

17633

21819

3 Hours / 100 Marks

Seat No.

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- Instructions* –
- (1) All Questions are *Compulsory*.
 - (2) Answer each next main Question on a new page.
 - (3) Illustrate your answers with neat sketches wherever necessary.
 - (4) Figures to the right indicate full marks.
 - (5) Use of Non-programmable Electronic Pocket Calculator is permissible.
 - (6) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

Marks

- 1. Attempt any FIVE of the following: **20****
- a) State any eight advantages of optical fiber communication over conventional communication.
 - b) Describe briefly bending losses in fiber optic cable.
 - c) Name the fabrication processes of optical fiber. Describe any one with neat sketch.
 - d) Draw constructional diagram of surface emitting LED and write its operating principle.
 - e) Explain lateral and angular fiber misalignment with neat diagram.
 - f) Define fiber coupler? Explain core interactive and surface interactive type fiber coupler.
 - g) Explain the concept of WDM in optical fiber communication system with neat diagram.

P.T.O.

2. Attempt any FOUR of the following:**16**

- a) Draw the basic block diagram of fiber optic communication system. State the function of each block.
- b) Define the term w.r.t optical fiber:
 - (i) Reflection
 - (ii) Refraction
 - (iii) Dispersion
 - (iv) Scattering of light
- c) State two advantages and two disadvantages of LED.
- d) Differentiate between step index fiber and graded index fiber.
- e) State different types of fiber connectors. Explain any one fiber connectors in brief.
- f) Compare avalanche photo diode and pin photo diode (four points) based on:
 - (i) Working
 - (ii) Responsivity
 - (iii) Quantum efficiency
 - (iv) Photo detector noise.

3. Attempt any FOUR of the following:**16**

- a) A light ray is incident from medium-1 to medium-2. If the refractive indices of medium-1 and medium-2 are 1.5 and 1.36 respectively. Then determine the angle of refraction for an angle of incidence of 30° .
- b) Explain any one type of optical isolator and circulator.
- c) Define fiber splicing? Describe any one of them with neat sketch diagram.
- d) Name the types of LASER (any eight).
- e) Define any two performance characteristic of LASER. With the help of block diagram describe optical digital system.

- f) Compare between LED and LASER. Based on:
- (i) Working
 - (ii) Spectral width
 - (iii) Efficiency
 - (iv) Optical power

4. Attempt any FOUR of the following: 16

- a) Explain SONET/SDH optical networking with neat diagram.
- b) Define the term w.r.t optical detectors:
 - (i) Responsivity
 - (ii) Dark current
- c) Derive an expression for maximum acceptance angle of a fiber.
- d) Draw and explain block diagram of hybrid multi channel analog system.
- e) Explain the working of avalanche photodiode with diagram.
- f) Give the importance of undersea optical system.

5. Attempt any FOUR of the following: 16

- a) A optical fiber has a core refractive index of 1.50 and cladding refractive index of 1.46. Calculate critical angle at the core-cladding interface and numerical aperature (NA) for the fiber.
- b) Explain absorption and scattering losses in fiber.
- c) Explain various standards for optical fiber communication.
- d) Compare single mode and multi mode fiber.
- e) State any four properties of good optical connectors.
- f) Differentiate between analog and digital optical system.

6. Attempt any FOUR of the following:**16**

- a) Explain chromatic losses in brief.
 - b) Describe the construction and working of LASER.
 - c) Illustrate the working principle domain reflectometer. With its block diagram.
 - d) Explain the construction and working principle of pin photo diode.
 - e) State the function of optical isolator and describe its working with diagram.
 - f) Draw the constructional diagram of edge emitting LED. State any two advantages.
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