22535

24225

3 Hours / 70 Marks Seat No. | | | | | | | | |

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) 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. Attempt any FIVE of the following : **10**

(a) Define the term w.r.t. waveguide (i) group velocity, (ii) phase velocity.

(b) State the frequency range for following bands :

(i) C Band

(ii) X Band

(iii) K Band

(iv) Ku Band

(c) Draw neat sketch of bends.

(d) Draw neat sketches of Magic Tee and lable it.

(e) List any two applications of IMPATT diode.

(f) Give the applications of RADAR.

(g) Define the term antenna scanning. Write its types.

2. Attempt any THREE of the following : **12**

(a) Compare waveguide and two wire transmission line on the basis of any four points.

(b) Explain the working principle of two hole directional coupler.

(c) Draw equivalent circuit and VI characteristics of Tunnel diode.

(d) Write RADAR range equation and state the factors affecting maximum range of RADAR.

3. Attempt any THREE of the following : **12**

(a) A rectangular waveguide is 5 cm × 2.5 cm. Calculate cutoff frequency of dominant mode.

(b) Explain Doppler effect and draw block diagram of CW Doppler RADAR.

(c) Explain Pulse Radar with neat block diagram.

(d) Describe the operating principle of PIN diode with neat sketch.

4. Attempt any THREE of the following : **12**

(a) Describe working principle of TWT (Travelling Wavetube) with neat diagram.

(b) Explain the working principle of Horn Antenna with neat sketch.

(c) Describe, how bunching is formed in Magnetron with neat diagram.

(d) List the types of display methods used in RADAR. Explain any one display method.

(e) Draw the block diagram of Frequency Modulated (FM) CW RADAR system and explain its operation.

5. Attempt any TWO of the following : **12**

(a) Describe TE and TM modes in rectangular waveguide.

(b) Draw the construction of microwave circulator and isolator. List applications of each. (any two)

(c) With neat sketch, describe the operation of GUNN diode and state its two application.

6. Attempt any TWO of the following : **12**

(a) State the working principles of Reflex Klystron and illustrate setting up of oscillations in the tube using Applegate diagram.

(b) Calculate the maximum range of Radar for the following specifications :

- Peak power transmitted by the Radar, Pt = 250 KW
- Gain of transmitting Antenna, G = 4000
- Effective aperture of the receiving Antenna, Ae = $4m^2$
- Radar cross section of the target, $\sigma = 25m^2$
- Power of minimum detectable signal, $S_{min} = 10^{-12}$ W

(c) Explain blind need of RADAR. Write step by step procedure to calculate blind speed.
