

22647

23124

3 Hours / 70 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) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

Marks

1. Attempt any FIVE :

10

- (a) State the value of uplink and downlink frequency used for satellite services for Ka and Ku band.
- (b) Draw well-labelled constructional diagram of fiber optics cable.
- (c) Define total internal reflection.
- (d) Define Equivalent Isotropic Radiated Power (EIRP).
- (e) The orbit of an earth orbiting satellite has an eccentricity of 0.15 and a semi-major axis 9000 km, determine the apogee. [Assume the earth's radius as 6371 km].
- (f) State any two specifications of 802.3z.
- (g) Draw the block diagram of regenerative transponder.



2. Attempt any THREE :**12**

- (a) Explain following terminologies used in satellite communication :
 - (i) Look angle
 - (ii) Footprint
- (b) With the help of neat diagram show the wave propagation of light in the optical fiber :
 - (i) Single mode step index fiber
 - (ii) Multimode step index fiber
- (c) Draw the block diagram of single conversion transponder and explain each block.
- (d) With the help of neat diagram, explain fusion splice technique.

3. Attempt any THREE :**12**

- (a) Justify, optical fiber communication is more advantageous.
- (b) Compare asynchronous and geo-synchronous satellite w.r.t.:
 - (i) Definition
 - (ii) Tracking system required
 - (iii) Coverage area
 - (iv) Propulsion system
- (c) With the help of neat diagram, explain the basic principle used in wavelength division multiplexing.
- (d) Explain the reasons for occurrence of following losses in optical fiber communication :
 - (i) Absorption loss
 - (ii) Modal dispersion loss

- 4. Attempt any THREE :** **12**
- (a) Explain the effect of following in satellite communication :
 - (i) Free space transmission losses
 - (ii) Antenna misalignment
 - (b) Draw the block diagram of fiber optics communication system. Give reason for using optical amplifier before optical detector.
 - (c) What is coupling loss ? Explain the reasons for coupling loss.
 - (d) State the need of following in optical communication :
 - (i) Optical switch
 - (ii) Optical splitter
 - (e) Draw the block diagram of OTDR. State any 2 applications of OTDR.
- 5. Attempt any TWO :** **12**
- (a) Define Orbital Perturbation. Explain the reasons for orbital perturbation.
 - (b) Classify optical amplifier. Explain any one in detail with neat diagram.
 - (c) State the function of following sub-system in spacecraft unit :
 - (i) Propulsion sub-system
 - (ii) Telemetry and tracking and command sub-system
 - (iii) Altitude control sub-system
- 6. Attempt any TWO :** **12**
- (a) With the help of neat diagram explain the working principle of Global Positioning System (GPS).
 - (b) Draw the architecture diagram of SONET. Explain in brief.
 - (c) A silica fiber has a core diameter of 7 μm and its refractive index is 1.43. The refractive index of cladding is 1.415. Determine :
 - (i) Numerical Aperture
 - (ii) Critical Angle
 - (iii) Acceptance half angle
 - (iv) Condition for angle of incidence at core-clad boundary so that light propagate along the fiber.
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