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Course Code 

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**Third Semester B.E. Degree Examinations, March/April 2023**  
**ELECTRIC CIRCUIT ANALYSIS**

Duration: 3 hrs

Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.  
 2. Missing data, if any, may be suitably assumed

<u>Q. No</u>	<u>Question</u>	<u>Marks</u>	<u>(RBTL:CO: PI)</u>
<b>MODULE – 1</b>			
1.	a. Define (i) active and passive elements (ii) Distributed and Lumped networks with examples.	06	(2 :1: 1.3.1)
	b. Explain how to measure AC and DC quantities using Oscilloscope.	06	(2 :1: 1.3.1)
	c. Derive three star connected impedances into its equivalent delta connected impedances.	08	(3 :2: 1.3.1)
<b>(OR)</b>			
2.	a. Reduce the network shown in fig.2 (a) into its equivalent single source network.	06	(3 :2: 1.3.1)
	b. Determine currents $i_1$ , $i_2$ , $i_3$ for the circuit shown in fig. 2 (b) using mesh analysis.	06	(3 :2: 1.3.1)
	c. Obtain node voltages $V_1$ , $V_2$ , for the network shown in fig. 2 (c) using node analysis.	08	(3 :2: 1.3.1)

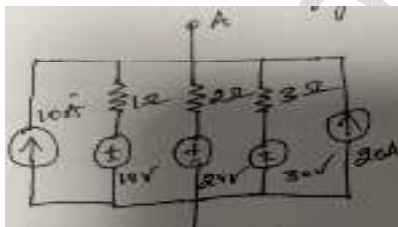


Fig. 2 (a)

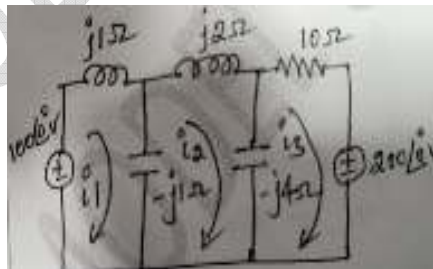


Fig. 2 (b).

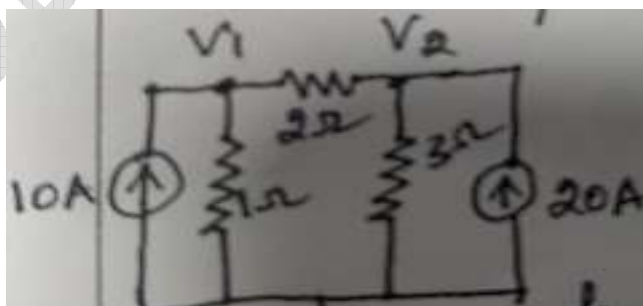


Fig. 2 (c).

<b>MODULE – 2</b>			
3.	a. State and prove Superposition theorem. Also verify the theorem.	10	(3:2: 1.3.1)
	b. State and prove maximum power transfer theorem for resistive loads.	10	(3 :2: 1.3.1)

(OR)

4. a. Show that Norton's theorem is dual of Thevenin's theorem. 10 (3 :2: 1.3.1)
- b. Find current through load resistance for the network shown in fig.4 (b) using Millman's theorem. 10 (3 :2: 1.3.1)

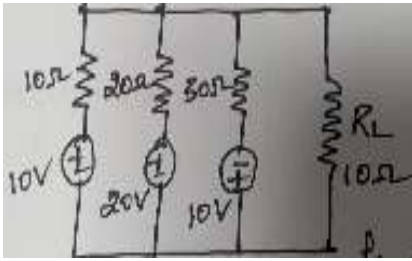


Fig. 4 (b)

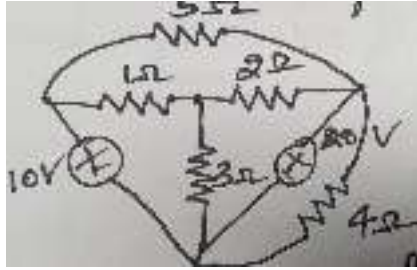


Fig. 5 (b)

**MODULE – 3**

5. a. Define Graph, tree, co-tree and incidence matrix with examples. 08 (2 :3: 1.3.1)
- b. Obtain tie-set schedule and find all the branch currents for the network shown in fig. 5(b). 12 (3 :3: 1.3.1)

(OR)

6. a. Derive resonant frequency for both series and parallel RLC circuit. 10 (3 :3: 1.3.1)
- b. Show that resonant frequency is geometric mean of two half power frequencies. 10 (3 :3: 1.3.1)

**MODULE – 4**

7. a. For the circuit shown in fig.7 (a). Switch 'S' is changed from 1 to 0 at  $t=0$ . Find  $i(t)$ , and  $di(t)/dt$  at  $t=0^+$ . 10 (3 :4: 1.3.1)

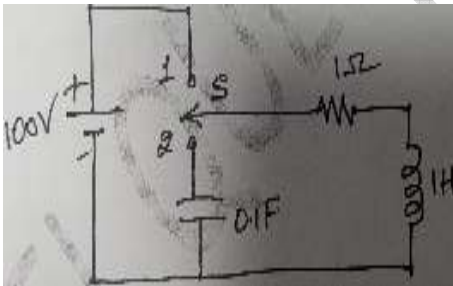


Fig. 7(a)

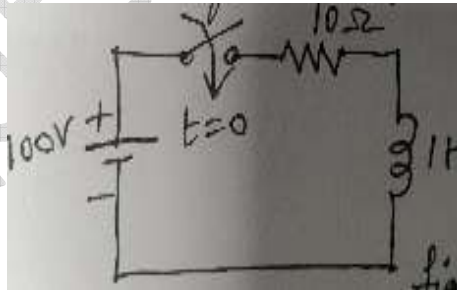


Fig. 8(a)

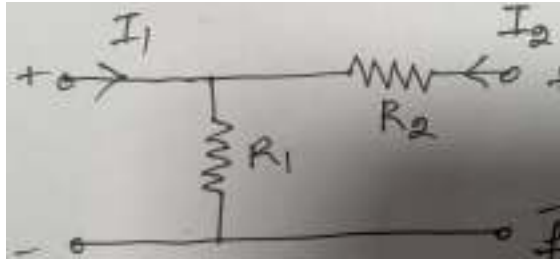
- b. State and prove initial and final value theorem. 10 (2 :4: 1.3.1)

(OR)

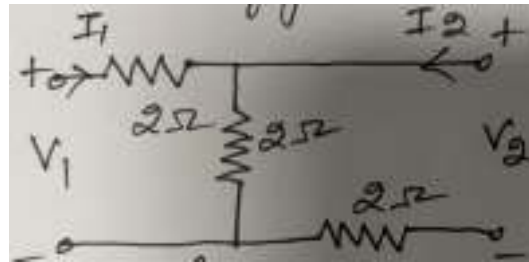
8. a. Find the values of  $i(t)$ ,  $di(t)/dt$ ,  $d^2i(t)/dt^2$  at  $t=0^+$  for the network shown in fig. 8(a). 10 (3 :4: 1.3.1)
- b. Find Laplace transform of following functions:  
(a)  $t^2e^{at}$  (b)  $e^{-nat} \sin bt$  (c)  $e^{-at} \sinh t$  10 (3 :4: 1.3.1)

## MODULE – 5

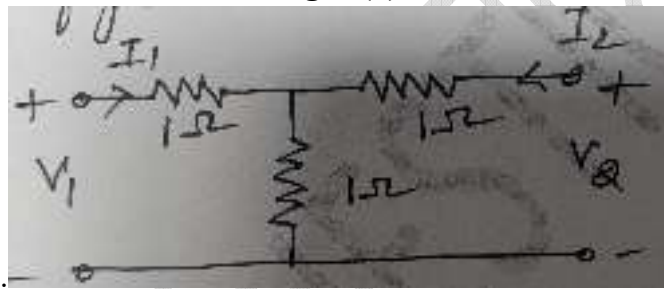
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|----|---|-----------|---------------|
| 9. | a. Determine Z and Y parameters for the network shown in fig.9 (a)  | <b>10</b> | (2 :5: 1.3.1) |
|    | b. Determine ABCD parameters of given network as shown in fig. 9(b) | <b>10</b> | (3 :5: 1.3.1) |



**Fig. 9 (a).**



**Fig. 9 (b)**



**Fig.10 (b)**

**(OR)**

- |     |  |           |               |
|-----|--|-----------|---------------|
| 10. | a. Obtain Y-parameters in terms of Z-parameters.   | <b>10</b> | (2 :5: 1.3.1) |
|     | b. Two identical networks as shown in fig. 10 (b) are connected in cascade. Determine the overall transmission parameters of combined network. | <b>10</b> | (3 :5: 1.3.1) |

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