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Question Paper Code : 51469

B.E./B.Tech. DEGREE EXAMINATION, MAY/JUNE 2016

Seventh Semester

Electronics and Communication Engineering

EC 2403/EC 73/10144 EC 703-RF AND MICROWAVE ENGINEERING

(Regulations 2008/2010)

(Common to PTEC 2403- RF and Microwave Engineering for B.E. (Part-Time) Sixth Semester Electronics and Communication Engineering – Regulations 2009)

Time : Three Hours

Maximum : 100 Marks

Smith Chart is to be provided

Answer ALL questions.

PART – A (10 × 2 = 20 Marks)

1. Mention any four differences between low frequency and high frequency microwave circuits.
2. Draw the high frequency equivalent circuit of the resistor and inductor.
3. Distinguish between conditional and unconditional stabilities of Amplifier.
4. A GaAs MESFET has the following parameters :

$$S_{11} = 0.65 \angle -154^\circ, S_{12} = 0.02 \angle 40^\circ, S_{21} = 2.04 \angle 185^\circ \text{ and } S_{22} = 0.55 \angle -30^\circ$$

Calculate its maximum stable power gain.

5. What are the composition of ferrite ?
6. What is Gyrator ?

7. What is the working principle of varactor diode ?
8. What is the need for matching network ?
9. Name the errors possible in VSWR measurements.
10. What is the role of slow wave structures in TWT ?

PART - B (5 × 16 = 80 Marks)

11. (a) (i) Derive Z and Y matrix formulation of multi port network. (8)
- (ii) State and prove the symmetry of S matrix for a reciprocal network. (8)

OR

- (b) Explain the scattering matrix for lossless junction.

12. (a) The S- parameters for a transistor is given below. Determine its stability and draw the input and output stability circles (Use Smith Chart).

$$S_{11} = 0.385 \angle -53^\circ, S_{12} = 0.045 \angle 90^\circ, S_{21} = 2.7 \angle 78^\circ \text{ and } S_{22} = 0.89 \angle -26.5^\circ$$

OR

- (b) (i) Describe the process of visualizing the noise performance of a transistor by plotting noise circles on the \sqrt{S} Plane. (8)
- (ii) Explain microstripline matching networks. (8)
13. (a) (i) Explain the working principle of E Plane Tee and derive its S parameters. (8)
- (ii) Explain the working of phase shifter with neat diagram. (8)

OR

- (b) (i) Explain the working of circulator and explain its applications. (10)
- (ii) Explain the working principle of isolator. (6)

14. (a) Explain the principle of operation of Tunnel diode and TRAPATT device.

OR

(b) (i) Describe the Gunn effect with the aid of Two-Valley model theory. (8)

(ii) Draw the physical structure and doping profile of IMPATT diode and explain in detail. (8)

15. (a) (i) Describe how the frequency of a given source is measured.

(ii) Explain the measurement of high VSWR with the help of block diagram.

OR

(b) Explain the principle of operation of the cavity klystron with the neat sketch.

A 250 kW pulsed cylindrical magnetron has the following parameters.

Anode voltage = 25 kV

Peak anode current = 25 A

Magnetic field B = 0.35 Wb/m²

Radius of cathode = 4 CM

Radius of cylinder = 8 CM

Calculate efficiency of the magnetron, cyclotron frequency, cut-off magnetic field.