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(2008 Scheme)
08.703 : MICROWAVE ENGINEERING (T)

Time : 3 Hours Max. Marks :100

PART – A

Answer **all** questions. **Each** question carries **4** marks. **(10×4=40 Marks)**

1. Explain re-entrant cavities.
2. Explain bunching effects in klystrons.
3. Why conventional tubes can not be operated in high frequencies ?
4. Draw the output equivalent circuit of a 2 cavity klystron. Derive the power output.
5. Explain how helical coil is used as slow wave structure.
6. What is strapping in magnetrons ?
7. What are different modes of operation of gunn diode ?
8. Explain common source amplifier using MESFET.
9. Explain how a circulator can be converted to an isolator.
10. Explain the difference between base band and IF repeaters in microwave communication.

P.T.O.

PART – B

Answer **any 2** questions from **each** Module.

Module – I

(6×10=60 Marks)

11. A 2-cavity klystron amplifier has the following parameters'

    $V_o = 1000V$; $R_o = 40\ K\Omega$

    $I_o = 25\ mA$; $f = 3\ GH_z$

    Gap spacing in either cavity : $d = 1\ mm$

    Spacing between the 2 cavities : $L = 4\ cm$

    Effective shunt impedance

    Excluding beam loading : $Rsh = 30\ K\ \Omega$.

    a) Find the input gap voltage to give maximum voltage V_2.

    b) Find the voltage gain, neglecting the beam loading in the output cavity

    c) Find the efficiency of amplifier, neglecting beam loading

    d) Calculate the beam loading conductance and show that neglecting it was justified in the proceeding calculations ?

12. Explain the working of reflex klystron.

13. With diagram explain the amplification process in travelling wave tube. What is the significance of electronic and circuit equations ?

Module – II

14. An x-band pulsed conventional magnetron has the following operating parameters

    A node voltage : $V_0 = 5.5\ kV$; Beam current; $I_o = 4.5\ A$

    Operating frequency $F = 9\ GHz$; Resonator conductance = $G_r = 2\times10^{-4}$ ℧ ; loaded conductance; $G_l = 2.5\times10^{-5}$ ℧. Vane capacitance : $C = 2.5\ pf$; Daly cycle : $DC = 0.002$ Powerloss $P_{loss} = 18.5\ kW$ compute.

a) The angular resonant frequency
b) The unloaded quality factor
c) The loaded quality factor
d) The external quality factor
e) The circuit efficiency
f) The electronic efficiency.

15. Explain the principal of operation of Gunn diode oscillator and amplifier.

16. Explain the principal of operation of tunnel diode.

Module – III

17. Explain the methods for measurement of frequency and impedance.

18. Explain 2 hole directional coupler.

19. Describe the most commonly used diversity schemes for microwave communication system.