## Question Paper Code : 52462

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2017

Seventh Semester

Electronics and Communication Engineering

EC 2403 – RF AND MICROWAVE ENGINEERING

(Regulations 2008)

(Common to PT EC 2403 – RF and Microwave Engineering for B.E. (Part-Time)
Sixth Semester – ECE – Regulations 2009)

Time : Three Hours
Maximum : 100 Marks

Answer ALL questions

PART – A
(10×2=20 Marks)

1. What are microwaves ?

2. The S-parameters of a two port network are given as $[S] = \begin{bmatrix} 0.8\angle -90° & 0.5\angle 90° \\ 0.5\angle 0 & 0.8\angle -90° \end{bmatrix}$.

   Is the network symmetrical or reciprocal ?

3. Define Stability of microwave amplifier.

4. What is a matching network ? State its use in microwave circuits.

5. Give examples of non-reciprocal devices.

6. Write the S-matrix of 3 dB attenuator.

7. State the transferred electron effect.

8. Mention the ideal characteristic of dielectric material in MMIC.

9. What is the role of slow wave structures in TWT ?

10. Name the methods used to measure attenuation at microwave frequency.

## PART – B  (5×16=80 Marks)

11. a) i) What is a scattering matrix ? Derive the scattering matrix formulation of a N-port network. (8)

    ii) Relate Z, Y and ABCD parameters with S-parameters. (8)

    (OR)

    b) i) Verify lossless and reciprocity property of any two port network using scattering matrix. (8)

    ii) Explain the behaviour of resistors and capacitors at radio frequencies. (8)

12. a) i) A microwave amplifier is characterized by its S-parameters. Derive expression for power gain and transducer gain. (8)

    ii) With necessary diagrams explain impedance matching using discrete components. (8)

    (OR)

    b) i) Explain in detail the concept of microstripline matching networks. (8)

    ii) Discuss the Smith chart approach to design L-matching network. (8)

13. a) i) Obtain the scattering matrix of a circulator from the first principle. (8)

    ii) State and prove the Unitary property and Zero property of Scattering matrix. (8)

    (OR)

    b) i) What are waveguide tees ? Derive the scattering matrix for a Magic T. (8)

    ii) Define Directivity and Coupling Co-efficient for a Directional Coupler. Derive its S-matrix. (8)

14. a) i) Discuss the different modes of operation of Gunn diode. (8)

    ii) What is a parametric device ? Derive the Manley – Rowe power relation. (8)

    (OR)

    b) i) Describe in detail the fabrication techniques followed in forming MMIC's. (8)

    ii) Write a note on IMPATT device. (8)

15. a) i) Derive an expression for the cut off magnetic field for a cylindrical magnetron. (8)

    ii) Explain the measurement of cavity 'Q' by slotted line method. (8)

    (OR)

    b) i) With neat diagram explain the working of Reflex Klystron. Draw an Applegate diagram to illustrate bunching. In what way bunching in this tube differs from bunching in multicavity tubes. (8)

    ii) With neat diagram explain the measurement of VSWR through return loss measurement. (8)

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