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

(An Autonomous Institution affiliated to VTU, Belagavi)

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

Semester End Examination; Dec. - 2019

Network Analysis and Synthesis

Time: 3 hrs *Max. Marks: 100*

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

UNIT - I

1	a.	State and explain Superposition theorem with an example.	6
	b.	Use source transformation to find power delivered by 50 V source in given network of Fig .1(b).	6
	c.	For the network shown in Fig.1(c), determine the node voltages V_1, V_2 and V_3.	8
2	a.	For the network shown in Fig. 2(a), find the current through 2 Ω resistance using mesh analysis.	6
	b.	State and explain Thevenin's theorem with an example.	6
	c.	Find the value of load resistance when maximum power is transferred across it and also find the value of maximum power transferred for the network shown in Fig. 2(c).	8

UNIT - II

3	a.	Define Q-factor and prove that for a parallel RLC circuit quality factor $Q_0 = W_0RC$.	8
	b.	A series resonant circuit includes 1 μF capacitor and a resistance of 16 Ω. If the bandwidth is 500 rad/s. Determine the following: i) L ii) Q iii) w_0 iv) w_1 and w_2	8
	c.	Define the following terms: i) Resonance ii) Band width iii) Half power frequencies iv) selectivity	4
4	a.	Show that; i) The voltage of capacitor cannot change instantaneously ii) The current is an inductor cannot change instantaneously	10
	b.	In the network shown in Fig.4 (b), the switch is changed from the position 1 to the position 2 at $t = 0$ steady state condition having reached before switching. *Find the values of* $i, \frac{di}{dt}$ *and* $\frac{d^2i}{dt^2}$ *at* $t = 0^+$.	10

UNIT - III

5	a.	State and prove; i) Initial Value Theorem ii) Final Value Theorem	10

b. Find the Laplace transform at, $i)\ e^{-at}\cos wt$ $\quad ii)\ 5+4e^{-2t}$ 5

c. Find the Inverse Laplace transform of $F(s)=\dfrac{(s+2)}{s^2(s+3)}$. 5

6 a. Prove that the Inverse Laplace transform of the product of two Laplace transform is the convolution of the individual Laplace transform. 7

b. Referring to the RL circuit of Fig.6(b),

i) Write a differential equation for inductor current

ii) Find $I_L(s)$ the Laplace transform of $i_L(t)$

iii) Solve for $i_L(t)$ by taking the inverse Laplace Transform of $I_L(s)$ 7

c. Find the initial and final values of the function whose Laplace Transform is,

$$F(s)=\frac{2s+1}{s^3+6s^2+11s+6}$$ 6

UNIT - IV

7 a. Explain impedance parameters for a two port network. 4

b. Determine the Y-parameters for the two port network shown in Fig. 7(b). 8

c. For the network shown in Fig.7(c), determine h-parameters. 8

8 a. Define the following:

i) Planar graph ii) Tree iii) Co-tree iv) Path 4

b. For the graph shown in Fig. 8(b), write the cutset and tieset matrices considering branches 4, 5 and 6 as twigs. 10

c. Draw the dual of the network shown in Fig. 8(c). 6

UNIT - V

9 a. Define Hurwitz polynomial. Test whether the polynomial $p(s)=s^5+3s^3+2s$ is Hurwitz. 8

b. Test whether $p(s)=\dfrac{s^2+1}{s^3+4s}$ is positive real function. 8

c. List any four properties of RC driving point immittance function. 4

10 a. Realize cauer-II form of the function $Z_{LC}(s)=\dfrac{4(s^2+1)(s^2+9)}{s(s^2+4)}$. 8

b. Realize Foster- I form of the function $Z(s)=\dfrac{(s+1)(s+4)}{(s+5)(s+3)}$. 8

c. Justify which of the function is RL or RC impedance function?

$i)\ Z(s)=\dfrac{3(s+2)(s+1)}{s(s+3)}$ $\quad ii)\ Z(s)=\dfrac{2(s+1)(s+3)}{(s+2)(s+6)}$ 4

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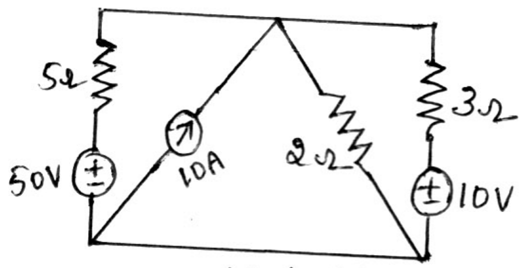
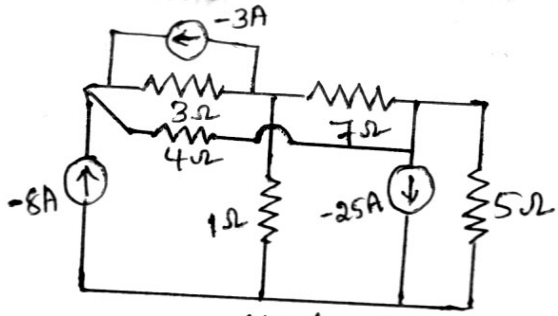


fig (1.b)



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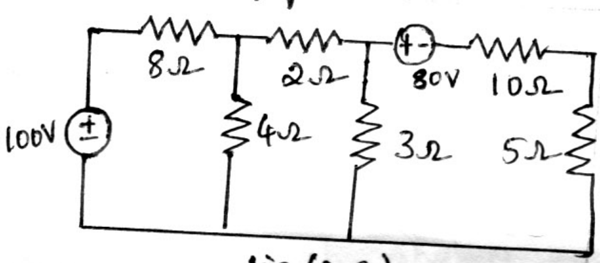

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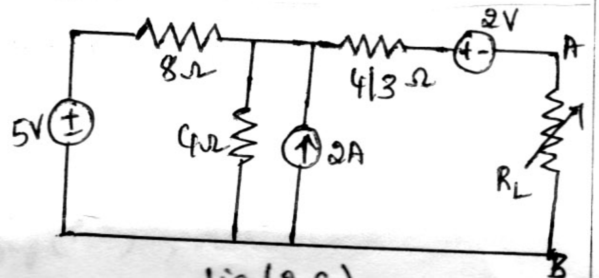

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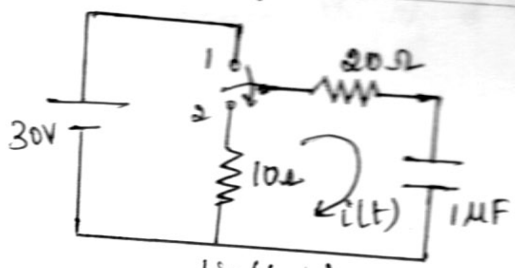

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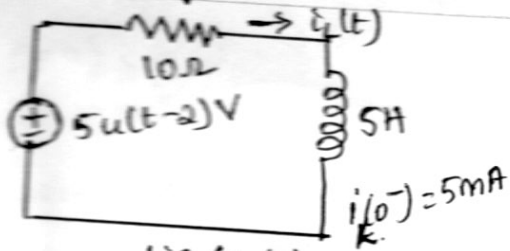

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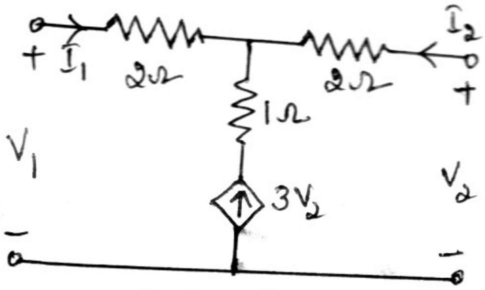

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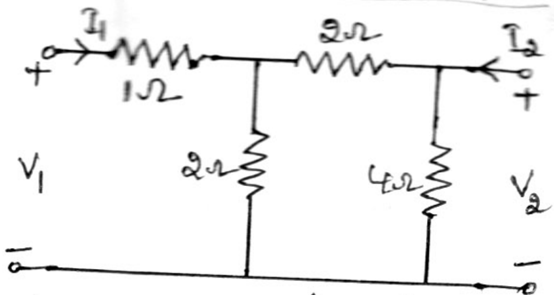

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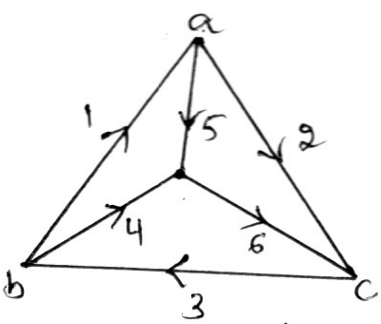

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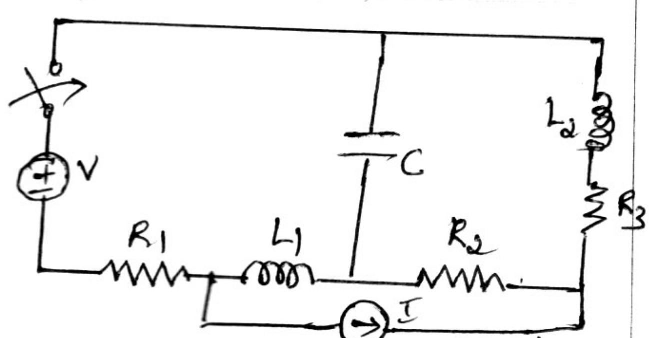

fig (8.C)

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