B.E. Eighth Semester (Electronics & Telecommu. Engineering) (CGS)

10639 : UHF and Microwaves : 8 XT 01

P. Pages : 2 | AU - 2996

Time : Three Hours | Max. Marks : 80

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Notes : 1. Due credit will be given to neatness and adequate dimensions.
2. Assume suitable data wherever necessary.
3. Illustrate your answer necessary with the help of neat sketches.
4. Use of pen Blue/Black ink/refill only for writing the answer book.

SECTION – A

1. a) Explain the operation of two cavity Klystron with the help of applegate diagram and derive the expression for beam current. **7**

b) Derive the expression for efficiency of Reflex Klystron. **6**

OR

2. a) With neat sketch, explain working of TWT. (Travelling Wave Tube). **7**

b) A Reflex Klystron operates at the peak mode of n = 2 with beam voltage = 300 V, Beam current = 20 mA, Signal Voltage = 40V. **6**
Determine :
i) Input power in watts. ii) Output power in watts
iii) Efficiency

3. a) What do you understand by transferred electron devices ? Explain Gunn effect and draw J-E characteristics of Gunn diode. **7**

b) Explain the following modes of operation of Gunn diode. **7**
i) Transit time mode ii) Delayed domain mode
iii) Quenched domain mode iv) LSA mode

OR

4. a) What are avalanche transit time devices ? Explain in detail the operation of TRAPATT diode. **7**

b) What is MASER ? How Ruby Maser is different from Ammonia Maser ? **7**

5. a) Explain the different types of losses in microstrip line. **6**

b) A 8.6 GHz signal is propagated through a rectangular waveguide **7**
Calculate
i) Cut off frequency for TE wave.
ii) Possible modes for TE wave
iii) Phase velocity for dominant mode of operation
Dimensions of the waveguide are 2.5 cm x 1 cm.

OR

6. a) Derive expression for characteristic impedance and attenuation losses for parallel strip line. A coplanar stripline carries an average power of 250 mW and peak current 100 mA. Determine characteristic impedance. **7**

b) A lossless parallel stripline has a conducting strip width w. The substrate dielectric separating two conducting strip has a relative dielectric constant ϵ_{rd} of 6 and a thickness of 4 mm if 6c for copper is 5.96×10^6 s / mm. **6**

Calculate :

i) The required width w for conducting strip in order to have a characteristic impedance of 50Ω.

ii) The stripline capacitance. iii) The stripline inductance.

SECTION – B

7. a) Derive the expression for following. Also explain each term in brief. **7**

i) Resonant frequency ii) Quality factor

iii) Bandwidth iv) Damping factor

of a resonant circuit

b) Derive equation of input impedance for a series resonator. **7**

OR

8. a) Derive an expression for Quality Factor (Q) for rectangular cavity resonator. **7**

b) Derive equation for resonant frequency for a rectangular cavity resonator with a = 7.5 cms, b = 4 cms, and d = 16 cms. Calculate resonant frequency in dominant mode and phase constant. **7**

9. a) Enlist the transmission characteristic of directional coupler and formulate it's scattering matrix. **7**

b) Derive scattering matrix for H-plane Tee. Also find power in the side arm if power of 30 mW is applied to H-arm. **6**

OR

10. a) Explain the working of magic tee as a duplexer with neat sketch. **7**

b) What is Faraday's rotation ? What are Ferrites ? Why are gerrites useful in microwaves ? **6**

11. a) Explain how high value of VSWR can be measured by twice the minimum method. **7**

b) Explain microwave power measurement using calorimetric watt meter. **6**

OR

12. a) Calculate VSWR of a transmitting system operating at 10 GHz. Assume TE_{10} mode wave is transmitted inside a waveguide having dimensions a = 4 cm, b = 2.5 cm. The distance measured between twice minimum power points is 1 mm on a slotted line. **7**

b) Explain any two methods of measuring impedance of a terminating load in a microwave system. **6**

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