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P.E.S. College of Engineering, Mandya - 571 401

(An Autonomous Institution affiliated to VTU, Belagavi)

Third Semester, B.E. - Electrical and Electronics Engineering

Semester End Examination; Dec - 2017/Jan - 2018

Network Analysis

Time: 3 hrs *Max. Marks: 100*

***Note**: Answer **FIVE** full questions, selecting **ONE** full question from each unit.*

UNIT - I

1 a. Transform the network given in Fig. Q 1(a) into a single voltage source using source transformation. 6

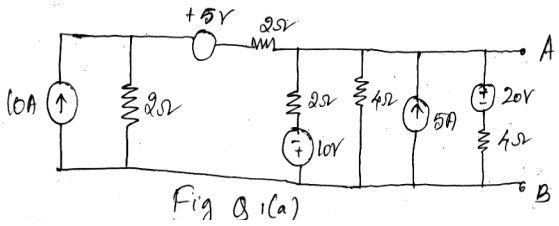


Fig Q 1(a)

b. Find the currents i_1, i_2 and i_3 in the network given in Fig. Q 1(b) using mesh analysis. 7

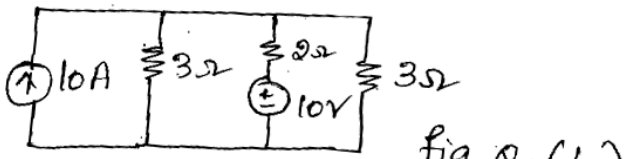


fig Q.1(b)

c. Find the current through 0.5 Ω resistances in the Fig. Q 1(c) using node analysis. 7

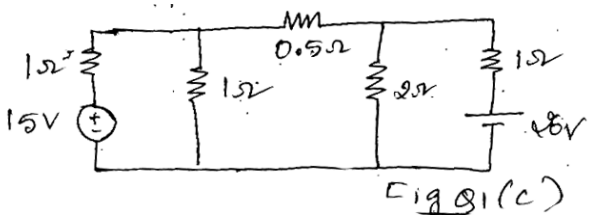


Fig Q1(c)

2 a. Determine the equivalent resistance between the terminals A and B in the network in the Fig. Q 2(a) using star-delta transformation. 8

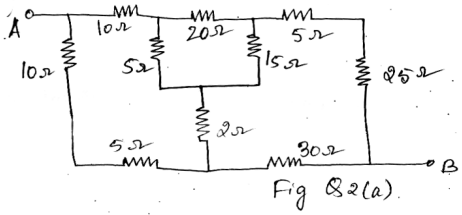


Fig Q2(a)

b. Derive expression for resonant frequency in series RLC circuit. 6

c. Give the comparison between series and parallel resonance. 6

UNIT - II

3 a. State and explain superposition theorem. 5

Contd…2

b. Obtain the current I_x in the circuit shown in Fig. Q 3(b) using Thevenin's theorem. 10

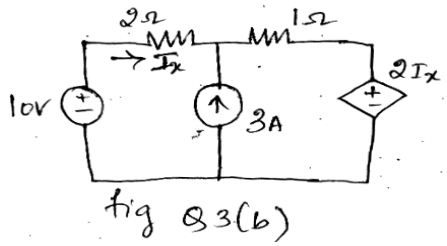


fig Q3(b)

c. Find the value of load resistance R_L for maximum power to be transferred to the load and also find maximum power for the network shown in Fig. Q 3(c). 5

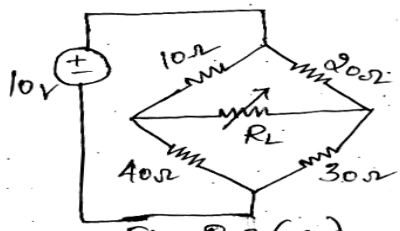


Fig Q3(c)

4 a. Define with examples : 8

(i) Oriented graph (ii) Tree (iii) Cutset matrix (iv) Tie set matrix.

b. For the network shown in Fig. 4(b) write a tie set schedule and then find all the branch currents and voltages. 12

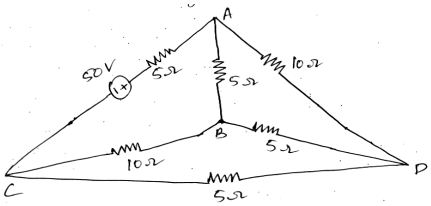


Fig 4(b)

UNIT - III

5 a. Switch k is opened at time t = 0 after reaching steady state in the circuit shown in Fig. Q 5(a). Find $V_k, \frac{dv_k}{dt}$ and $\frac{d^2V_k}{dt^2}$ at time $t = 0^+$. 10

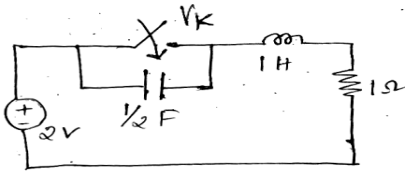


Fig Q(5)(a)

b. In the circuit shown in Fig. Q 5(b) switch is opened at time t = 0, find the values of $v\frac{dv}{dt}$ and $\frac{d^2v}{dt^2}$ at $t = 0^+$. 10

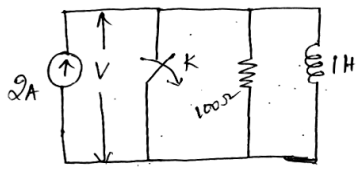


Fig Q(5)(b)

Contd…3

6 a. Switch is closed at time $t = 0$ in the circuit shown in Fig. Q (6) (a), find the values of i_1, i_2, $\frac{di_1}{dt}, \frac{di_2}{dt}$ at time $t = 0^+$. 10

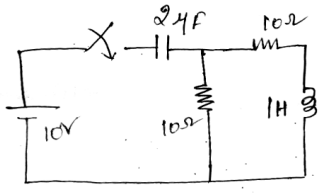


Fig Q6(a)

b. Switch K is opened after the circuit has reached steady state at $t = 0$ in the network shown in Fig. Q (6)(b), find the expression for $V_2(t)$ for time $t>0$. 10

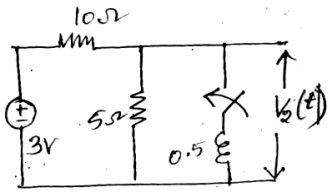


Fig Q6(b)

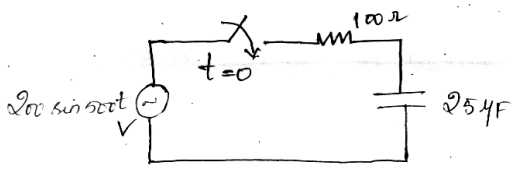
UNIT - IV

7 a. Find Laplace transform of the following functions : 6

(i) sin ωt (ii) cos ωt (iii) te^{-at}.

b. State and prove Initial value theorem. 6

c. In the circuit shown in Fig. Q 7(c), find the expression for current, if switch is closed at $t = 0$. Assume initial charge on capacitance is zero. 8



Q 7(c)

8 a. Find inverse Laplace transform of the following functions :

(i) $\frac{s^2+5}{s(s^2+4s+4)}$ 6

(ii) $\frac{2s+6}{s^2+6s+25}$.

b. Using initial and final value theorem where they apply find *f(0)* and *f(∞)* for the following functions:

(i) $\frac{s^3+7s^2+5}{s(s^3+3s^2+4s+2)}$ 6

(ii) $\frac{s(s+4)(s+8)}{(s+1)(s+6)}$.

Contd...4

c. Find *i(t)* using Laplace transforms switch is closed at time $t = 0$ with zero initial conditions. 8

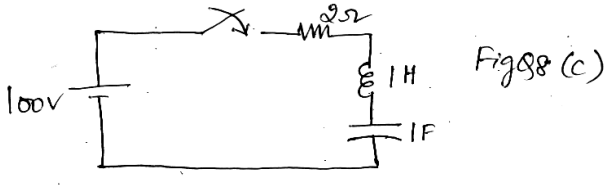


Fig Q8 (c)

UNIT - V

9 a. Find Z parameters of the circuit shown in Fig. Q 9(a). 10

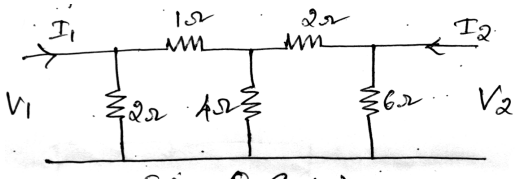


Fig. Q 9 (a)

b. Find 'T' parameters of the circuit in Fig Q 9(b). 10

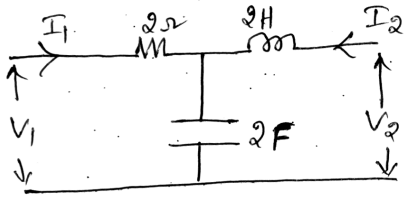


Fig. Q 9 (b)

10 a. A series RLC circuit has its driving point admittance pole-zero diagram is shown in Fig. Q10, find the value of R-L-C. 10

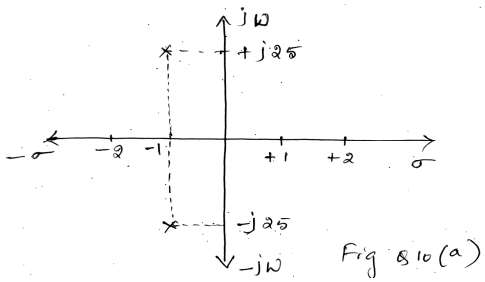


Fig Q 10 (a)

b. Find the response *i(t)* when input signal,

(i) $5\delta(t-2)$

(ii) $5u(t-2)$ is given to a R-L series circuit shown in Fig. 10 (b) assume initial current through the inductor to be zero. 10

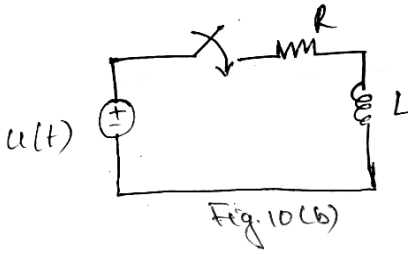


Fig. 10 (b)

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