22535

21222

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

15 minutes extra for each hour

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.

(7) Preferably, write the answers in sequential order.

Marks

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

(a) List two applications of IMPATT diode.

(b) Define cut-off wavelength of a waveguide.

(c) State principle of operation of cassegrain feed antenna.

(d) Draw construction details of Gunn diode and label it.

(e) State the frequency range for following bands : (i) UHF band (ii) Ku band (iii) X band (iv) S band

(f) List two advantages and two disadvantages of Pulse RADAR system.

(g) Draw neat sketches of Magic Tee and label it.

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

(a) Compare waveguide with transmission line on the basis of (i) construction (ii) propagation with respect to cut-off frequency (iii) field / circuit theory (iv) application.

(b) Explain application of Tunnel diode as an amplifier with neat diagram.

(c) State working principle of sonar system and list four applications.

(d) Draw neat sketches and give one use of following Waveguide Accessories : (i) Bends (ii) Corners

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

(a) Draw construction diagram of Magnetron and label it. Give two applications.

(b) For rectangular waveguides define : TE & TM modes.

Sketch field pattern for $TE_{2.0}$ mode.

(c) Discuss the use of RADAR tracking antennas and explain any one type of tracking antenna.

(d) Draw block diagram of MTI RADAR and relate it, to explain detection of moving target.

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

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

(b) State the need of Radar antenna scanning and explain spiral scanning.

(c) Describe operating principle of Directional Coupler and give two applications.

(d) Define doppler effect. Draw block diagram and explain principle and operation of CW Doppler RADAR.

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

(a) Calculate the maximum range of a radar system (in km and nautical miles), which operates at 3 cm with a peak pulse power of 600 kW, if its antenna is 5 m^2, minimum detectable signal is 10^{-13} W and the radar cross-sectional area of the target is 20 m^2.

(b) Compare with neat sketches the actions of gyrators, isolators and circulators using ferrites. Mention their typical application.

(c) Draw construction details and state principle of operation of PIN diode. Explain any one application circuit of PIN diode with suitable schematic diagram.

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

(a) Draw block diagram of FM CW RADAR. Explain its operation and use as altimeter in aircrafts.

(b) A rectangular waveguide has a = 4 cms; b = 3 cms as its sectional dimensions. Find all the modes which will propagate at 5000 MHz.

(c) With physical construction diagram, explain working principle of a TWT. State 02 performance characteristics and 02 applications of TWT.

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