Con. 2868-09. B.E./EXTC/Sem VII (CR) Microwave Device & Circuits **VR-4803**

(3 Hours) **[Total Marks : 100**

26-05-09 11 a.m to 2 p.m

N.B.:(1) Question No. **1** is **compulsory**.
(2) Attempt any **four** questions out of remaining **six** questions.
(3) Assume **suitable data** whenever **necessary** and justify the **same**.

1. Explain in brief (any **four**) :— **20**
   (a) Single stub impedance matching on transmission lines
   (b) Exitation of modes in waveguides
   (c) Microwave ferrite devices
   (d) Modes of operation in Gunn diode
   (e) Microwave radiation Hazards.

2. (a) Explain Transmission line sections as Impedance and Voltage transformers. **10**
   (b) A television has its antenna connected via a 50 ft. 300 Ω twin lead line. **10**
   The input impedance of receiver is 75 Ω resistive. The manufacturer's instructions indicate that z_0 = 300 Ω, relative velocity is 0·82, attenuation is 20 db/100 ft. at 10 MHz. Find impedance into which antenna works at given frequency. (Use Smith Chart).

3. (a) Explain Tunnel diode as oscillator and amplifier with typical characteristics, applications and advantages. **10**
   (b) A Gunn diode is working in transit time mode at 12 GHz. The domain charge move at 10^7 cm/sec. Calculate (i) the length of the device (ii) can the device work at 10 GHz and 14 GHz. Which is the mode of operation in each case ? **5**
   (c) The input power in a two hole directional coupler is 1 mw. The coupler has a coupling factor of 15 dB and a directivity of 30 dB. Calculate the power in all ports. **5**

4. (a) Explain following for Magnetron : **10**
   (i) π mode operation (ii) Mode jumping
   (iii) Magnetron Tuning (iv) Rising Sun magnetron
   (b) Explain high frequency limitations of conventional tubes. **5**
   (c) In reflex Klystron for a change in 2% of repeller voltage, calculate the change in frequency with the following data : **5**
   Repeller Voltage 1000 V, V_{dc} = 500 V, drift space d = 2 cm, mode n = 1, f = 6 GHz.

5. (a) Explain development of waveguide from a parallel plate transmission lines. Also explain : (i) Group velocity (ii) Phase velocity (iii) Waveguide impedance. **10**
   (b) It is required to propagate a single TE_{10} mode in a rectangular waveguide working at 'X' band. Calculate range of frequency at which the waveguide may be used. Also calculate the variation of the guide wavelength over this frequency range. **5**
   (c) Compare Circular Waveguide with Rectangular Waveguide. **5**

6. (a) A rectangular cavity of cross sectional dimensions a = 2·286 cm and b = 1·016 cm is closed by a perfect conductor with a small hole at z = 0 and other end is closed by a perfect short circuiting plunger. What must the range of movement of the Piston be, if the cavity is to resonate at frequencies from 9·3 GHz to 10·2 GHz. Assume TE_{102} mode. **5**
   (b) Write short notes on Reflectometer and VSWR meter. **10**
   (c) Explain the working of hybrid rings. **5**

7. (a) Draw block diagram for measurement of attenuation by substitution method to determine attenuation of a component under test. Also give advantages and disadvantages of above method. 10

(b) What is principle of Microwave heating ? Explain any one application of microwave heating in detail. 5

(c) Write Advantage and Applications of Microstrip lines. 5
