B.E. (Electrical Engineering (Electronics & Power)) Third Semester (C.B.S.)

Network Analysis

P. Pages : 5 **NIR/KW/18/3310**

Time : Three Hours *1731* Max. Marks : 80

Notes :
1. All questions carry marks as indicated.
2. Solve Question 1 OR Questions No. 2.
3. Solve Question 3 OR Questions No. 4.
4. Solve Question 5 OR Questions No. 6.
5. Solve Question 7 OR Questions No. 8.
6. Solve Question 9 OR Questions No. 10.
7. Solve Question 11 OR Questions No. 12.
8. Assume suitable data whenever necessary.
9. Use of non programmable calculator is permitted.

1. a) Prove that combination of ideal current source and ideal voltage source in series is equivalent to ideal current source. **5**

b) Write mesh equilibrium equations in matrix form for the network shown in fig. 1 (b). **8**

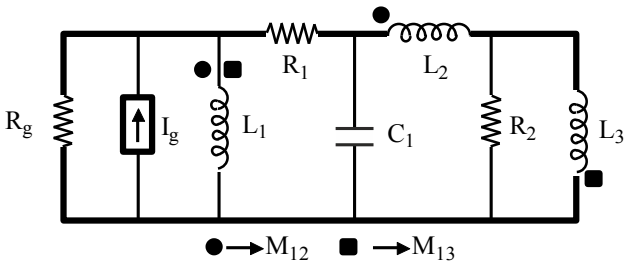


Fig. 1(b)

OR

2. a) Find loop currents for the network shown in fig. 2 (a). **6**

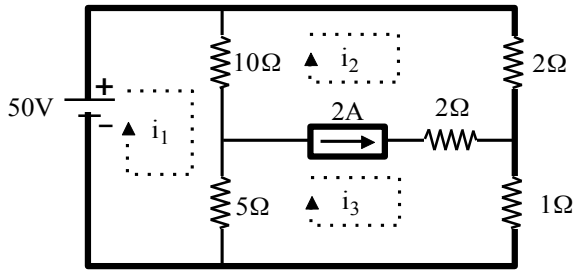


Fig. 2 (a)

b) Find the power lost in the circuit shown in fig. 2 (b) by Mesh Analysis. **7**

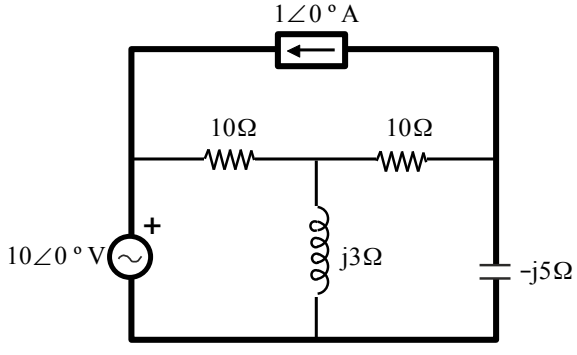


Fig. 2(b)

3. a) Construct dual for the network shown in fig. 3 (a). **5**

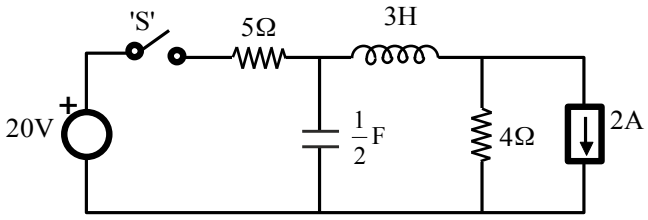


Fig. 3(a)

b) Find 'V' from fig. 3 (b) if the branch AB should not carry any current. Use Nodal Analysis. **8**

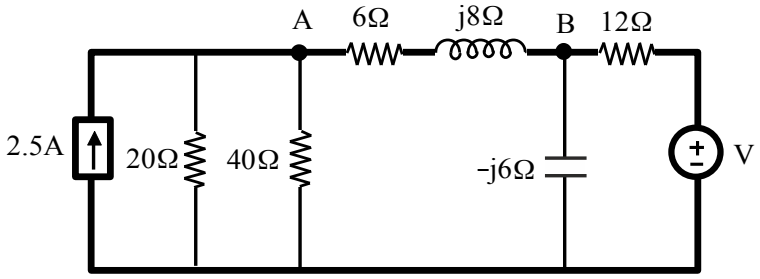


Fig. 3(b)

OR

4. a) Define Duality. What are the conditions for a network to be dual and **2**
Draw dual of network as shown in fig. 4 (a). **3**

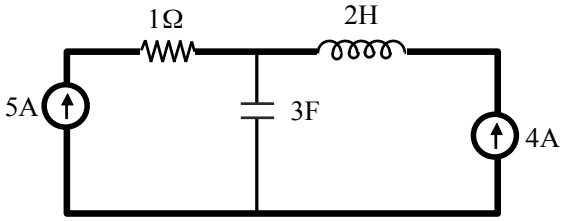


Fig. 4 (a)

b) Using Nodal Analysis determine refer fig. 4 (b).

i) Node voltage's V_A and V_B. **4**

ii) Power dissipated in Inductor. **2**

iii) Current supplied by source. **2**

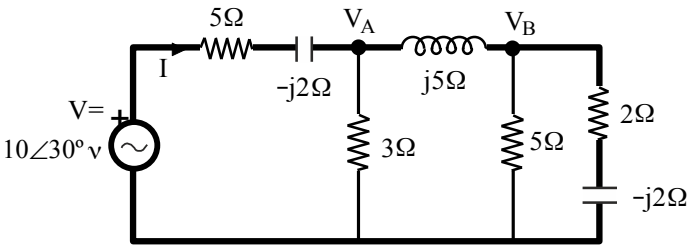


Fig. 4 (b)

5. a) In the network of fig. 5 (a), the resistance of 8Ω is changed to 4Ω find the change in current 'I' by using Compensation Theorem. **7**

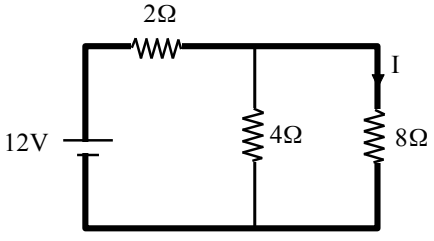


Fig. 5 (a)

b) Determine Thevenin's and Norton's Equivalent between terminals A & B as shown in fig. 5 (b) **8**

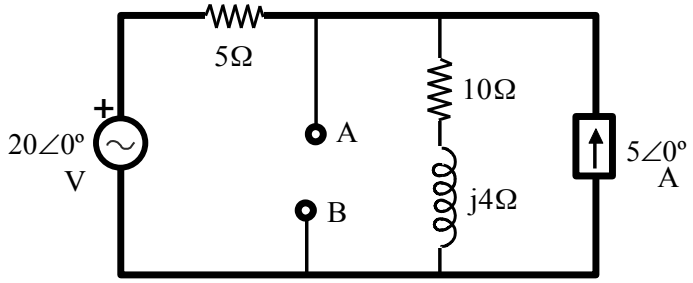


Fig. 5 (b)

OR

6. a) What is the value of Z_L in n/w shown fig. 6 (a) so as to transfer maximum power to it and hence, find the maximum power transferred. **6**

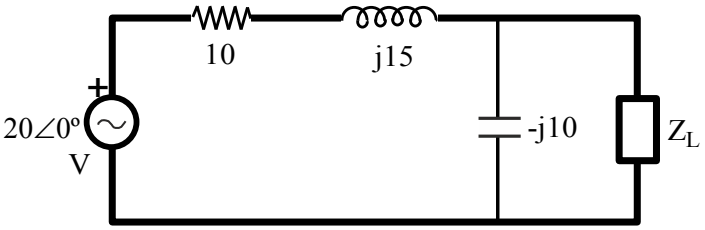


Fig. 6 (a)

b) Find 'V' such that current through impedance $(3+j4)\,\Omega$ is zero as shown in fig. 6 (b) Thevenin's Theorem. **8**

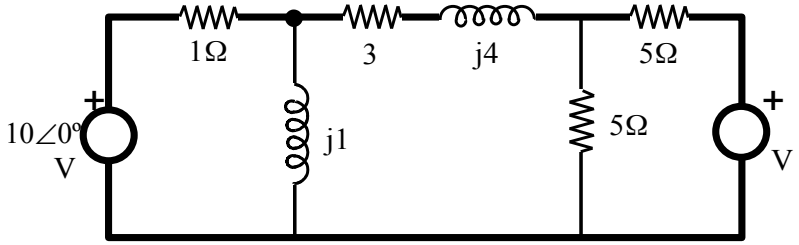


Fig. 6 (b)

7. a) In the network shown in fig. 7 (a) a steady state is reached with switch 'K' closed. At t = 0, switch 'K' is opened. Find : **7**

i) V_K at $t = 0^+$

ii) $\frac{dV_K}{dt}$ at $t = 0^+$

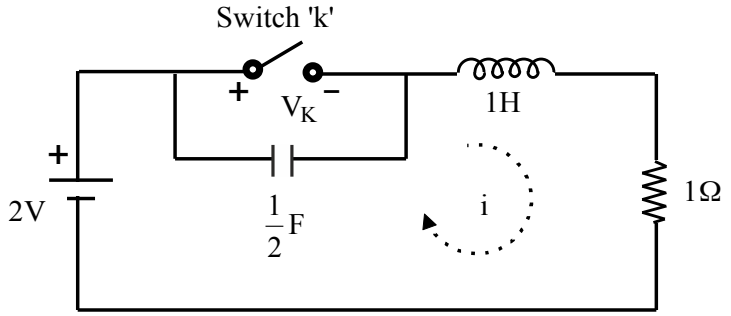


Fig. 7 (a)

b) In the network shown in fig. 7 (b) switch 'K' is closed at t = 0 connecting battery to an unenergized network. Determine : $i, \frac{di}{dt}, \frac{d^2i}{dt^2}$ at $t = 0^+$. **7**

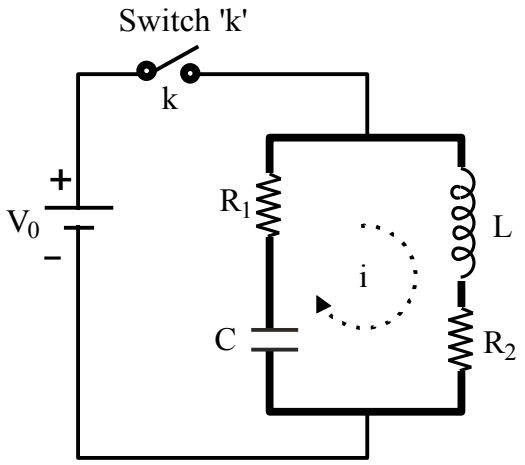


Fig. 7 (b)

OR

8. a) An exponential voltage $4e^{-3t}$ volts is applied at t = 0 to a series R – L – C circuit. Obtain particular solution for current $i(t)$. Assume initially unenergized network refer fig. 8 (a). **8**

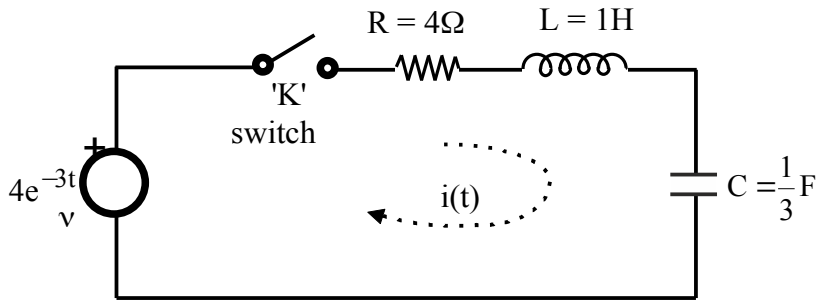


Fig. 8 (a)

b) Obtain Laplace Transform of the following waveform shown in fig. 8 (b). **6**

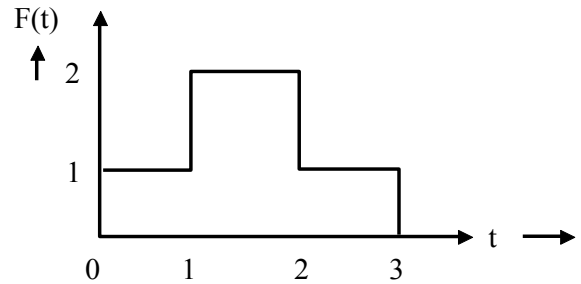
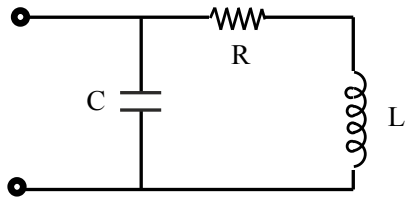


Fig. 8 (b)

9. a) Define a Driving Point Function. What are its types. **3**

b) What are the necessary conditions for representing a driving point function? **5**

c) Determine the driving point impedance function of a one port network. **5**



OR

10. a) $I(s) = \frac{20s}{(s+5)(s+2)}$ Find $i(t)$ by Pole – Zero plot. **5**

b) For the network shown in fig. 10 (b). below find Z_{11} and Z_{12}. **8**

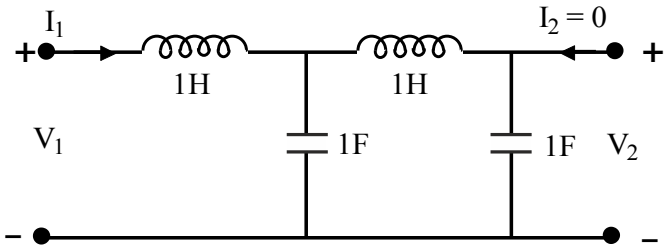


Fig. 10 (b)

11. a) Derive the condition for reciprocity and symmetry for open circuit parameters. **6**

b) For the network shown, in fig. 11 (b) find ABCD parameters and show that the network is reciprocal. **7**

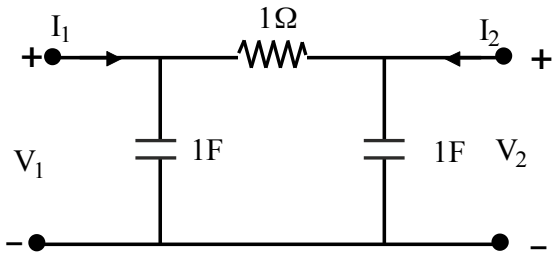


Fig. 11 (b)

OR

12. a) Compare Series and Parallel Resonant Circuit. **6**

b) Three phase impedances $(10+j2)\Omega$, $(20-j2)\Omega$ and $(4+j3)\Omega$ are star connected to R, Y and B phases respectively to a 400V supply. Assume RYB as phase sequence and V_{RY} as reference. Find voltage between star point and neutral of the supply. Find load currents in each phase. **7**

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