

Seat No.	
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**T.E. (Electronics and Telecommunication) (Semester - VI) Examination,
May - 2018
OPTICAL COMMUNICATION AND NETWORKS (Revised)
Sub. Code : 66919**

Day and Date : Saturday, 12 - 05 - 2018

Total Marks : 100

Time : 02.30 p.m. to 05.30 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 neat diagram the phenomenon of light propagation through optical fiber? Classify optical fibers on the basis of modes?
- b) Briefly explain the names & designations of spectral bands used for optical communication?
- c) Define numerical aperture? Show that the $NA = n_1 \sqrt{2\Delta}$.

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

- a) With the help of neat diagrams explain step index & graded index glass fiber?
- b) A graded index fiber has a core with a parabolic refractive index profile which has a diameter of $60 \mu\text{m}$. The fiber has a numerical aperture of 0.4. Estimate the total number of guided modes propagating in the fiber when it is operating at a wavelength of $1 \mu\text{m}$.
- c) What are the different chemical vapor deposition process? With neat diagram explain Modified chemical vapor deposition process?

Q3) Attempt any two of the following : **[16]**

- a) Explain attenuation & absorption losses in optical fibers?
- b) What do you mean by signal dispersion in optical fibers? With the help of neat diagram, briefly explain intermodal & polarization mode dispersion?
- c) Explain in detail bending & scattering losses in optical fiber?

P.T.O.

Q4) Attempt any two of the following : [18]

- The radiative and non-radiative recombination lifetimes of the minority carriers in the active region of a double-heterojunction LED are 80 ns and 120 ns respectively. Determine the total carrier recombination lifetime and the power internally generated within the device when the peak emission wavelength is 0.90 μm at a drive current of 45 mA.
- With the help of neat diagram explain the construction & working of Vertical cavity surface emitting laser VCSEL? State its advantages?
- With the help of neat diagrams & refractive index profile explain the construction & working of double hetero-structure LED?

Q5) Attempt any two of the following : [16]

- When 3×10^{11} photons each with a wavelength of 0.85 μm are incident on a photodiode, on average 1.2×10^{11} electrons are collected at the terminals of the device. Determine the quantum efficiency and the responsivity of the photodiode at 0.85 μm .
- What are the different types of noise sources at the receiver? Explain each in details?
- Explain reach-through avalanche photodiode structure along with electric field distribution in the depletion and multiplication regions.

Q6) Attempt any two of the following : [16]

- How the fiber Bragg grating can be used in optical filtering? Explain the procedure for formation of Braggs grating in a core of optical fiber?
- Explain the methods used for adjusting the wavelength in Tunable optical filters?
- Explain in detail transmission formats and speeds in SONET?

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