

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

Term-End Examination

01440

December, 2014

BIEL-017 : OPTICAL FIBER COMMUNICATION

Time : 3 hours

Maximum Marks : 70

Note : Attempt any **seven** questions out of ten questions.
Make suitable assumptions if needed. Use of
scientific calculator is permitted.

1. (a) What are the key elements of an optical fiber communication system ? Explain with the help of a suitable block diagram. 5
- (b) What are the various applications of an optical fiber communication system ? 5
2. (a) How does light propagate in an optical fiber ? Explain with the help of ray theory. 5
- (b) Explain the structure of an optical waveguide. 5

3. (a) Explain modal bire-fringences in detail. 5
(b) Explain the overall fiber dispersion for multimode and monomode fiber. 5
4. (a) Write the basic concept of Einstein relations and population inversion. 5
(b) Derive the expression for threshold current density. 5
5. (a) Explain the structure of a semi-conductor injection laser and its characteristics. 5
(b) Explain photodiode. What are the requirements for photo detection using p-n photodiode? 5
6. (a) A single mode optical fiber has a beat length of 8 cm at 1300 nm. Calculate the bire-fringes. 5
(b) Explain ISI penalty and optical power budgeting for digital optical fiber system. 5
7. (a) Consider a multimode silica fiber which has a core refractive index $n_1 = 1.46$ and a cladding index $n_2 = 1.42$. Calculate the 5
(i) Critical Angle.
(ii) Numerical Aperture.
(iii) Acceptance Angle in air.
(b) Explain the different types of optical fibers on the basis of modes. 5

8. (a) Explain sub-carrier intensity modulation using AM, FM and PM. 5
- (b) Explain BER of optical fiber receiver. 5
9. (a) Explain PIN diode and its characteristics in detail. 5
- (b) Explain Regenerative repeater and Channel loss in optical fiber communication system. 5
10. Write short notes on any *two* of the following : $2 \times 5 = 10$
- (i) Photoconductors
- (ii) Acceptance Angle
- (iii) Pulse Broadening
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