

Roll No.

Total No. of Pages : 02

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B.Tech. (Civil Engg.) (Sem.-6)
OPTICAL FIBERS AND COMMUNICATION

Subject Code : BTEC-603-18

M.Code : 79965

Date of Examination : 12-07-22

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. Write briefly :

- a) What are steps index and graded index fibers?
- b) Explain the phenomenon of material dispersion in optical fiber.
- c) An optical signal has lost 55% of its power after travelling 8.5 km of fiber. What is the loss in dB/km of the fiber?
- d) Give the expression for numerical aperture in graded index fibers.
- e) Describe the two methods of fiber coupling.
- f) Define macroscopic bending.
- g) Differentiate between Splices and Connectors.
- h) What width of depletion region of an InGaAs photo detector do we need to make its quantum efficiency 70%.
- i) What are the conditions for total internal reflection?
- j) Why the photodiode is reverse biased?

SECTION-B

2. A p-i-n diode has a transit time of 2 nanoseconds and junction capacitance of 3 p F. If the load resistor is 50 ohms, find out whether the bandwidth is limited by transit time or capacitance.
3. What is meant by Hetero - junction lasers? How this is different from single hetrostructure lasers? Discuss their performance characteristics.
4. What are various types of attenuation factors in optical fibers? Suggest various measures to overcome attenuation.
5. How gain of SOA is different from the Laser?
6. Explain the fiber optic receiver operation using a simple model and equivalent circuit.

SECTION-C

7. Discuss the sources of errors in optical receivers.
8. A multimode optical fiber has the specifications: core refractive index = 1.52, cladding refractive index = 1.48; core diameter = 90 μ m, wavelength of operation = 0.85 μ m. Calculate
 - a) Relative refractive index difference
 - b) Critical angle at core-cladding interface
 - c) Acceptance angle
 - d) Solid acceptance angle
 - e) Numerical aperture of fiber
 - f) Normalized V-number
 - g) Number of guided modes.
9. Write notes on the following:
 - a) Discuss the SONET layers with diagram.
 - b) Discuss the multiplexing methods in details.

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.