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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) 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 : **12**

(a) Define the terms w.r.t. waveguide :

(i) Cut-off frequency

(ii) Phase velocity

(iii) Group velocity

(iv) Guided wavelength of waveguide

(b) Draw labelled sketch of TWT. Give two applications.

(c) Describe the principle of Doppler effect used in Radar system.

(d) Define following terms w.r.t. satellite :

(i) Foot print

(ii) Azimuth angle

(B) Attempt any ONE : **6**

(a) With neat diagram describe propagation of microwave through rectangular waveguide. In which condition it becomes dominant mode ?

(b) With neat sketch describe the operation of GUNN diode.

2. Attempt any FOUR : **16**

(a) Differentiate between waveguide and two wire transmission line.

(b) Describe working of reflex klystron amplifier with a neat diagram.

(c) Write RADAR range equation and state the factor affecting maximum range of RADAR.

(d) List uplink and downlink frequency for different bands used in satellite communication.

(e) Define the following with respect to optical fiber communication :

(i) Critical angle

(ii) Snell's law

with suitable diagrams.

(f) Describe coupling losses occur in optical fiber communication with neat diagrams.

3. Attempt any FOUR : **16**

(a) Compare rectangular waveguide and circular on the basis of :

(i) Definition

(ii) Construction

(iii) Application

(iv) Field pattern

(b) Sketch the construction of Tunnel diode and write its operation.

(c) Explain A-scope Display Method with diagram, used in Radar System.

(d) State four advantages of geo-stationary satellite.

(e) Differentiate between satellite communication and fiber optic communication. (any four points)

4. (A) Attempt any THREE : **12**

(a) Sketch the construction of circulator and isolators. State two applications of each.

(b) Draw the construction of PIN diode. Describe working principle.

(c) Give the operation of pulsed radar to detect the object.

(d) Describe the function of Altitude Control Subsystem in Satellite for keeping satellite in its orbit.

(B) Attempt any ONE : **6**

(a) Draw block diagram of Optical Fiber Communication System. Describe the function of different sensors used in optical communication system.

(b) Draw the block diagram of MTI radar and describe its working with waveforms.

5. Attempt any FOUR : **16**

(a) Draw field pattern of circular waveguide.

(b) Draw TWT and give its two applications.

(c) State four limitations of LED as a source to optical fiber.

P.T.O.

(d) Draw block diagram of satellite subsystem and describe function of each sections.

(e) A silica optical fiber with a core diameter large enough to be considered by ray theory analysis has a core reflective index of 1.50 and a cladding refractive index of 1.47. Calculate (i) Critical angle, (ii) NA of fiber, (iii) Acceptance angle in air for fiber.

(f) Differentiate between single mode and multimode fiber.

6. Attempt any FOUR : **16**

(a) Describe function of hybrid Tee with neat diagram. (E – H plane or Magic Tee)

(b) List the different losses occur in optical fiber. Describe any one loss with diagram.

(c) List different types of splicing techniques. Describe any one method.

(d) Describe the function of telemetry and tracking in satellite communication system.

(e) Distinguish between LED and LASER. (4 points)

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