

8E4090

Roll No. _____

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B. Tech. VIII Semester (Main/Back) Examination-2014
Electronics & Communication
8EC3 Optical Communication

Time : 3 Hours**Maximum Marks : 80**
Min. Passing Marks : 24**Instructions to Candidates:**

Attempt any five questions, selecting one question from each unit. All questions carry equal marks. (Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.)

Unit - I

1. a) Explain step index fibres and graded index fibres with suitable diagrams, also give important expression related to them. (6)
- b) What is normalized frequency of fibre? Prove that $M_g = \frac{V^2}{4}$ for graded index fibre have parabolic profile, where M_g is the mode volume of graded index fibre and V is normalized Frequency. (6)
- c) The numerical aperture for a fibre is 0.352 and core diameter is $50 \mu m$ with light wavelength of $0.8 \mu m$. Calculate number of modes. (4)

OR

1. a) Discuss the signal distortion caused by inter modal and intra model dispersion. Distinguish their characteristics. (8)
- b) A continuous 10Km long optical fibre link has a loss of 1.5 dB/km .
 - i) What is the minimum optical power level that must be launched into the fibre to maintain an optical power level of $0.3 \mu W$ at the receiving end.
 - ii) What is the required power if the fibre has a loss of 2.5 dB/km . (4×2)

Unit - II

2. a) What do you understand by a double heterostructure? Draw and explain surface and edge emitting DH-LED. (8)
- b) How does a Distributed feedback laser operate? What does DFB stands for? Distinguishing characteristic of this type of laser diode. (8)

OR

2. a) With the aid of suitable diagram, discuss the principles of operation of the injection laser. (8)
- b) Write notes on population inversion. Give difference between spontaneous and stimulated emission. (8)

Unit - III

3. a) Explain the "Impact ionization" in avalanche photodiode. Define photo multiplication factor and multiplication factor in reference to APD. (8)
- b) Compare p-i-n diode and Avalanche photodiode (8)

OR

3. a) Discuss the fundamental of optical receiver. (4)
- b) Discuss the types of noises that come in action with a optical detector. (6)
- c) What is meant by SNR? Derive an expression for SNR for p-i-n photodiode and Avalanche photodiode. (6)

Unit - IV

4. a) Discuss about the three types of fibre alignments which may contribute to insertion loss at an optical fibre joint. (8)
- b) What are optical splices? Describe the different types of optical splicing used in optical communication. (8)

OR

4. a) Explain system requirements of fibre optic communication system design. (8)
- b) Discuss important components of WDM transmission system and their properties, also describe the classification of WDM systems. (8)

Unit - V

5. a) Explain different methods of measurement of total attenuation in optical fibre. (8)
- b) Explain methods of measurement of fibre dispersion using suitable diagram. (8)

OR

5. a) Explain different methods of measurement of refractive index profile of an optical fibre with suitable diagram. (8)
- b) Explain the method of measurement of Numerical aperture of an optical fibre. (8)