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Question Paper Code : 21378

B.E./B.Tech. DEGREE EXAMINATION, MAY/JUNE 2013.

Seventh Semester

Electronics and Communication Engineering

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

(Regulation 2008)

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

Time : Three hours

Maximum : 100 marks

Smith chart is to be provided.

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Define reciprocal and symmetrical networks.
2. Express power input and power output under matched conditions for a two-port network in terms of wave components.
3. Why impedance matching is required. What are other constraints required.
4. Draw typical output stability circle and input stability circle.
5. Give the significance of Rat-race junctions.
6. Power at the input port is 900mw. If this power is incident on 20dB coupler with directivity 40dB, What is the coupled power and transmitted power .
7. What is Gunn effect? Name the materials that exhibit Gunn effect?
8. Draw the voltage wave forms of a TRAPATT diode.

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) State and explain the properties of S-parameters. Derive the S parameters of a Directional Coupler.

Or

- (b) Formulate S-matrix for n-port network compute ABCD for a T-network.

12. (a) Derive the transducer power gain for a transistor amplifier. Design LC network to match source impedance $Z_s = (50 + j25) \Omega$ to the load $Z_L = (25 - j50) \Omega$. Assume $Z_0 = 50 \Omega$, $f = 2 \text{ GHz}$. Use smith chart.

Or

- (b) Discuss the smith chart approach to design the L-section and T-section matching networks.

13. (a) Explain the properties of E-plane Tee? Derive the expression of scattering matrix for directional coupler.

Or

- (b) Explain the properties of magic Tee and derive scattering matrix for it.

14. (a) With the aid of suitable sketch discuss construction, materials characteristics and working of IMPATT diode.

Or

- (b) With the help of two-valley theory, explain how negative resistance is created in Gunn diodes.

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 neat sketch.

A 250KW pulsed cylindrical magnetron has the following parameters.

Anode voltage = 25 KV

Peak anode current = 25A

Magnetic field B = 0.35Wb/m²

Radius of cathode = 4CM

Radius of cylinder = 8CM

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