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Question Paper Code : 71469

B.E./B.Tech. DEGREE EXAMINATION, APRIL/MAY 2015.

Seventh Semester

Electronics and Communication Engineering

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

(Regulation 2008/2010)

(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. 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. Draw the VSWR circle for reflection coefficient 1.
4. Draw the contour of Nodal Quality Factor $Q = 3$.
5. Name any two microwave passive devices which make use of Faraday rotation.
6. What are the properties of S matrix?
7. Draw the equivalent circuit of Varactor diode.
8. What is the need for matching network?
9. What are the limitations of conventional vacuum devices?
10. Mention the major differences between the TWT and Klystron.

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) (i) Write the mathematical analysis of amplifier stability. (8)
(ii) Design a microwave amplifier for maximum transducer power gain. (8)

Or

- (b) Using the Smith chart design any two possible configuration of discrete two element matching networks to match the source impedance $Z_S = (50 + j25)\Omega$ to the load $Z_L = (25 - j50)\Omega$. Assume the characteristic impedance of $Z_0 = 50\Omega$ and operating frequency of 2 GHz. (16)

13. (a) (i) Explain the concept of N port scattering matrix representation. (8)
(ii) With neat diagram explain the operation of phase shifter and show its phase change is $2\theta + 4\beta l$. (8)

Or

- (b) With neat diagram explain the operation of the following devices :
(i) Gyrator (8)
(ii) Two hole directional coupler. (8)

14. (a) Explain the working principle of Gunn diode with two valley model and plot its characteristics.

Or

- (b) What are avalanche transit time devices? Explain the operation and construction of IMPATT diode.

15. (a) Explain the π mode of operation of magnetron. Mention few high frequency limitations.

Or

- (b) (i) Describe how can the power of a microwave generator be measured using bolometer. (10)
(ii) Calculate the SWR of a transmission system operating at 10 GHz. Assume TE_{10} wave transmissions inside a wave guide of dimensions $a = 4$ cm, $b = 2.5$ cm. The distance measured between twice minimum power points = 1 mm on a slotted line. (6)