OR

10. a) What is a reciprocal network? Derive the condition for reciprocity in terms of 'z' parameters.

b) The network shown in Fig. 10 contains a current-controlled current source. For this network find the 'Y' parameters.

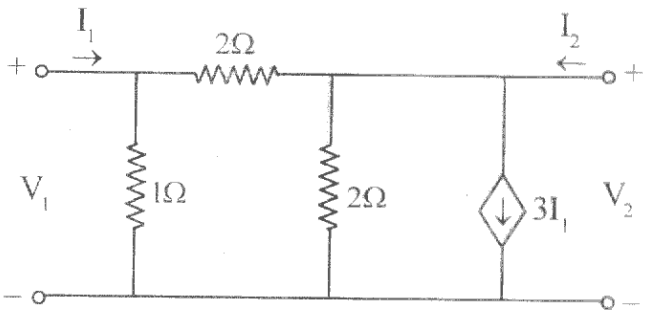

Fig. 10

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Roll No .....

EC - 305

B.E. III Semester

Examination, December 2013

Network Analysis

Time : Three Hours

Maximum Marks : 70

Note: 1. Attempt *five* questions, selecting one question from each unit.

2. All questions carry equal marks.

Unit - I

1. a) Discuss the properties of an ideal current-source and an ideal voltage source. Explain how a voltage source can be converted into an equivalent current source and vice versa.

b) Draw the dual of the network shown in Fig. 1.

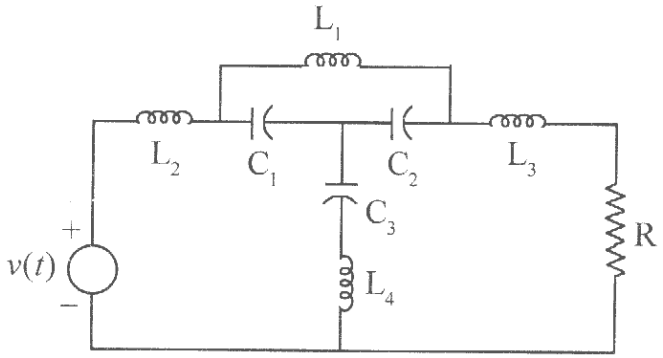

Fig. 1

[2]

OR

2. a) Explain series and parallel resonance. What are their similarities and dissimilarities?

   b) Following data refers to two coupled coils 1 and 2, as shown in Fig. 2.

   $\phi_{11} = 0.5\times10^{-3}$Wb ; $\phi_{12} = 0.3\times10^{-3}$ Wb ; $N_1 = 100$ turns; $N_2 = 500$ turns; $i_1 = 1$A.

   Find, K, the coefficient of coupling, the inductances L_1 and L_2 and M, the mutual inductance.

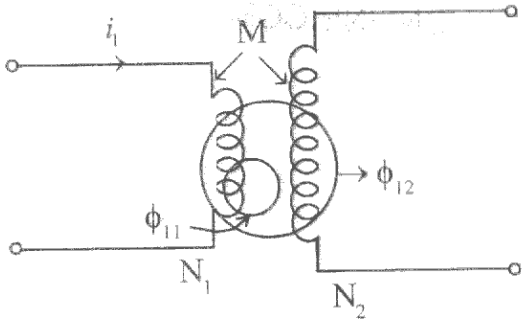

Fig. 2

Unit - II

3. a) For the network shown in Fig. 3, draw the graph and write down the tie-set matrix.

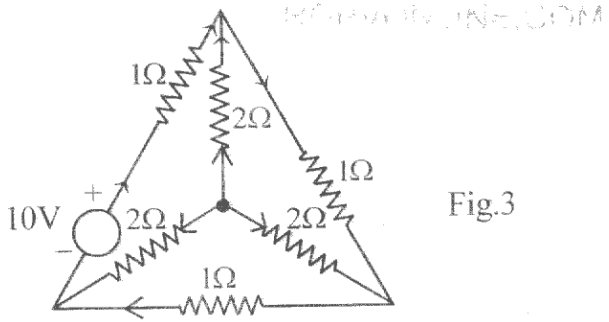

Fig.3

   b) State and explain the following
      i) Reciprocity theorem
      ii) Millman's theorem

[3]

OR

4. State and explain 'Maximum power transfer theorem'.
   In the network shown in Fig. 4, determine Z_L so that the power absorbed by it is maximum and the value of the power absorbed.

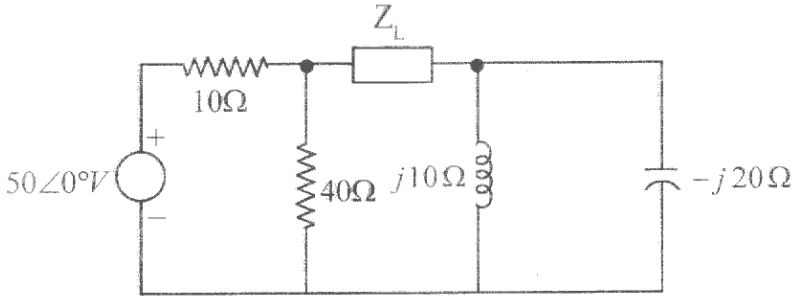

Fig. 4

Unit - III

5. In the network shown in Fig. 5, the voltage source follows the law $v(t) = Ve^{-\alpha t}$, where α is a constant. The switch is closed at $t = 0$.

   a) Solve for the current assuming that $\alpha \neq \frac{R}{L}$

   b) Solve for the current when $\alpha = \frac{R}{L}$.

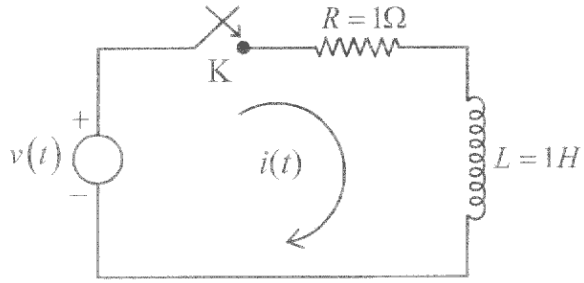

Fig. 5

OR

6. a) Discuss the initial conditions in a network. Outline the procedure for evaluating the initial conditions in network problems.

   b) In the network shown in Fig. 6, the switch K is closed at $t = 0$, with zero capacitor voltage and zero inductor current.

   Solve for

   i) v_1 and v_2 at $t = 0_+$ ii) v_1 and v_2 at $t = \infty$

   iii) $\frac{dv_1}{dt}$ and $\frac{dv_2}{dt}$ at $t = 0_+$

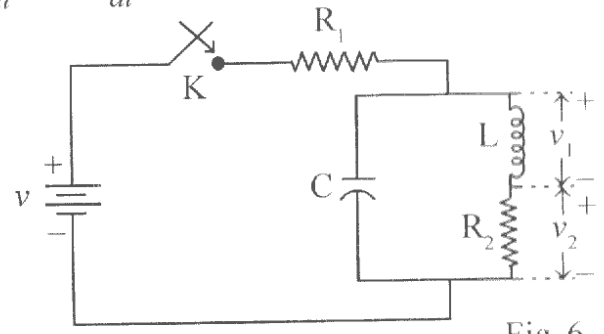

Fig. 6

Unit - IV

7. a) Define 'Unit impulse function' and derive its Laplace transform.

   b) In the network shown in Fig. 7, the switch is in position 'a' until a steady state is reached.

   At t = 0, the switch is moved to position 'b'. Under that condition, determine the transform of the voltage across the $\frac{1}{2}F$ capacitor using Thevenin's theorem.

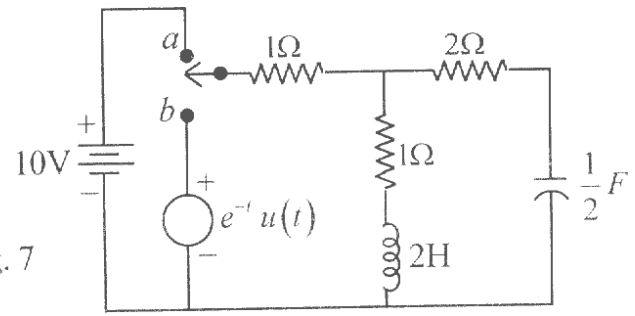

Fig. 7

OR

8. a) Discuss the effect of symmetry for a periodic function to determine the trigonometric Fourier series coefficients.

   b) Find the Fourier coefficients for the waveform shown in Fig. 8.

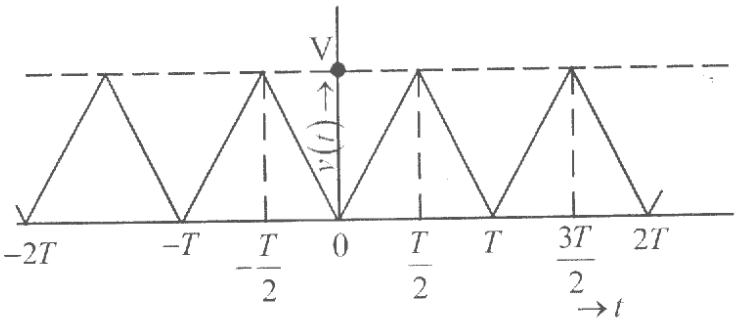

Fig. 8.

Unit - V

9. a) Discuss the restrictions on poles and zeros locations in s-plane for driving points locations.

   b) For the network shown in Fig. 9 determine the voltage-ratio transfer function, $\frac{V_2(s)}{V_1(s)}$

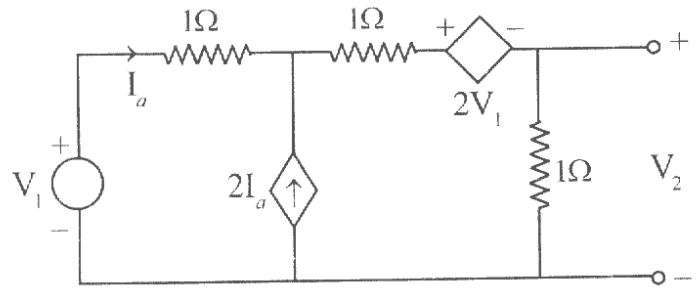

Fig. 9