

17633

15162

3 Hours / 100 Marks

Seat No.

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- Instructions* – (1) All Questions are *Compulsory*.
(2) Illustrate your answers with neat sketches wherever necessary.
(3) Figures to the right indicate full marks.
(4) Assume suitable data, if necessary.
(5) Preferably, Write the answers in sequential order.

Marks

1. a) **Attempt any THREE of the following:** **12**
- (i) Draw the basic block diagram of fiber optic communication system. State the function of each block.
 - (ii) State the advantages of optical fiber communication over conventional communication (Any four)
 - (iii) Justify the need of Total Internal Reflection (TIR) in optical fiber.
 - (iv) Define the terms w.r.t. optical fiber
 - (1) Dispersion
 - (2) Scattering of light
- b) **Attempt any ONE of the following:** **6**
- (i) Name the fabrication processes of optical fiber. Describe any one with neat sketch.
 - (ii) Draw schematic of LASER and describe its working principle with transition process involved in LASER process.

P.T.O.

2. Attempt any FOUR of the following: 16

- a) List the spectral band name, designation and range used in optical fiber communication.
- b) Define the following with well labeled diagram.
 - (i) Numerical Aperture
 - (ii) Acceptance angle
- c) Compare step index and graded index fiber for four points.
- d) Describe briefly bending loss in fiber optic cable.
- e) Draw the constructinal diagram of DH AlGa As edge-emitting LED. Describe its working principle.
- f) State advantages and disadvantages of LED (two each)

3. Attempt any FOUR of the following: 16

- a) When the mean optical power launched into an 8 km length of fiber is 120 μW , the mean optical power at the fiber output is 3 μW . Determine.
 - (i) The overall signal attenuation or loss in decibels through the fiber assuming there are no connectors or splices.
 - (ii) The signal attenuation per km for the fiber.
- b) Describe the effect of inter modal dispersion in the optical fiber.
- c) Name the types of LASER (Any eight)
- d) Describe the working principle of : YAG laser with neat diagram.
- e) Give reason, which optical source LED or LASER is suitable for long distance optical communication.

- 4. a) Attempt any THREE of the following:** **12**
- (i) State the performance characteristics of LASER diode and explain any two of them.
 - (ii) Compare photodiode and avalanche diode for four points.
 - (iii) Describe working of PIN photodiode with constructional diagram.
 - (iv) Define the terms w.r.t. optical detectors
 - (1) Responsivity
 - (2) Dark current
- b) Attempt any ONE of the following:** **6**
- a) Describe the fusion splicing technique for joining the optical fibers.
 - b) State the necessity of optical network. List the various terminologies used in optical networking. Describe any one of them.
- 5. Attempt any FOUR of the following:** **16**
- a) Describe the effect of misalignment of optical fiber on signal transmission.
 - b) State various types of mechanical splicing of fiber. Describe any one of them with neat sketches.
 - c) List any four types of fiber connectors with application and insertion loss in dB.
 - d) State the function of core interaction type and surface interaction type of fiber coupler.
 - e) Describe the concept of wave, division multiplexing in optical communication system.
 - f) Give the importance of undersea optical system.

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

- a) State the function of optical isolator and describe its working with diagram.
 - b) Name the device which is used for fault finding in fiber optic cable. Describe its working principle with neat labelled diagram.
 - c) Draw the block diagram of optical analog system and list the major noise contributors.
 - d) Describe the working of hybrid multichannel analog and digital optical system.
 - e) With the help of block diagram, describe the optical digital system.
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