

**B.Tech. – VIEP – ELECTRONICS AND  
COMMUNICATION ENGINEERING  
(BTECVI)**

**00443 Term-End Examination**

**June, 2018**

**BIEL-017 : OPTICAL FIBER COMMUNICATION**

*Time : 3 hours*

*Maximum Marks : 70*

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*Note : Attempt any seven questions. All questions carry equal marks. Make suitable assumptions if needed. Use of scientific calculator is permitted.*

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1. Draw the block diagram of optical fiber communication system and explain the function of each component separately. 10
  
2. (a) What is acceptance angle ? Derive an expression for it and show its relation with numerical aperture. 5
  
- (b) Using Ray theory, describe the mechanism for the propagation of light in an optical fiber. 5

3. (a) A step index fiber has core cladding refractive index of 1.50 and 1.46 respectively. What is the value of critical angle and numerical aperture of fiber ? 5
- (b) What do you mean by attenuation ? Discuss the various mechanisms responsible for attenuation in optical fiber. 5
4. (a) Differentiate between intermodal and intramodal dispersion for step index fibers. 5
- (b) For a step index fiber whose numerical aperture (NA) = 0.275 and  $n_1 = 1.48$ , calculate how much a light pulse spreads after travelling along 5 kms. 5
5. (a) Explain the various characteristics of injection lasers. Also write down the various sources of noise in injection laser. 5
- (b) Describe the structure of LED with suitable diagram. Also list the various characteristics of LEDs. 5
6. What do you understand by optical detector ? Discuss its various types. 10

7. (a) Derive an expression of SNR for the p-n and p-i-n photodiode receiver. 5
- (b) Explain the working principle of p-n photodiode with necessary diagrams. 5
8. (a) What do you understand by equalization ? Explain with the help of suitable diagram. 5
- (b) Draw and explain the circuit diagram of automatic gain control (AGC) in the optical receiver. 5
9. (a) Describe the ISI penalty and optical power budgeting for digital optical fiber system. 5
- (b) A photodiode has a capacitance of 8 pF. Calculate the maximum load resistance with allows a 6 MHz post detection bandwidth. 5
10. Write short notes on any *two* of the following :  $2 \times 5 = 10$
- (a) Photoconductors
- (b) Skew rays
- (c) Direct and indirect band gap semiconductors
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