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BIELE-008

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

Term-End Examination

00519

December, 2017

BIELE-008 : OPTO ELECTRONICS COMMUNICATION SYSTEMS

Time : 3 hours *Maximum Marks : 70*

Note : *Attempt **seven** questions. All questions carry equal marks. Missing data, if any, may be suitably assumed. Use of scientific calculator is permitted.*

1. What are circularly symmetric step-index optical fibers ? Briefly explain the process of solving Maxwell's equation in such types of optical fibers. *10*

2. Define and explain the concept of V-number as applicable to optical fiber communication. Also, differentiate between single mode and multi-mode fibers. *10*

3. Mathematically derive Kerr non-linearity and physically explain its significance. *10*

4. Explain the construction, operation and characteristics of a LED. *10*

5. Explain the constructional details, operational mechanism and optical characteristics of a pin detector. *10*

6. Briefly discuss the mechanisms of the following : *5+5=10*

   (a) High-impedance receivers

   (b) Trans-impedance receivers

7. (a) Define the following terms : *5*

      (i) Dispersion

      (ii) Self-phase modulation

   (b) What will be the combined effect of dispersion and self-phase modulation phenomenon ? *5*

8. (a) Discuss various intermodulation effects. *5*

   (b) Describe sensitivity and quantum efficiency in optical detectors. *5*

9. Explain the operation of a semiconductor amplifier and hence derive an expression for signal-to-noise ratio. *5+5=10*

10. Write short notes on any ***two*** of the following : *2×5=10*

    (a) Non-linear Schrödinger Equation

    (b) Brillouin Amplifier

    (c) Graded Index Fibers