2017

M.Sc.
4th Semester Examination

ELECTRONICS

PAPER—ELC-404

Subject Code—27

Full Marks : 50

Time : 2 Hours

The figures in the right-hand margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

Illustrate the answers wherever necessary.

(Optical Communication and Information Processing)

Answer Q. No. *1* and any *three* from the rest.

1. (a) What is wavelength division multiplexing (WDM) ? 2

(b) What do you mean by Waveguide Dispersion ? 2

(c) Define Numerical Aperture. Explain its significance. 2

(d) What is Bit Error Rate (BER) ? 2

(e) What do you mean by nonlinearity of optical fiber ? 2

2. (a) Using time independent perturbation theory derive an expression for second order perturbation in energy.

(b) Using time-dependent perturbation theory explain the phenomena of absorption and emission. 5+5

3. (a) Write down the importance of optical amplifiers in communication system.

(b) Explain the basic mechanism of optical amplification in EDFA and Raman amplifier.

(c) What are the advantages of Raman amplifiers.

2+(3+3)+2

4. (a) What do you mean by multipath dispersion in a step index optical fiber ? Derive the expression for multipath dispersion.

(b) A multimode step index fiber with a core diameter of 80 μm and a relative index difference of 1.5% is operating

at a wavelength of 0.85 μm. If the core refractive index is 1.48, estimate (i) the normalized frequency for the fiber, (ii) the number of guided modes. (2+5)+3

5. (a) Define micro bending and macro bending. Explain with diagram the macro bending loss in optical fiber.

(b) Explain briefly absorptive losses and radioactive losses.

(1½+1½+3)+(2+2)

6. (a) Why WDM system is advantageous over TDM system ? Explain any one type of WDM system.

(b) Explain the working principle of phototransistor.

(2+3)+5

[Internal Assessment — 10 Marks]

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