6E3085

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B.Tech VI Semester (Main/Back) exam. May, 2012

Electronics & Communicatint
6ECI Microwave Engg.-II

Time : 3 Hours   **Maximum Marks : 80**

Min. Passing Marks : 24

Instructions to Candidates:

*Attempt any **five questions**, selecting one question from each unit. All Question carry equal marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*

Units of quantities used/ calculated must be stated clerly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. _____ **Nil** _____   2. _____ **Nil** _____

Unit - I

1. (a) Discuss the Network analyser setup for the measurement of Scattering parameters.   8

     (b) In a SWR measurement at 10 GH_3, the distance between the successive minima is 0.1 cm. Inside dimension of waveguides are 4cm and 2cm respectively. TE_{10} mode is propagating through the waveguide. Calculate the VSWR.   8

<div align="center">Or</div>

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

         (i) Bolo meter

         (ii) Thermocouple

(iii) Calorimeter-Wattmeter

(b) In a Calorimeter – Wattmeter power measurement system, mass of water taken is 1000 gm and rise in temperature is 100^0c. Calculate the amount of incident microwave power. 4

Unit - II

2 (a) :- Discuss different type of losses occurred in Micrortrip lines, along with necessary relation. 12

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

$$E r = 5.23 \qquad t = 2.8 \, mils$$

$$h = 7 \, mils \qquad w = 10 \, mils$$

calculate the characteristic Impedance (Zo) of the line. 4

Or

2. (a) What do you mean by parallel strip lines. Explain. 4

(b) Derive the relation for character Impedance and attenuation losses of a parallel strip line. 6

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

Er = 2.56

w =25mils (strip width)

t = 14 mils (strip thickness)

d =70 mils (shield depth)

Calculate – (i) k factor

(ii) Frindge capacitance

(iii)Characteristic Impedance of the line 6

Unit-III

3. (a) Discuss ABCD matrix analysis of two port networks . 8

   (b) Briefly explain , all possible discontinuaties , which can occur in waveguides . 8

Or

3. (a) What are Reciprocal Networks ? Explain . 4

   (b) How can we say , Directional coupler is a reciprocal multipart junction. Explain its construction and Working. 12

Unit-IV

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

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

   (i) Physical structure

   (ii) Principle of operation

   (iii) Power output & Efficiency 12

Or

4. (a) Explain the working of Tunnel diode. Draw the energy band diagram under different bias conditions . 8

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

Electron density	$(Nd) = 1 \times 10^{17} \, cm^{-3}$
Hole density	$(Na) = 1 \times 10^{19} \, cm^{-3}$
Relative dielectric constant	$(Er) = 11.8$
Channel height	$(a) = 0.2 \times 10^{-4} \, cm$
Channel length	$(L) = 8 \times 10^{-4} \, cm$
Channel Width	$(z) = 50 \times 10^{-4} \, cm$
Electron Mobility	$(\mu_n) = 800 \, cm^2 / v.s$

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Drain Voltage	(Vd) = 10 V
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

8

Unit-V

5. (a) Discuss different type of MMIC fabrication techniques .   10

(b) Categorise the materials available for MMIC and give their charac-
teristics.   6

Or

5. (a) What is the use of planar inductor films in their film formation.   2

(b) Explain different type of Inductor film available , along with required
expressions.   10

(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	(l)	= 0.00254 cm
Finger base width	(w)	= 0.051 cm

Compute the capacitance.   4

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