

17656

15116

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) Assume suitable data, if necessary.
- (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
- (i) Define the terms w.r.t. waveguide
- 1) Cutoff frequency of a waveguide
- 2) Guide wavelength
- (ii) Draw labelled sketch of Reflex Klystron. State its applications.
- (iii) Write RADAR range equation and state the factors affecting maximum range of RADAR.
- (iv) Define geostationary orbit and geostationary satellite.
- b) Attempt any ONE of the following: 06
- (i) Sketch the construction of Gunndiode and write its operation.
- (ii) What is waveguide? With neat sketch explain its operation.

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**Marks**

- 2. Attempt any FOUR of the following:** **16**
- a) Differentiate between circular and rectangular waveguide.
  - b) Draw the construction of two cavity Klystron amplifier and describe its working principle.
  - c) How doppler effect can be used to measure speed?
  - d) State the reason for difference in uplink and downlink frequency in satellite communication.
  - e) Describe scattering and dispersion losses in optical fiber.
  - f) Draw frequency spectrum for optical communication with band name and its range.
- 3. Attempt any FOUR of the following:** **16**
- a) State advantages and applications of circular waveguide.
  - b) Sketch the construction of tunnel diode and write its operation.
  - c) Describe a scope display method of radar with its diagram.
  - d) State the advantages and disadvantages of fiber optic communication.
  - e) Define with respect to satellite communication
    - (i) Orbit
    - (ii) Footprint
- 4. a) Attempt any THREE of the following:** **12**
- (i) Draw field pattern of circular waveguide. State its applications.
  - (ii) Draw the construction of PIN diode and describe with its working principle.
  - (iii) State two advantages and two applications of CW radar.
  - (iv) Illustrate the block diagram of communication channel subsystem used in satellite communication.

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**Marks****b) Attempt any ONE of the following:****06**

- (i) Explain the working of MTI radar with the help of block diagram and with suitable waveforms.
- (ii) Draw the block diagram of fiber optic communication system and list out the detectors and light source for it.

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

- a) Distinguish microwave circulator and isolator with following parameters:
  - (i) Function
  - (ii) Construction
  - (iii) Application
  - (iv) Number of ports
- b) Show how TWT can be used as an amplifier.
- c) A step index fiber has a numerical aperture of 0.16, a core refractive index of 1.45 and core diameter of 90 mm. Calculate:
  - (i) The acceptance angle  $\theta_a$
  - (ii) The refractive index of cladding
- d) Describe the antenna used in satellite.
- e) Describe edge emitter LED construction and working principle.
- f) Draw and explain the block diagram of OTDR.

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

- a) Draw diagram of twists and corners. State its applications.
- b) Describe the Intrinsic and Extrinsic absorption losses in optical fiber.
- c) Draw the diagram of fusion splicing and rigid alignment tube splice.
- d) Illustrate how telemetry tracking and command system is used in satellite.
- e) Draw structure of avalanche photodiode and describe its working principle.

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