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BIEL-017

B. TECH.-VIEP-ELECTRONICS AND COMMUNICATION ENGINEERING (BTECVI)

Term-End Examination

June, 2019

BIEL–017 : OPTICAL FIBER COMMUNICATION

Time : 3 Hours *Maximum Marks : 70*

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

1. Discuss the main constituents of an optical fiber communication link. 10

2. Define the relative refractive index difference for an optical fiber and show how it may be related to the numerical aperture. 10

3. (a) Determine the numerical aperture (NA), acceptance angle and critical angle of the fiber having core refractive index 1.50 and refractive index of cladding as 1.45. 5

(b) What are the advantages of optical communication over other communication techniques ? 5

4. Briefly describe the following terms : 10

(i) Rayleigh scattering and MIE scattering

(ii) Microbend and macrobend loss

5. Distinguish among a PN, PIN and APD photodiodes. Is it possible to make these three photodiodes using same semiconductor ? 10

6. (a) Differentiate between LED and LASER action. Also compare their features. 5

(b) What are direct band gap and in-direct band gap type of semiconductors ? 5

7. (a) Differentiate between intermodal and intramodel dispersion. How can their effect be minimised ? 5

(b) Compare the threshold optical powers of 1.35 μm stimulated Brillouin and Raman scattering within fiber at an operating wavelength of 1.35 μm. The single mode fiber has a core diameter of 5 μm with an attenuation of 0.75 dB/km. The source used is a laser diode with a bandwidth of 450 MHz. 5

8. Write short notes on any *two* of the following : 10

   (a) ISI penalty

   (b) Optical power budgeting

   (c) Noise in PIN photodiode

9. (a) Discuss the operation of an optical receiver. 5

   (b) What is link power budget ? Explain. 5

10. (a) What do you mean by automatic gain control in optical receiver ? Explain. 5

    (b) Explain homojunction and heterojunction. 5