M.E. Second Semester (Electronics & Tele.) (Full Time) (C.G.S.- New)

13344 : RF & Microwave Circuit Design

2 ENTC 4

P. Pages : 2

Time : Three Hours

* 0 3 9 4 *

AW - 3637

Max. Marks : 80

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

SECTION - A

1. a) Given the ABCD matrix for a two port network, derive its [s] matrix. **6**

b) Find the Y parameter for two port N/W given **7**

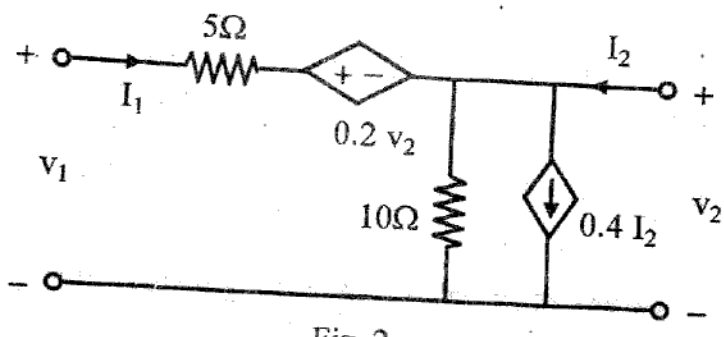

Fig. 2 a

OR

2. a) Derive Z parameters in term of h parameters. **6**

b) Derive the condition of reciprocal and lossless N/W for S-parameters. **7**

3. For a load impedance of $Z_L = (60\text{-}45j)\ \Omega$, design two single stub matching networks that transform the load to a $Z_{in} = (75 + j90)\ \Omega$ input impedance. Assume that both stub and transmission line have a characteristic impedance of $Z_0 = 75\Omega$. **14**

OR

4. Design matching network that transforms load $Z_L = 30 + j10$ to $Z_{in} = 60 + j80\ \Omega$ matching should contain two series transfer line & shunt capacitance. Assume $Z_0 = 50\ \Omega$ at freq. 1.5 GHz. **14**

5. a) Explain how stabilization of amplifier for input & output port is attempted through series resistance or shunt conductance. **7**

b) Explain design issues of balanced broadband Amplifier. **6**

OR

P.T.O

6. a) Prove that the maximum power transfer from the source to the amplifier is achieved if the impedance is complex conjugate matched ($Z_{in} = Z_s$). 7

b) RF amplifier has $S_{11} = 0.3 \angle -70°$, $S_{21} = 3.5 \angle 85°$, $S_{12} = 0.2 \angle -10°$, $S_{22} = 0.4 \angle -45°$ with i/p voltage same. $Z_s = 40$. Assume $Z_0 = 50$ find G_T, G_{TU}, G_A. 6

SECTION - B

7. a) Describe in brief the high frequency oscillator configuration. 6

b) A typical varactor diode has an equivalent series resistance of 45Ω and a capacitance ranging from 10 Pf to 30 Pf for reverse voltages between 30V and 2V. Design a voltage controlled clapp-type oscillator with center frequency of 300 MHz and ± 10% tuning capability. Assume that the trans conductance of the transistor is constant and equal to $g_m = 115$ ms. 8

OR

8. a) A crystal is characterized by the parameters $L_q = 0.1H$, $R_q = 25\Omega$, $C_q = 0.3Pf$ & $C_o = 1Pf$ Determine the series and parallel resonance frequencies. 7

b) Explain double balanced mixer design in detail. 7

9. a) Explain the losses in microstrip lines. 6

b) Explain even and odd mode analysis of coupled microstriplines. 7

OR

10. a) Explain encapsulation of devices in hybrid MICs. 6

b) Explain working of step recovery diode frequency multiplier. 7

11. a) A planar resistor has the following parameters :
Resistive film thickness $\ell = 0.1$ μm
Resistive film length $\ell = 10$ mm
Resistive film width w = 10 mm
Sheet resistivity of gold film $P_S = 2.44 \times 10^{-8}$ Ω / m
Calculate the planar resistance. 6

b) Explain thin film formation in MMIC. 7

OR

12. a) Describe hybrid integrated circuit fabrication in detail. 5

b) Explain the following :
i) Substrate materials
ii) Conductor materials
iii) Dielectric materials
iv) Resistive materials. 8

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