2740

Fiber Optic Communication
(New) (1220)

P. Pages : 2

Time : Three Hours

Max. Marks : 100

Instructions to Candidates :
1. Do not write anything on question paper except Seat No.
2. Answersheet should be written with blue ink only. Graph or diagram should be drawn with the same pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. Attempt **any two** question from each unit.
5. All questions carry equal marks.
6. Assume suitable data.

UNIT - I

1. a) Define Refractive index difference for an optical fiber & show how they are related to numerical Aperture. A step index fiber with a large core diameter with wavelength transmitted light has an acceptance angle in air 22° & Relative index difference of 3% Estimate the NA & critical angle at core - cladding interface. **10**

   b) With the help of R. I. profile & ray transmission, explain **10**
      i) Step index optical fiber.
      ii) Single made optical fiber
      iii) Multimode graded index optical fiber.

   c) Discuss the advantages & Disadvantages of optical fiber communication over existing communication system. **10**

UNIT - II

2. a) Explain in detail population inversion. Discuss strip Geometry & distributed laser. **10**

   b) Define Quantum efficiency & responsivity of detector. Derive an expression for the responsivity of an intrinsic photodetector in terms of device & wavelength of incident radiation. Determine wavelength at which Quantum efficiency they are equal. **10**

   c) Discuss in detail $P - I - N$ Photodiode with regard to performance & compatibility requirement in photodetectors. Explain the detection process in $P - N$ photodiode. Compare $P - N$ & $P - I - N$ Photodiode. **10**

UNIT - III

3.   a)   Explain the limitation of source Transmitter.   **10**

     b)   Describe ASK, FSK, PSK modulating format.   **10**

     c)   Asynchronous heterodyne FSK receiver are commonly used for coherent light wave system. What is SNR required to operate at BER of 10^{-9} ? Calculate the receiver sensitivity (in dB_m) at 2Gbls in shot noise limit by assuming 1.2 GHz receiver BW, 80% Quantum efficiency & a $1.55\mu m$ operating wavelength.   **10**

UNIT - IV

4.   a)   Discuss in detail linear scattering & Non linear scattering.   **10**

     b)   With neat block diagram fiber dispersion measurement in fiber optic domain.   **10**

     c)   Explain rise time budget for fiber ? An optical fiber system is to be designed to operate over at 8 km length without repeater. The rise time of chosen component are

Source (LED)	δns
Fiber intermodal	$5 n s km^{-1}$
Intramodal (pube broadening)	$1 n s km^{-1}$
Detector	$6 n s km^{-1}$

From the system rise time consideration estimate maximum bit rate that may be achieved on link when using NRZ format.   **10**

UNIT - V

5.   a)   Write short note on :   **10**

       i)   Optical fiber used as pressure sensor.

       ii)   Integrated optics.

     b)   With the help of diagram, Explain working of WDM in fiber optic communication ?   **10**

     c)   Explain the single mode optical fiber sensor for current measurement with neat diagram.   **10**

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