22535

12223

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 following term :
(i) Group Velocity (ii) Phase Velocity

(b) Draw the microwave spectrum and designate the appropriate band in it.

(c) List application of two-hole directional couplar.

(d) Draw the construction diagram of E-plane and H-plane junction.

(e) List applications of tunnel diode.

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

(g) Write the factors that affect the RADAR range.

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

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

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

(c) Draw the construction and explain working principle of IMPATT diode.

(d) Explain the working of basic RADAR system with neat block diagram.

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

(a) Draw and Explain the field pattern of circular waveguide for its dominant mode.

(b) Explain working MTI RADAR with neat block diagram.

(c) Explain the working principle of a cassegrain antenna with neat sketch.

(d) Describe working principle of TWT (Travelling wavetube) with neat diagram.

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

(a) Explain the Principle of operation of two cavity Klystron amplifier with neat diagram.

(b) Explain working of isolator.

(c) Explain effect of magnetic field and electric field in magnetron.

(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) For Rectangular waveguide with wall seperation of 4 cm and desired frequency of operation is 8 GHz, determine group velocity, Phase velocity. Write the advantages of Rectangular waveguide.

(b) Explain the working principle of Horn antenna with neat sketch. Write the performance parameters of antenna.

(c) Describe the operation of PIN diode with neat sketch. List the applications of PIN diode.

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

(a) Write the name of microwave diode suitable for following each application :

(i) Microwave Oscillator

(ii) Replacing TWT Transmitter

(iii) Microwave power switching

(iv) Airborne Radar

(v) Logic operation

(vi) Pulse modulation

(b) Calculate the maximum range of RADAR for the following specification :

(i) Operating Frequency = 10 GHz

(ii) Peak power transmitted by RADAR = 400 kW

(iii) Effective aperture of the receiving antenna = 5 m^2

(iv) RADAR cross section of the target = 30 m^2

(v) Power of minimum detectable signal = 10^{-10} W

(c) In MTI RADAR the pulse repetition frequency is 200 Hz and the carrier transmission frequency is 100 Hz. Find its first, second and third blind speed.
