Roll No...

EC-703

B.E. VII Semester

Examination, December 201౨

Optical Communication

Time : Three Hours

Maximum Marks : 70

Note: i) Answer five questions. In each question part A, B, C is compulsory and D part has internal choice.

ii) All parts of each questions are to be attempted at one place.

iii) All questions carry equal marks, out of which part A and B (Max.50 words) carry 2 marks, part C (Max.100 words) carry 3 marks, part D (Max.400 words) carry 7 marks.

iv) Except numericals, Derivation, Design and Drawing etc.

UNIT-I

1. a) What are fiber modes?
   b) Define numerical aperture of optical fiber.
   c) What are differences between a step index and graded index fiber?
   d) An optical fiber has a NA of 0.2 and a cladding refractive index of 1.59. Determine the acceptance angle for the fiber in water which has a refractive index of 1.33.

   OR

   A glass fiber is made with core glass of refractive index 1.5 and the cladding is doped to give a fractional index difference of 0.0005. Find
   i) Cladding refractive index
   ii) Critical internal reflection angle
   iii) External critical acceptance angle
   iv) Numerical aperture

UNIT-II

2. a) What do you understand by population inversion?
   b) What is LASER?

   c) What are optical connectors?
   d) List the various characteristics of LED and explain the same in detail.

   OR

   Discuss various splicing techniques in optical fibers.

UNIT-III

3. a) What is chromatic dispersion?
   b) What are absorption losses in optical fibers?
   c) What are intramodal and intermodal dispersion?
   d) The material dispersion in an optical fiber defined by

   $\left|\dfrac{d^2n}{d\lambda^2}\right|$ is 4.0×10^{-2} $\mu\,m^{-2}$. Estimate the pulse broadening

   per kilometer due to material dispersion within the fiber when it is illuminated with an LED source with a peak wavelength of 0.9 μm and an rms spectral width 45 nm.

   OR

   Explain the scattering and the bending losses that occur in optical fiber with suitable diagrams.

UNIT-IV

4. a) What is coherent detection?
   b) Explain the homodyne detection.
   c) Explain the heterodyne detection.
   d) Discuss the link power budget and rise time budget in detail.

   OR

   Explain the Eye patterns in detail.

UNIT-V

5. a) What are isolators?
   b) What are circulators?
   c) What are optical amplifiers?
   d) Discuss the concept of wavelength division multiplexing.

   OR

   Discuss EDFA in detail.

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