Roll No. ..... Total No. of Pages : 2

Total No. of Questions : 09

B.Tech (ECE) (Sem.–7,8)

OPTICAL FIBER COMMUNICATIONS

Subject Code : EC-404

Paper ID : [A0329]

Time : 3 Hrs. **Max. Marks : 60**

INSTRUCTION TO CANDIDATES :

1. **SECTION-A is COMPULSORY.**
2. **Attempt any FOUR questions from SECTION-B.**
3. **Attempt any TWO questions from SECTION-C.**

SECTION-A **(10 × 2 = 20 Marks)**

1. (a) What is dispersion?

   (b) List the advantages of optical communication.

   (c) How is eye diagram important in signal analysis?

   (d) Describe some important modulation formats.

   (e) What is Rayleigh scattering?

   (f) Calculate to express a channel spacing of 50 GHz in terms of wavelength.

   (g) Define zero-dispersion wavelength.

   (h) Compare coherent and non-coherent detection.

   (i) Give the principle of MSM photo detectors.

   (j) Give the significance of Q factor and how is it related to BER.

SECTION-B **(4 × 5 = 20 Marks)**

2. Derive the expression for numerical aperture in a step-index fiber. Draw the intensity pattern for LP_{12} mode.
3. Discuss mode control in tunable lasers.

4. Compute the responsivity of an InGaAs APD operating at 1.55 (μm and having a quantum efficiency of 0.7 if its gain is 10. How much optical power is needed by this detector to produce 20 nA?
5. Describe these: timing jitter, RIN and inter channel crosstalk.
6. Write a note on code division multiplexing.

SECTION-C **(2 × 10 = 20 Marks)**

7. Discuss the various sources those contribute to power penalty in optical links.
8. Discuss the modulation response of laser for small-signal modulation.
9. Derive the expression for signal-to-noise ratio in APDs.