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

Network Analysis

P. Pages : 4 **NRT/KS/19/3310**

0181

Time : Three Hours 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) Reduce the Network shown in Fig. 1 (a) into a single current source in parallel with single resistor across terminals A and B. **6**

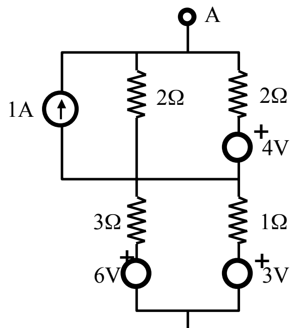

Fig. 1 (a)

b) Find current through 100Ω resistance shown in Fig. 1 (b) due to D.C. sources using Mesh Analysis method. **7**

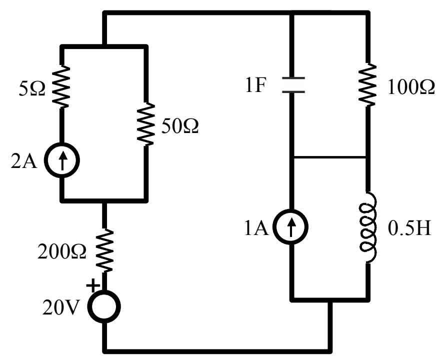

Fig. 1 (b)

OR

2. a) Write Mesh equations for Network shown in Fig. 2 (a). **7**

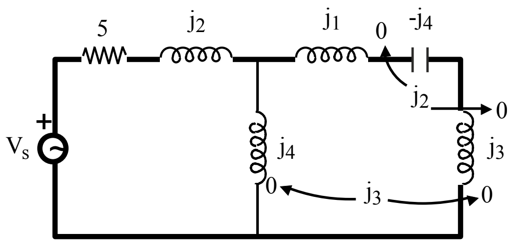

Fig. 2 (a)

b) For Network shown in Fig. 2 (b) find currents i_1 and i_2 using Mesh analysis. **6**

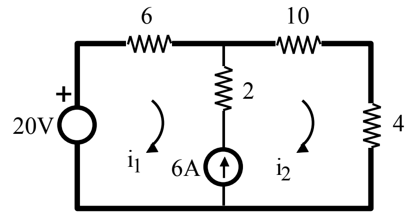

Fig. 2 (b)

3. a) Using Nodal Analysis method find voltage drop across 4Ω resistor for Network shown in Fig. 3 (a). **7**

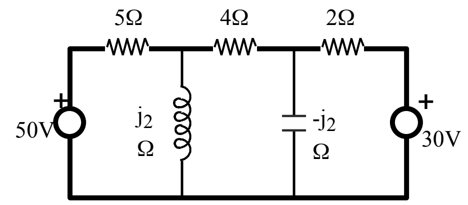

Fig. 3 (a)

b) Construct the dual of Network shown in Fig. 3 (b) **6**

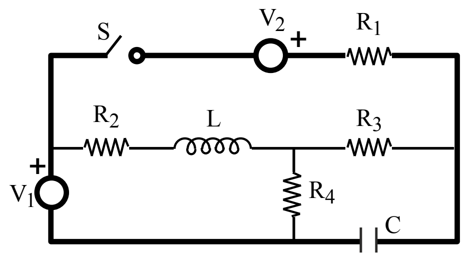

Fig. 3 (b)

OR

4. a) Write the equilibrium equations for the Network shown in Fig. 4 (a) using Nodal Analysis. **7**

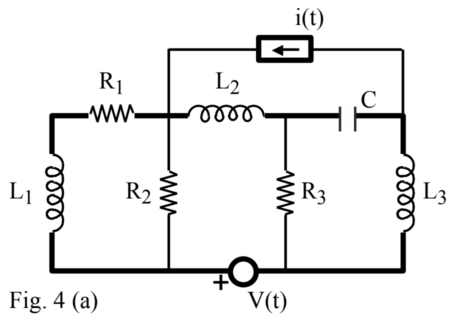

Fig. 4 (a)

b) For the Network shown in Fig. 4 (b) determine the value of V_A using Node Analysis. **6**

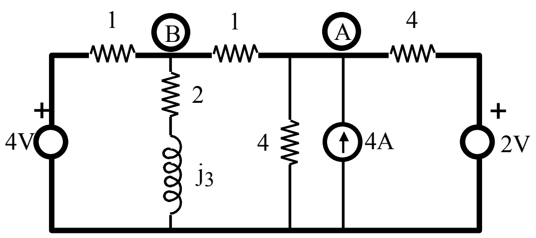

Fig. 4 (b)

5. a) State and Prove Maximum Power transfer theorem. **7**

b) Evaluate current in impedance $2+j3$ using Thevenin's Theorem for Network shown in Fig. 5 (b). **7**

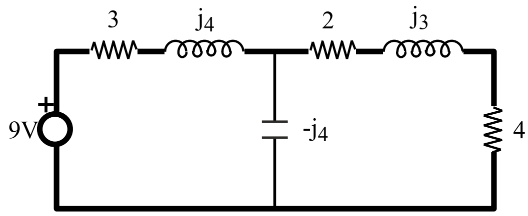

Fig. 5 (b)

OR

6. a) If R_1 is changed from 20Ω to 18Ω, find change in current I by using compensation theorem. Refer Network in Fig. 6 (a). **7**

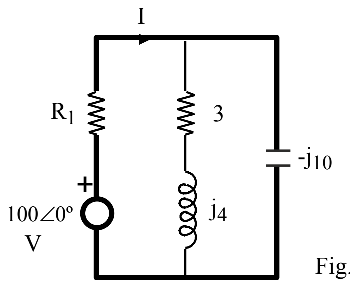

Fig. 6 (a)

b) For Network shown in fig. 6 (b), determine voltage V using Superposition Theorem. **7**

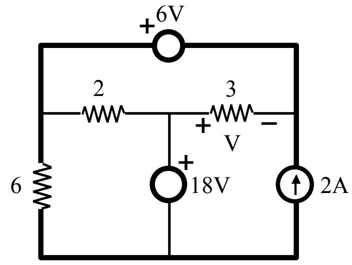

Fig. 6 (b)

7. a) Given **6**

$$f(s)=\frac{2(s+4)}{(s+3)(s+8)}$$

Verify Initial and final value theorem of Laplace Transform.

b) In Network shown in Fig. 7 (b), switch is thrown from position 'a' to 'b' at t = 0. Find at t = 0 +. **7**

i) V_C ii) $\frac{dV_C}{dt}$ iii) $\frac{d^2V_C}{dt^2}$ iv) $\frac{d^2i}{dt^2}$

Assume that switch is in position 'a' for very long time so that network attains steady state condition before throwing switch to position 'b'.

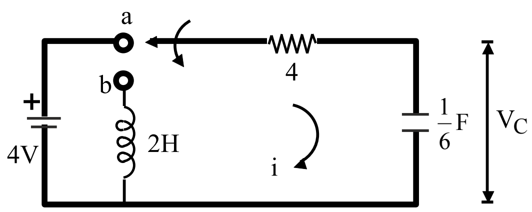

Fig. 7 (b)

OR

8. a) In circuit shown in Fig. 8 (a), switch K is closed at t = 0. Prior to closing the switch steady state conditions are established. Determine current $i_2(t)$ by using Laplace Transform method. **7**

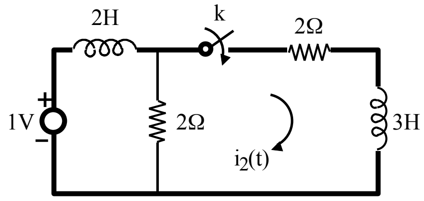

Fig. 8 (a)

b) Prove that, Laplace Transform of Periodic waveform is $\frac{1}{1-e^{-TS}}$ times the Laplace transform of first cycle where T is Period. **6**

9. a) Draw Pole-Zero diagram for given network function $V_{(s)}$ and hence obtain $V_{(t)}$ using Pole-zero diagram $V_{(s)} = \frac{20s}{(s+2)(s+5)}$ **7**

b) State the necessary conditions for the driving point impedance and transfer function. **6**

OR

10. a) Define the following terms. **4**

i) Driving Point function ii) Transfer function
iii) Current Gain iv) Voltage Gain

b) For ladder Network shown in Fig 10 (b), determine voltage transfer function $\frac{V_2(s)}{V_1(s)}$. **9**

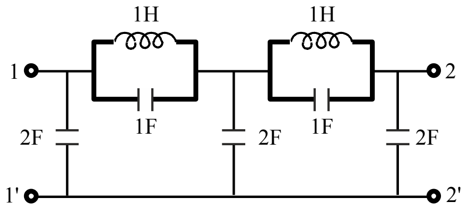

Fig. 10 (b)

11. a) Determine Z-parameters for Network shown in Fig. 11 (a) and comment on the result. **7**

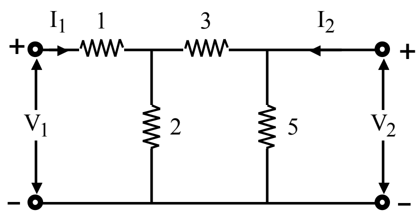

Fig. 11 (a)

b) For a two part Network; Prove that AD-BC=1. **7**
where A, B, C, D are the Transmission Parameters for a two port Network.

OR

12. a) Derive the expression for Resonance frequency in series and parallel RLC circuit. **7**

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 400V symmetrical supply. Find load currents in each phase and voltage between star point and neutral of supply. Assume RYBas phase sequence and V_{RY} as reference. **7**

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