Total No. of printed pages = 6

Et-603/OFC/6th Sem/2017/N

OPTICAL FIBER COMMUNICATION

Full Marks – 70

Time – Three hours

The figures in the margin indicate full marks for the questions.

PART – A

1. Fill in the blanks. $1 \times 5 = 5$

   (i) The _____ is a transparent medium bounden by two spherical surfaces or by one spherical surface and plane surface.

   (ii) Sin^{-1} N.A = _____.

   (iii) $(n_1^2 - n_2^2)^{1/2}$ = _____.

   (iv) The angle of incidence is called _____, when a ray of light of any given colour travel from a dense medium to a rare medium in such a way that the angle of refraction is 90°.

(v) In case of graded index fibre the _____ of the core is made to vary as a function of radical distance from the centre of the fibre.

2. Answer the following : 1×10=10

(i) What is the full form of T.I.R ?

(ii) Write the expression of N.A in terms of θa.

(iii) What is the full form of SONET ?

(iv) What is the function of photo multiplier tube ?

(v) What is the core diameter of multimode G.I.F ?

(vi) What is co-herent light ?

(vii) What is the mathematical expression for Snells law.

(viii) What is the full form of LASER ?

(ix) What is the R.I for air ?

(x) What is the colour of light given by LED if it is made from GaAsP ?

3. State true or false : 1×5=5

(i) The density of atom in population invension process is higher in lower energy level.

(ii) In optical fibre communication the θa must be greater than the θc.

(iii) The connector is a device to connect two fibre end in removable fashion.

(iv) Encoder convert digital electrical signal to analog signal.

(v) The LASER is a threshold device.

4. Choose the correct answer. 1×5=5

(i) The R.I of glass is

(a) 2.5 (b) 1.8

(c) 1.5 (d) 3

(ii) The condition for T.I.R is that

(a) Angle of incidence is 90°

(b) Angle of incidence is less than 90°

(c) Angle of refraction is more than 90°

(d) None of the above.

(iii) The spectral line width of emitted ray of LED, when operating in the 0.8 to 0.9 μm wavelength range is

(a) 10 nm - 12nm

(b) 20nm - 25nm

(c) 25nm - 50nm

(d) None of the above.

(iv) A silica optical fibre with core R.I of 1.5 cladding R.I is 1.47. The N.A will be

(a) 0.25

(b) 0.30

(c) 1.2

(d) 2.0

(v) In case of eight level quantizer the PAM signal is encoded with.

(a) 8-binary bit

(b) 4-binary bit

(c) 3-binary bit

(d) 2-binary bit

PART – B

1. Answer any *five* questions : 2×5=10

(a) What do you mean by optical fiber ?

(b) What is the difference between reflection and refraction ?

(c) What is refractive index ?

(d) What is critical angle of difraction ?

(e) What is photodiode ?

(f) What is total internal reflection ?

(g) What is multiplexing ?

2. Answer any *five* questions : 3×5=15

(a) What is a fiber coupler ? What are the different types of coupler ?

(b) What do you understand by acceptance angle and numerical aperture ?

(c) State the advantages and disadvantages of various light sources.

(d) What is photodetector ? What are the different types of photodetector ?

(e) What do you mean by source limitation? What are the different source limitations ?

(f) Explain the term "Pulse dispersion".

(g) Describe the function of equalizer in optical fiber receiver.

(h) What are the main applications of optical fiber in communication ?

3. Answer any *four* questions : 4×5=20

(a) What are the different types of optical fiber ? Describe any one of them.

(b) Describe shortly about the frequency division multiplexing (FDM).

(c) Describe with diagram the construction of optical fiber cable.

(d) What are the different blocks in optical fiber transmitter ? Write briefly about optical amplifier.

(e) Describe briefly the photodetection process in the P-N in photodiodes.