Question Paper Code: 47403

B.E. / B.Tech. DEGREE EXAMINATION, DEC 2021

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. The range of microwave frequency is

    (a) 3-30 GHz   (b) 3-30 Hz

    (c) 3-30 KHz   (d) 3-30 MHz

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. The resonant frequency of the cavity is expressed as

    (a) $f = V_d + 2L$ (b) $f = V_d * 2L$ (c) $f = V_d - 2L$ (d) $f = V_d / 2L$

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. The load reflection coefficient can be calculated as
   - (a) $\Gamma_L = (Z_L-Z_0) + (Z_L+Z_0)$
   - (c) $\Gamma_L = (Z_L-Z_0) - (Z_L+Z_0)$
   - (b) $\Gamma_L = (Z_L-Z_0) / (Z_L+Z_0)$
   - (d) $\Gamma_L = (Z_L-Z_0) + (Z_L+Z_0)$

10. In VSWR measurement, the condition for producing standing wave measurement is
    - (a) $Z_L + Z_0$
    - (b) $Z_L = Z_0$
    - (c) $Z_L \neq Z_0$
    - (d) $Z_L - Z_0$

PART - B (5 x 2 = 10 Marks)

11. What are hybrid couplers?

12. What is Two-valley model?

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

14. List the advantages of MMIC's

15. What are the errors in impedance measurement?

PART - C (5 x 16 = 80 Marks)

16. (a) Discuss with supporting equations about scattering matrix of a directional coupler. (16)

Or

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

17. (a) Explain the operating principle of a Gunn diode. Describe its domain formation and various modes of operations. (16)

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(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) (i) Explain the working principle and operation of multi-cavity Klystron
         amplifier and derive the expressions for its output power.   (8)
     (ii) Explain the Working Principle of reflex klystron oscillator and derive the
         expression for power and efficiency.   (8)

19. (a)   Analyze the performance of characteristics impedance and dielectric
         constantinmicrostriplines.   (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) Draw a block diagram for impedance measurement using reflectometer and explain
      in detail   (16)

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