 Marks)

* * * * *