RTU Previous Question Papers BE EC 6th Semester Microwave Engineering

Unit -1

1. (a) Discuss the Network analyser setup for the measurement of Scattering parameters.

(b) In a SWR measurement at 10 GH₃, the distance between the successive minima is 0.1cm. Inside dimension of waveguides are 4cm and 2cm respectively. $TE_{|0}$ mode is propagating through the waveguide. Calculate the VSWR.

Or

1. (a) How can we measure power of micro wave signals using —

(i) Bolo meter

(ii) Thermocouple

(b) In a Calorimeter - Wattmeter power measurement system, mas§ of , water taken is 1000 gm and rise in temperature is 100°c. Calculate the amount of incident microwave power.

2. (a) .-Discuss different type of losses occurred in Micrortrip lines, along with necessary relation.

(b) A certain micro strip line has the following parameters-

h = 7 mils w = 10 mils

calculate the characteristic Impedance (Zo) of the line.

Or

2. (a) What do you mean by parallel strip lines. Explain.

(b) Derive the relation for character Impedance and attenuation losses of a parallel strip line.

(c) A shielded strip line has the following parameters -

Er = 2.56 *

w = 25 mils	(strip width)

t= 14 mils (strip thickness)

4=70 mils

(shield depth)

Calculate - (i) k factor

(i) Frindge capacitance

(iii) Characteristic Impedance of the line

Unit-Ill

3. (a) Discuss ABCD matrix analysis of two port networks .

(b) Briefly explain, all possible dis continuaties, which can occur in waveguides.

Or

3. (a) What are Reciprocal Networks ? Explain.

(b) How can we say, Directional Coupler is a reciprocal multipart junction. Explain its construction and Working.

Unit-IV

4. (a) Define the term Negative Resistance . Name the diode which works on the principle of Negative resistance.

(b) Discuss TRAPATT diodes on the basis of following points -

(i) Physical structure

(ii) Principle of operation

(ii) Power output & Efficiency

Or

4. (a) Explain the working of Tunnel diode. Draw the energy band diagram under different bias conditions.

(b) A Silicon IFET at 300°K has the following parameters -

Electron density	$(Nd) = 1 \times 10^{17} cm$
Hole density	$(Na)=lx10^{19} cm^{-3}$
Relative dielectric constant	(Er) =11.8
Channel height	(a) = 0. $2x \ 10^{4} \ cm$
Channel length	$(L) = 8x10^{-4} cm$

Channel Width	$(z) = 5 \text{ Ox } 10^{"4} \text{ cm}$
Electron Mobility	$(i_n) = 800 \text{ cm}^2 / v.s$
Drain Voltage	(Vd)=10V
Gate Voltage	(Vg)1.5 V
Calculate	
(i) Pinch off Voltage	(ii) Pinch off current
(iii) Built in Voltage	(iv) Drain current
(v)Saturation drain current at $Vg = 0$	(iv) Cut off frequency

Unit-V

5. (a) Discuss different type of MMIC fabrication techniques .

(b) Categories the materials available for MMIC and give their characteristics.

Or

5. (a) What is the use of planar inductor films in their film formation.

(b) Explain different type of Inductor film available, along with required expressions.

(c) An Interdigitated capacitor fabricated on a GaAs substrate has the following parameters -

Number of fingers (N) = 8

Relative dielectric constants of GaAs (Er) = 13.10

Substrate height (h) = 0.254 cm

Finger Length (1) = 0.00254 cm

Finger base width (w) =0.051 cm

Compute the capacitance.