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

Day : Tuesday

Date : 14-06-2022   **S-13375-2022**

Time : 02:30 PM-05:30 PM

Max. Marks : 60

N.B.

1) All questions are **COMPULSORY**
2) Figures to the right indicate **FULL** marks.
3) Draw neat and labeled diagram **WHEREVER** necessary.
4) Assume suitable data if necessary.

Q.1 a) What is meant by a graded index optical fiber giving an expression for the **(05)** possible refractive index profile? Using simple ray theory concepts, discuss the transmission of light through the fiber.

b) A silica optical fiber with a core diameter large enough to be considered by **(05)** ray theory analysis has a core refractive index of 1.50 and a cladding refractive index of 1.47. Determine
  i) The critical angle at the core cladding interface
  ii) The NA for the fiber
  iii) The acceptance angle in air for the fiber

OR

a) What is total internal reflection? Why it is necessary to meet the condition of **(05)** total internal reflection at the core cladding interface. Define Numerical Aperture

b) If the step – index fiber has a core of refractive index 1.5, a cladding of **(05)** refractive index 1.45 and a core diameter of 120μm. If the fiber is kept in air, calculate
  i) NA of the fiber
  ii) Pulse broadening pen unit length due to multipath dispersion.

Q.2 a) What are direct band gap and indirect band gap type of semiconductors? Give **(05)** at least two examples of each. Which of these are more suitable for fabricating LEDs? Give reasons.

b) Derive an expression for SNR of a photodetector. **(05)**

OR

a) An injection laser has an active cavity with losses of $30cm^{-1}$ and the **(05)** reflectivity of the each cleaved laser facet is 30%. Determine the laser gain co – efficient for the cavity when it has a length of 600μm.

b) Explain the basic principle of optoelectronic detection. **(05)**

Q.3 a) What is the difference between attenuation and dispersion? What are the **(05)** techniques used to reduce dispersion in optical fiber system?

b) Distinguish between fusion and mechanical splicing of optical fibers. Discuss **(05)** the advantages and drawbacks of these techniques.

OR

P.T.O

	a)	What are intermodal and intramodal dispersion? What is butt – jointed connectors?	**(05)**
	b)	Explain the degradation loss in optical fiber.	**(05)**
Q.4	a)	What is meant by OTDR? Discuss, with the aid of a diagram, how this method may be used in field measurements?	**(05)**
	b)	Explain the measurement of dispersion in time domain.	**(05)**

OR

	a)	What is meant by pre – amplifier on optical communication system? What is Quantum limit?	**(05)**
	b)	How is the refractive index profile of a fiber measured?	**(05)**
Q.5	a)	What is meant by synchronous networks?	**(05)**
	b)	Explain wavelength division multiplexing method in optical network.	**(05)**

OR

	a)	Explain the network transmission modes and architecture.	**(05)**
	b)	How does the optical circuit switched network work?	**(05)**
Q.6	a)	What is EDFA? Explain it with suitable diagram.	**(05)**
	b)	Explain FDDI network topology.	**(05)**

OR

Write short notes on: **(10)**
  i) Soliton
  ii) Ultra high capacity in optical network

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