Printed Pages: 3 | 487 | EEC-049(A)

(Following Paper ID and Roll No. to be filled in your Answer Book)

Paper ID :131758 Roll No. | | | | | | | | | | |

B. Tech.

(SEM. VII) THEORY EXAMINATION, 2015-16

OPTICAL FIBRE COMMUNICATION.

[Time:3 hours] [MaximumMarks:100

Section-A

1. Attempt **all** parts. All parts carry equal marks. Write answer of each part in short. (2×10=20)

(a) Draw the structure of an optical waveguide.

(b) What do you mean by Effective Refractive Index for a single mode fiber?

(c) How the attenuation in optical fibers is measured?

(d) What is Modal Noise?

(e) Name one direct band gap and one indirect band gap semiconductor material.

(f) Write down the main function of an optical detector.

(g) What are various sources of noises/ errors in optical receiver?

(h) List the reasons for biasing the laser near but below threshold in the off state.

(i) What are Channel Losses and how these can be estimated?

(j) Draw a simple circuit for pre-amplifier used in an optical system.

Section-B

Attempt **any five** questions from this section. (10×5=50)

2. Draw the block diagram of Optical Fiber Communication System. Explain the advantages of Optical Fiber Communication as compared to other systems.

3. (a) Explain non-linear Scattering losses in optical systems.

(b) A multimode graded index fiber exhibits the total pulse broadening of 0.2 μ m over a distance of 10 km. Estimate: (i) Maximum possible BW without

ISI. (ii) Pulse dispesion per unit length (iii) Information carrying capacity.

4. What is the reason for Intramodal Dispersion? Derive an expression for Material Dispersion in optical fibers along with overall fiber dispersion.

5. Discuss the concept of Stimulated Emission and Population Inversion. Draw Injection Laser Structure and explain it with its characteristics.

6. Draw and explain different types of LED structures for using as source in optical communication system.

7. Write short note on (i) PIN Photodiode (ii) Avalanche Photodiode.

8. Draw and explain different types of LED drive circuits for digital and analog transmission.

9. With the help of proper diagram explain Subcarrier Intensity Modulation.

Section-C

Attempt **any two** questions from this section : (15×2=30)

10. (a) Explain wave theory for optical propagation with modes in a planar and cylindrical guide.

(b) A silica optical fiber with a core diameter large enough to be considered by ray theory analysis has a core refractive index of 1.45 and a cladding refractive index of 1.30.

Determine: (i) The critical angle at the core-cladding interface; (ii) The NA for the fiber; (iii) The acceptance angle in air for the fiber.

11. (a) List the drawbacks and advantages of LEDs. Discuss DH structure of LED used for improving the efficiency.

(b) Derive an expression for noise in p-n and p-i-n receivers.

12. Draw the block diagram and explain the detection principle of coherent optical fiber system.

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