Reg. No. :

Question Paper Code: 47403

B.E. / B.Tech. DEGREE EXAMINATION, MAY 2022

Seventh Semester

Electronics and Communication Engineering

14UEC703 - MICROWAVE ENGINEERING

(Regulation 2014)

Duration: Three hours   Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. To couple two waveguides a choke flange may be used

    (a) As it is simpler than any other method of joining

    (b) To help the alignment of the waveguides

    (c) To compensate for discontinuities at the joint

    (d) T increase the bandwidth of the system

2. The waveguide tuning component, which is not easily adjustable is,

    (a) Screw   (b) Iris   (c) Stub   (d) Plunger

3. TRAPATT diode is preferred over IMPATT diode because of

    (a) High η (b) Less sensitivity to harmonics

    (c) Lower noise   (d) Ability to operate at higher frequencies

4. Two entities that are combined to form a Magic Tee are

    (a) One H and one E plane tee   (b) One Hand two E plane tees

    (c) Two Hand two plane tees   (d) Two H and one E plane tee

5. The efficiency (η) of the klystron can be calculated as

    (a) $\eta = P_{ac} + P_{dc}$ (b) $\eta = P_{ac} + P_{dc}$ (c) $\eta = P_{ac} - P_{dc}$ (d) $\eta = P_{ac} / P_{dc}$

6. The microwave tube amplifier that uses an axial magnetic field and radial electric field is
    (a) Reflex klystron   (b) CFA
    (c) Coaxial magnetron   (d) Travelling wave magnetron

7. The fabrication of microstrip line is done by

    (a) Photo etching   (b) Printed circuit technique
    (c) Oxidation   (d) Cladding

8. Processing in MMICs is done by

    (a) Ion implantation   (b) Net list generation
    (c) Floor planning   (d) None of the above

9. A loss less line of characteristics impedance Z_0 is terminated in pure reactance of $-jZ_0$ value. VSWR is

    (a) 10   (b) 2   (c) Infinity   (d) 1

10. The reflection coefficient on a line is $0.2 \angle 45^0$. The SWR is

                                                                        (d) 1.5
    (a) 0.8   (b) 1.1   (c) 1.2

PART - B (5 x 2 = 10 Marks)

11. What are hybrid couplers?

12. List the applications of Gunn diode.

13. Compare O-type tube and M-type tube

14. What is double stub matching?

15. What are the errors in impedance measurement?

PART - C (5 x 16 = 80 Marks)

16. (a) The S-parameters of a two-port network are given by

    $S_{11} = 0.2 \angle 90°$ $S_{22} = 0.2 \angle 90°$
    $S_{12} = 0.5 \angle 90°$ $S_{21} = 0.5 \angle 0°$
    (i) Determine whether the network is lossy or not.

    (ii) Is the network symmetrical and reciprocal? Find the insertion loss of network.(16)

Or

    (b) Draw a diagram and explain in detail about four port circulator   (16)

2

47403

17. (a) Explain the operating principle of a Gunn diode. Describe its domain

       formation and various modes of operations. (16)

Or

  (b) (i) Draw the construction and explain the working of IMPATT diode. (8)

      (ii) Explain the working of TRAPATT Diode. (8)

18. (a) Explain the π mode of Oscillations in a Magnetron and derive the Hull cut-off

     equations of a Magnetron. (16)

Or

  (b) Explain the concept and derive the expression for Bunching process. (16)

19. (a) Explain the various stages involved in Monolithic Microwave Integrated Circuits

      technology. (16)

Or

  (b) Draw a flow chart for MMIC fabrication process and discuss in detail. (16)

20. (a) (i) Explain the impedance measurement technique using slotted line and

      reflectometer. (8)

    (ii) Explain the measurement of high VSWR with the help of block diagram. (8)

Or

  (b) Describe the measurement of power at microwave frequencies. (16)

47403

47403