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16172

3 Hours / 100 Marks Seat No. | | | | | | | | |

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. (A) Attempt any THREE of the following : **12**

(a) State the advantages of optical fibre communication over conventional communication. (Any Four)

(b) Define : (i) Refractive index (ii) Critical angle (iii) Numerical aperture (iv) Acceptance angle.

(c) Draw and explain spontaneous emission and stimulated emission.

(d) List any four types of fibre connectors with their applications and insertion loss in dB.

(B) Attempt any ONE of the following : **06**

(a) Draw the block diagram of fibre optic communication system. Explain in brief the function of each block.

(b) Name the different techniques of fabricating optical fibres. Explain with neat diagram any one fabrication technique.

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

(a) Draw the electromagnetic spectrum showing the region (spectral band) used for optical fibre communication.

(b) Draw the single-mode step index fibre and multi-mode step index fibre. Also, state the advantages of multimode fibres over single-mode fibre.

(c) Draw and explain in brief graded index fibres.

(d) State the advantages and disadvantages of LED.

(e) Explain the fusion splicing technique for joining the optical fibres.

(f) Draw and explain the block diagram of optical analog systems.

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

(a) Define the terms –

(i) Reflection (ii) Refraction

(iii) Dispersion (iv) Polarization of light

(b) State the performance characteristics of Laser diode (Any four).

(c) Compare between LED & Laser diode.

(d) Draw and explain longitudinal and angular misalignments.

(e) Draw and explain the block diagram of digital optical system.

4. (A) Attempt any THREE of the following : **12**

(a) Explain in brief absorption and scattering losses in optical fibres.

(b) Explain with neat diagram the working principle of YAG Laser.

(c) Compare between fusion splice and mechanical splice.

(d) State the advantages and disadvantages of wave division multiplexing optical fibre communication system.

(B) Attempt any ONE of the following : **06**

(a) Draw the construction and working of Avalanche photodiode. Also state its merits and demerits.

(b) Draw and explain the under-sea optical systems.

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

(a) Draw and explain inter-modal dispersion.

(b) Explain in brief mechanical properties of fibre. (Any Four)

(c) Explain the terms –

(i) Responsivity (ii) Dark current

(d) Explain the working principle of LED and draw its characteristics.

(e) Draw and explain the block diagram of Optical Time domed Reflectometer.

(f) Explain the concept of synchronous optical networking (SONET).

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

(a) Draw the PIN photodiode and state its advantages and disadvantages.

(b) Compare between photodiode and PIN diode.

(c) Draw and explain the operation of optical isolator. State it's use.

(d) State the functions of core interaction type and surface interaction type fibre couplers.

(e) Draw the hybrid multichannel analog and digital optical system. State it's applications.
