

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
(AUTONOMOUS)
B.Tech III Year II Semester Regular Examinations August-2023

FIBER OPTIC COMMUNICATIONS
(Electronics & Communications Engineering)

Time: 3 Hours

Max. Marks: 60

(Answer all Five Units 5 x 12 = 60 Marks)

UNIT-I

- 1 a How the attenuation is caused by absorption losses? CO1 L2 6M
b Derive the expressions for fiber Core and Cladding losses. CO1 L3 6M

OR

- 2 a Explain the differences between meridional and skew rays. CO1 L2 6M
b With neat sketch describe the characteristics of multimode Step index & graded index fibers. CO1 L2 6M

UNIT-II

- 3 a A planar LED is fabricated from GaAs which has a refractive index of 3.6.(i) Calculate 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 60% of the electric power supplied, determine the external power efficiency. CO2 L3 6M
b Illustrate the working principle of an edge emitter LED with neat diagram. CO2 L2 6M

OR

- 4 a The Radiative and non-radiative recombination life times of minority carriers in the active region of a double heterojunction LED are 60 nS and 90 nS respectively. Evaluate the total carrier recombination life time and optical power generated internally if the peak emission wavelength is 870 nm and drift current is 40 mA. CO2 L4 8M
b Explain in brief about direct and indirect band gap materials in detail. CO2 L2 4M

UNIT-III

- 5 a A photo diode has a quantum efficiency of 65% when photons of energy of 1.5×10^{-19} J are incident upon it. (i) Find the operating wavelength of the photodiode (ii) Calculate the incident optical power required to obtain a photo current of 2.5 μ A when the photodiode is operating as described above. CO3 L4 6M
b Explain about Avalanche multiplication noise in APD diode. CO3 L3 6M

OR

- 6 a Explain the mechanism of error sources and disturbance in the optical pulse detection with diagram. CO3 L2 6M
b Compute the expression for Response time of a Photodiode. CO3 L4 6M

UNIT-IV

- 7 a Illustrate in detail about Link power budget. CO4 L2 8M
b List the applications of Optical amplifier. CO4 L1 4M

OR

- 8 a** A transmitter has an output power of 0.1 mW. It is used with a fiber having $NA=0.25$, attenuation of 6 dB/km and length of 0.5 km. The link contains two connectors of 2 dB average loss. The receiver has a minimum acceptable power (sensitivity) of -35 dBm. The designer has allowed a 4 dB margin. Calculate the link power budget. **CO4 L4 6M**
- b** What is meant by Receiver Sensitivity? How do you measure and compare receiver sensitivity for different modulation formats and bit rates? **CO4 L2 6M**

UNIT-V

- 9 a** Illustrate about basic optical networks. **CO5 L2 6M**
- b** What are the characteristics of WDM? **CO5 L2 6M**
- OR**
- 10 a** Discuss about broadcast and select single hop network. **CO5 L2 6M**
- b** Describe about the optical CDMA network using coded sequence pulse. **CO5 L2 6M**

***** END *****