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

13344 : RF & Microwave Circuit Design : 2 ENTC 4

P. Pages : 2 | **AW - 3908**

Time : Three Hours | 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) For given S matrix **7**

$$[S] = \begin{bmatrix} 0.15 \angle 0^\circ & 0.85 \angle -45^\circ \\ 0.85 \angle 45^\circ & 0.2 \angle 0^\circ \end{bmatrix}$$

Determine that it is reciprocal & lossless if part 2 is terminated with matched load what is return loss.

b) Transform ABCD parameters to Y parameters. **6**

OR

2. a) Defined rules for signal flow graph. **6**

b) Find Y parameter for ckt given. **7**

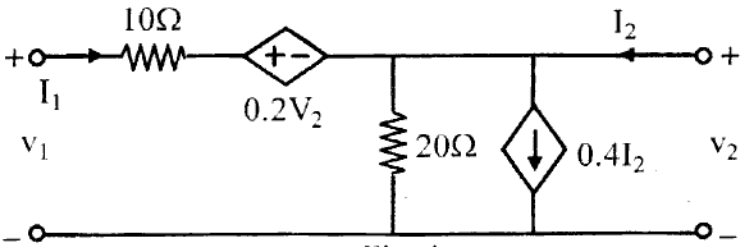

Fig. 4 - a

3. Design a matching network that transforms the load $Z_L = (30 + j10)\Omega$ to an input impedance $Z_{in} = (60 + 80j)\Omega$. The matching network should contain only two series transmission lines and a shunt capacitance. Both transmission lines have a 50Ω characteristic line impedance and the frequency at which matching is designed is f = 1.5 GHz. **14**

OR

4. Design a T type matching network that transforms a load impedance $Z_L = (60 - 30j)\ \Omega$ into a $Z_{in} = (10 + 20j)\ \Omega$ input impedance and that has a maximum nodal quality factor of 3. Compute the values for the matching networks components. Assume that the matching is required at f = 1 GHz. **14**

5. a) Derive the reflection coefficient expression 7

$$\overline{\Gamma ns} = \frac{B_1}{2C_1} - \frac{1}{2}\sqrt{\left(\frac{B_1}{C_1}\right)^2 - 4\frac{C_1^*}{C_1}}$$

b) Derive the stability factor k from $|| C_{in} - r_{in} | > 1$ 6

OR

6. a) Explain a generic single stage amplifier configuration embedded between input and output matching networks. Also explain its parameters. 7

b) Explain design issues of balanced broadband amplifier. 6

SECTION - B

7. a) Explain Quartz Oscillator in detail with its equivalent representation. 7

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

OR

8. a) Describe in brief the negative resistance oscillator model. 7

b) Explain voltage controlled oscillator in detail. 7

9. a) Describe the hybrid mode analysis of striplines in detail. 7

b) Explain MMIC technology in detail. 6

OR

10. A lossless parallel stripline has a conducting stripwidth w. The substrate dielectric separating the two conducting strips has a relative dielectric constant $\in_{rd}$ of 6 and a thickness d of 4 mm. Calculate : 13

a) The required width w of the conducting strip in order to have a characteristic impedance of 50 Ω.
b) The stripline capacitance
c) The stripline inductance
d) The phase velocity of the wave in the parallel stripline.

11. a) Explain MOSFET fabrication in detail. 6

b) List the basic properties provided by ideal conductor, dielectric and resistive materials used in MMIC. 7

OR

12. a) Discuss the following : 8

i) Substrate material ii) Conductor material
iii) Dielectric material iv) Resistive material

b) Describe hybrid integrated circuit fabrication in detail. 5

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