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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) Use of Non-programmable Electronic Pocket Calculator is ***permissible****.*
(7) Mobile Phone, Pager and any other Electronic Communication devices are ***not*** *permissible in Examination Hall.*

Marks

1. Attempt **any five** of the following : **20**

a) Compare waveguide and two wire transmission line.

b) State the typical values of the following performance parameters of the Reflex Klystron :

i) Frequency range ii) Output power

iii) Efficiency iv) Tunning range.

c) Describe any two applications of PIN diode.

d) Define blind speed. How problem of blind speed can be solved ?

e) Why uplink frequency is greater than down link frequency ? State the typical values of uplink and downlink frequencies in 'C' band.

f) Define "Look angle" and "Foot print" associated with satellite communication.

g) Describe the application of Magic Tee as a duplexer.

2. Attempt **any four** of the following : **16**

a) Describe the operation of microwave circulator with the help of suitable diagram.

b) Describe the construction of "Magnetron".

c) State any two applications of TWT and Two Cavity Klystron amplifier.

d) Describe Doppler's effect in brief.

e) Why microwave dish antenna is having parabolic shape and meshy surface ?

f) State advantages and disadvantages of satellite communication.

3. Attempt **any two** of the following : **16**

a) Describe the construction, working and applications of "Gunn diode".

b) Draw the block diagram of satellite earth station. Describe the function of each block.

P.T.O.

Marks

c) Describe the function of the following subsystems of satellite :
   i) Antenna sub-system
   ii) Repeater sub-system
   iii) Telemetry, Tracking and Control (TTC) subsystem
   iv) Communication channel subsystem.

4. Attempt **any two** of the following : **16**

a) i) Describe the working of two hole directional coupler with the help of suitable diagram.
   ii) Describe the following performance parameters of directional coupler :
      a) Coupling factor
      b) Directivity
      c) Isolation

b) i) Distinguish between TE and TM modes in rectangular waveguide with the help of field pattern. What is dominant mode in rectangular waveguide ? Draw the field pattern for dominant mode in the rectangular waveguide.
   ii) An airfilled rectangular waveguide of inside dimensions 7 cm × 3.5 cm operates in dominant mode. Find the cut-off frequency and guided wavelength when frequency of operation is 3.5 GHz.

c) i) Describe the construction and working of TWT.
   ii) State any four applications of TWT.
   iii) State the typical values of the following performance parameters of TWT :
      1) Frequency of operation
      2) Power output
      3) Efficiency
      4) Noise figure.

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

a) Compare microwave tubes and conventional vaccum tubes (any four points).
b) Draw the constructional details of two cavity Klystron tube.
c) State any two applications of Gunn diode and Microwave Bipolar Transistor.
d) Describe working principle of PIN diode.
e) State the advantages and disadvantages of CW Doppler Radar.
f) List the antenna scanning methods used in Radar. Describe any one of them.

6. Attempt **any two** of the following : **16**

a) Describe construction, working and applications of IMPATT diode.
b) Draw the block diagram of MTI radar. Describe the function of each block.
c) i) Draw the basic block diagram of satellite communication system. Describe its working.
   ii) Describe the construction and working of paraboloid dish antenna with a focal point horn feed.