

**BACHELOR OF TECHNOLOGY (C.B.C.S.) (2014 COURSE)**  
**B.Tech.Sem - VIII ELECTRONIC :SUMMER- 2022**  
**SUBJECT : OPTICAL FIBER COMMUNICATION**

Day : Tuesday  
Date : 14-06-2022

**S-13401-2022**

Time : 02:30 PM-05:30 PM  
Max. Marks : 60

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**N.B.**

- 1) All questions are **COMPULSORY**.
  - 2) Figures to the right indicate **FULL** marks.
  - 3) Assume suitable data if necessary.
  - 4) Use of non – programmable **CALCULATOR** is allowed.
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**Q.1** Describe Ray theory transmission. Also find value of  $n_2$  for given fiber with  $n_1 = 1.48$  and  $\Delta = 2.6\%$ . (10)

**OR**

**Q.1** a) Describe 'Fiber drawing' technique for preparation of optical fiber. (06)  
b) Derive expression for 'Numerical Aperture'. (04)

**Q.2** a) A planar LED is fabricated from gallium arsenide which has a refractive index of 3.6 (06)  
Calculate:

- i) The optical power emitted into air as a percentage of the internal optical power for the device when the transmission factor at the crystal – air interface is 0.68.
- ii) When the optical power generated internally is 50% of the electrical power supplied, determine the external power efficiency.

b) Describe characteristics of Laser diode. (04)

**OR**

**Q.2** a) A LED with  $\eta_{int} = 0.67$ ,  $i = 25$  mA at wavelength 800nm. If the refractive index of material is 2.15 then calculate the power emitted from the device. (06)

b) Describe operation of LED drive circuits. (04)

**Q.3** a) Draw p-i-n photodiode showing combined absorption and depletion region and explain operation of p-i-n photodiode. (06)

b) Draw various characteristics of avalanche photodiode. (04)

**OR**

**Q.3** a) Define responsivity. When  $3 \times 10^{11}$  photons each with a wavelength of 0.85  $\mu\text{m}$  are incident on a photodiode, on average  $1.2 \times 10^{11}$  electrons are collected at the terminals of the device. Determine the Quantum efficiency and responsivity of the photodiode at 0.85 $\mu\text{m}$ . (06)

b) Describe Quantum efficiency. (04)

**Q.4** a) Describe in brief 'Time Division Multiplexing'. (06)

b) Describe Wavelength Division Multiplexing. (04)

**OR**

**Q.4** Describe operation of Raman Amplifier. (10)

**Q.5** a) Classify the optical fiber couplers and write functions of each. (06)

b) Describe working principle of opto – isolator. (04)

**OR**

**Q.5** a) Draw and explain fusion splicing technique of optical fiber. (06)

b) Write note on Network Topology. (04)

**Q.6** Describe in brief working of OTDR. (10)

**OR**

**Q.6** Describe the Attenuation measurement technique for optical fiber communication. (10)