Roll No. $\square$ Total No. of Pages: 02
Total No. of Questions : 09

# B.Tech.(ECE) (Sem.-7,8) <br> OPTICAL FIBER COMMUNICATIONS <br> Subject Code : EC-404 <br> Paper ID : [A0329] 

Time : 3 Hrs.
Max. Marks : 60

## INSTRUCTION TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students has to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students has to attempt any TWO questions.

## SECTION-A

1. Write briefly :
a) List properties of optical detectors.
b) Draw the layer diagram of p-i-n photodiode.
c) Taking suitable example explain Snell's law.
d) A single mode fiber has refractive index of 1.47 and a radius of $4.3 \mu \mathrm{~m}$. The relative index difference is $0.20 \%$. Find out the value of cutoff wavelength.
e) How Group velocity dispersion affect performance of optical communication?
f) List some factor which determine need of optical fiber communication.
g) Discuss importance of total internal reflection in optical communication.
h) Why graded index fiber has higher transmission bit rate than multimode step index fiber?
i) Differentiate between connectors and splices.
j) Explain laser characteristics.

## SECTION-B

2. What are basic requirements of WDM system?
3. Which of the dominant nonlinear phenomenon limits the system performance in a long haul system? Also analyze combined effects of GVD and SPM.
4. What do you understand by double hetero structure? Draw schematic diagram of an edge emitting DH LED.
5. Differentiate between spontaneous emission and stimulated emission.
6. A step index fiber in air has a numerical aperture of 0.16 , core refractive index 1.45 and core diameter $60 \mu \mathrm{~m}$. Determine normalize frequency for the fiber.

## SECTION-C

7. Explain the following mechanism associated with in optical fiber communication :
a) Quantum shot noise
b) Avalanche excess noise
c) Fiber mode partition noise
d) Thermal noise
8. a) Describe with aid of suitable diagram the mechanism giving the emission of light from the LED.
b) Discuss the properties of LED in relation to its use as an optical source for communication.
9. a) Describe the mechanism of emission of light from light emitting diode.
b) A double hetero junction In GaAsP LED operating at 1310 nm has radiative and non-radiative recombination times of 30 and 100 ns . The injected current is 40 mA . Calculate bulk recombination life time, Internal quantum efficiency and Internal power level.
