

Seat No.	
----------	--

T.E. (E & TC) (Semester - VI) Examination, May - 2017
OPTICAL COMMUNICATION AND NETWORKS (Revised)
Sub. Code : 66919

Day and Date : Thursday, 04 - 05 - 2017

Total Marks : 100

Time : 02.00 p.m. to 05.00 p.m.

- Instructions :**
- 1) All questions are compulsory.
 - 2) Figures to the right indicate full marks.
 - 3) Assume suitable data if necessary and state it clearly.
 - 4) Planck's constant $h = 6.626 \times 10^{-34}$, speed of light $c = 2.998 \times 10^8$, charge of electron $e = 1.602 \times 10^{-19}$.

Q1) Attempt any two of the following : **[18]**

- a) Explain with the help of block diagram elements of optical fiber transmission link? Write any four advantages of optical fiber?
- b) A silica optical fiber with a core diameter large enough to be considered by ray theory of analysis has core refractive index of 1.45 and cladding refractive index of 1.38. Determine
 - i) the critical angle at the core-cladding interface
 - ii) the NA for the fiber
 - iii) acceptance angle in air for the fiber
- c) With the help of neat diagram explain the phenomenon of light propagation through optical fiber by Total Internal reflection? Write down the definition of critical angle & acceptance angle?

Q2) Attempt any two of the following : **[16]**

- a) Compare Glass fibers & Plastic fibers?
- b) What are the different liquid phase method used for manufacturing optical fiber? What are its drawbacks? How they are compensated using RF induction heating method?
- c) Explain mechanical properties of fibers. Find the expression for failure probability.

P.T.O.

Q3) Attempt any two of the following :

[16]

- a) With the help of neat diagrams explain bending losses?
- b) What do you mean by signal dispersion in optical fibers? With the help of neat diagram explain intermodal & intra modal dispersion optical fiber?
- c) The radiative and non-radiative recombination lifetimes of the minority carriers in the active region of a double-heterojunction LED are 31 ns and 8 ns respectively. Determine the total carrier recombination lifetime and the power internally generated within the device when the peak emission wavelength is $0.81 \mu\text{m}$ at a drive current of 31 mA.

Q4) Attempt any two of the following :

[18]

- a) What the different reliability considerations for LED & LASERS?
- b) What are the different types of single mode LASERS? With the help of neat diagram explain Distributed Feedback laser & Distributed Bragg's laser?
- c) With the help of neat diagram explain modal, partition & reflection noise with respect to LASER diode?

Q5) Attempt any two of the following :

[16]

- a) Draw and explain basic sections of an optical receiver?
- b) A photodiode has a quantum efficiency of 65% when photons of energy $1.5 \times 10^{-19} \text{J}$ are incident upon it.
 - i) At what wavelength is the photodiode operating?
 - ii) Calculate the incident optical power required to obtain a photocurrent of $2.5 \mu\text{A}$ when the photodiode is operating as described above.
- c) Draw and explain structure for InGaAs APDs. What is effect of temperature on avalanche gain?

Q6) Write short note on any three of the following :

- a) Mach-Zehnder Interferometer Multiplexer.
- b) Preamplifier types in optical receiver.
- c) Diffraction gratings.
- d) Star Couplers.

