Total No. of Questions : 4]

SEAT No. :

PD-284

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

FIBER OPTIC COMMUNICATION

(2019 Course) (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.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Describe the following terms **[5]**

i) Total internal reflection

ii) Acceptance angle

iii) Numerical aperture

b) Compare SMSI,MMSI and MMGI fibers. **[4]**

c) 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]**

OR

Q2) a) Draw and explain optical fiber communication system showing all the key elements. Enlist the advantages of optical fibers as a communication media. **[5]**

b) Enlist losses in optical fiber and explain any three **[4]**

c) A multimode graded index fiber exhibits total pulse broadening of 0.1 μ sec 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

P.T.O.

Q3) a) Distinguish direct and indirect band- gap semiconductor materials. Also state the major requirements of good optical sources. **[6]**

b) Explain the following terms w.r.t. LED **[6]**

i) Spectral Width

ii) Modulation Bandwidth

iii) I-P characteristics

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

OR

Q4) a) Differentiate stimulated emission and spontaneous emission. **[5]**

b) A double heterojunction InGAsP LED emitting at a peak wavelength of 1310 nm has radiative and non- radiative recombination times of 30 ns and 100 ns respectively. The drive current is 40 mA. Determine **[6]**

i) Bulk recombination lifetime

ii) The internal quantum efficiency

iii) Internal Power level

c) What do you understand about the term external quantum efficiency and internal quantum efficiency in the case of LED? **[4]**

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