Total No. of Questions : 4]

SEAT No. :

PB291

[Total No. of Pages : 2

[6270]-80

B.E. (Electronics & Telecommunication Engineering) (Insem)

FIBER OPTIC COMMUNICATION

(2019 Pattern) (Semester-VIII) (404190)

Time : 1 Hour] *[Max. Marks : 30*

Instructions to the candidates:

1) *Answer Q.1 or Q.2, Q.3 or Q.4 from following questions.*
2) *Neat diagrams must be drawn wherever necessary.*
3) *Figures to the right indicate full marks.*
4) *Assume suitable data, if necessary.*

Q1) a) A step index fiber has a relative refractive index difference of 1.3% & a core refractive index of 1.5. The core diameter is 100 µm and operating wavelength is 850nm. Assuming fiber is kept in air, calculate numerical aperture of fiber, acceptance angle and critical angle. **[6]**

b) Compare single mode and multimode fibers. **[4]**

c) Draw and explain optical fiber communication system showing all the key elements. Enlist the advantages of optical fibers as a communication media. **[5]**

OR

Q2) a) Explain intramodal dispersion, intermodal dispersion and overall fiber dispersion in optical fibers. **[4]**

b) A multimode graded index fiber exhibits total pulse broadening of 0.1 µsec over a distance of 15km. Calculate. **[6]**

i) Maximum possible bandwidth on the link

ii) The pulse dispersion per unit length

iii) The bandwidth-length product for the fiber

c) Describe the following losses in optical fiber. **[5]**

i) Absorption

ii) Attenuation

iii) Scattering

Q3) a) Explain the following terms for semiconductor laser diodes with neat diagram **[5]**

i) Absorption

ii) Spontaneous Emission

iii) Stimulate Emission

b) Explain working and characteristics of LED with diagrams. State its advantages and disadvantages. **[4]**

c) A double heterojunction InGAsP LED emitting at a peak wavelength of 1310 nm has radiative and non-radiative recombination times of 30ns and 100 ns respectively. The drive current is 40 mA Determine

i) Bulk recombination lifetime

ii) The internal quantum efficiency

iii) Internal power level **[6]**

OR

Q4) a) Explain external quantum efficiency and the external power generated in the LED with necessary equations. **[6]**

b) Distinguish direct and Indirect band-gap semiconductor materials. Also state the major requirements of good optical sources. **[6]**

c) Calculate the emission wavelength in nm of the light emitted using a semiconductor material with energy band-gap of 3eV **[3]**