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EE34

Third Semester B.E. Degree Examination, Dec. 07 / Jan. 08
Network Analysis

Time: 3 hrs. Max. Marks:100

Note : ***Answer any FIVE full questions.***

1 a. Define the term 'CONTROLLED SOURCE' and explain the various types of controlled sources used in practice in electrical circuits. **(06 Marks)**

b. Find the power delivered by the 6 volt source in the circuit shown in fig.1(b). Use loop analysis. **(08 Marks)**

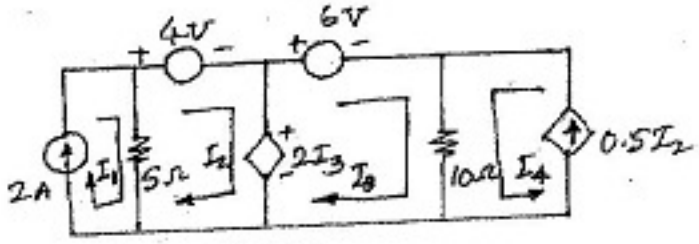

Fig.1(b)

c. The voltage of a node of a network is given by.

$$V_2 = \frac{\begin{vmatrix} 2 & 1 & -1 \\ -1 & 0 & -1 \\ -1 & 1 & 2 \end{vmatrix}}{\begin{vmatrix} 2 & -1 & -1 \\ -1 & 3 & -1 \\ -1 & -1 & 2 \end{vmatrix}}$$

(06 Marks)

Construct the network.

2 a. Reduce the network shown in fig.2(a) into a single series impedance and find the power dissipated in the branch b-c of the network. **(10 Marks)**

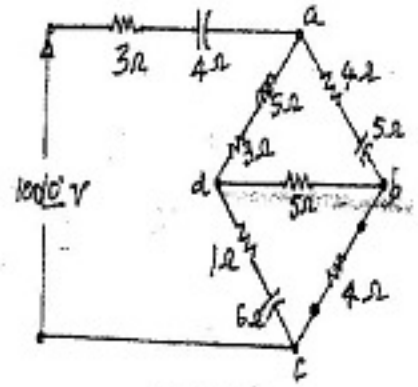

Fig.2(a)

b. Calculate the voltage and power output of the dependent source shown in fig.2(b). **(10 Marks)**

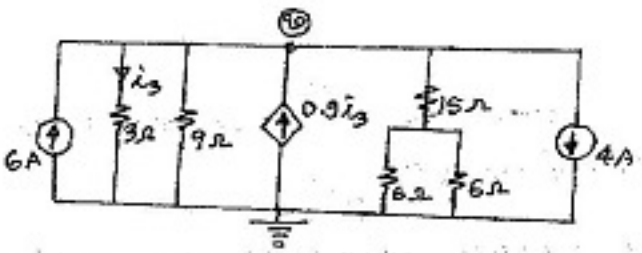

Fig.2(b)

3 a. Define the following : i) Co – tree ii) Tie – set. (02 Marks)

b. Construct a tree for the circuit shown in fig.3(b) so that all the loop currents flow throug the 6 ohm resistor and obtain the i) cut set and ii) Tie set matrices. (10 Marks)

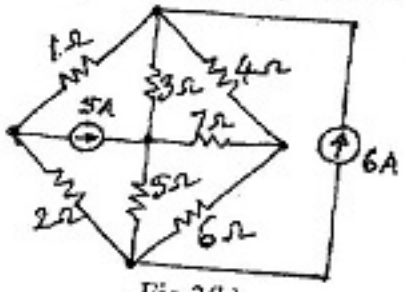

Fig.3(b)

c. Briefly explain the principle of quality in electrical networks and obtain the dual of the network graph shown in fig.3(c). (08 Marks)

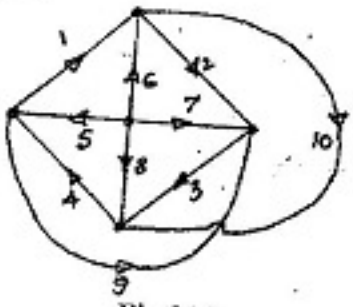

Fig.3(c)

4 a. State Thevinin's theorem, and obtain the Thevinin's and Nortan's equivalent circuit of the fig.4(a) shown. (10 Marks)

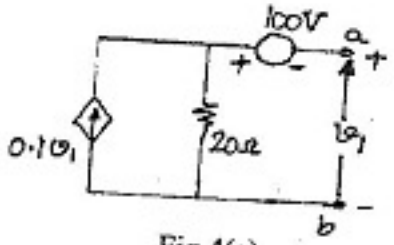

Fig.4(a)

b. In a circuit shown in fig.4(b), find the value of R_L for P_{max} and also find the value of P_{max}. (10 Marks)

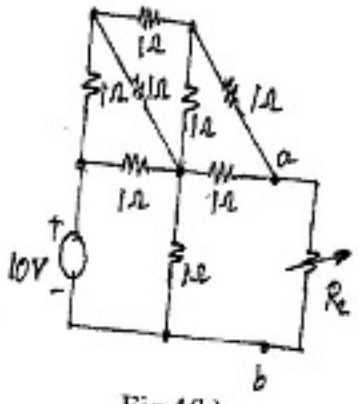

Fig.4(b)

5 a. Show that the value of the capacitor for maximum voltage across it in case of capacitor tuning of series resonance is $C = \frac{L}{R^2 + X_L^2}$ (08 Marks)

b. Give the comparison between series resonance and parallel resonance. (04 Marks)

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c. A coil has resistance of 400Ω and inductance of 318μH. Find the capacitance of a capacitor which when connected in parallel with the coil will produce resonance with a supply frequency of 1MHz. If a second capacitor of capacitance 23.42pF is connected in parallel with the first capacitor, find the frequency at which resonance will occur. **(08 Marks)**

6 a. In the network shown in fig.6(a), the switch k is closed at t = 0. Find i) i_1, ii) i_2 iii) Di_1, and iv) Di_2 at $t = 0_+$ for zero initial conditions. **(10 Marks)**

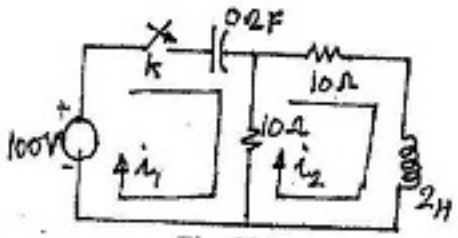

Fig.6(a)

b. Sketch the following sinusoidal functions and give their Laplace transformations.
i) A Sinωt ii) A Sinω(t-t_0), iii) A Sinωt u(t-t_0) **(10 Marks)**

7 a. State and prove Initial and Final value theorems. **(08 Marks)**

b. Synthesize the periodic waveform shown in fig.7(b) and find its Laplace Transform and prove any formula used. **(12 Marks)**

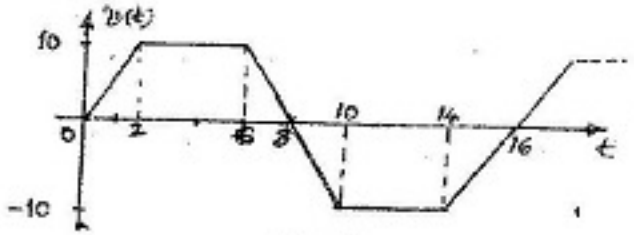

Fig.7(b)

8 a. Using Convolution theorem, find the Laplace inverse of $F(s) = \frac{s}{(s+1)(s+2)(s+3)}$. **(10 Marks)**

b. Find the Z – parameters of the two port network shown in fig.8(b). **(05 Marks)**

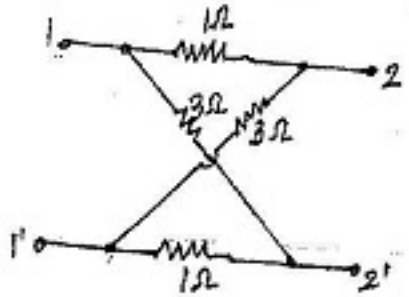

Fig.8(b)

c. Write the Π - equivalent circuit of a two port network described by.
$I_1 = 2V_1 - V_2$
$I_2 = -V_1 + 4V_2$.