Basavarajeswari Group of Institutions

BALLARI INSTITUTE OF TECHNOLOGY & MANAGEMENT

(Autonomous Institute under Visvesvaraya Technological University, Belagavi)

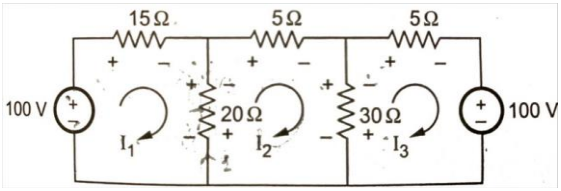
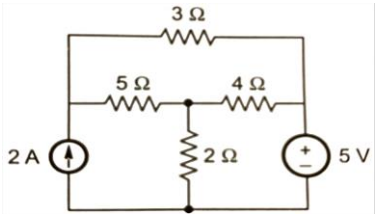
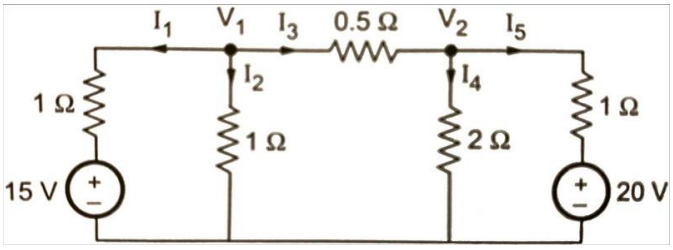
USN											Course Code	2	1	E	E	3	2

Third Semester B.E. Degree Examinations, September/October 2024

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

Q. No		*Question*	*Marks*	*(RBTL:CO:PI)*
		MODULE – 1		
1.	**a.**	Define (i). Active and passive elements (ii). Distributed and lumped networks with examples.	**06**	(2 :1 : 1.3.1)
	b.	Determine currents i_1, i_2, i_3 for the circuit shown in Fig. Q1 (b) using mesh analysis.	**06**	(2 :1 : 1.3.1)
		 **Fig.Q1(b)**		
	c.	Derive three star connected impedances into its equivalent delta connected impedances.	**08**	(3 :1 : 1.3.1)
		OR		
2.	**a.**	Find voltage across 2 Ω resistor using source transformation and source shifting techniques as shown in Fig. Q2 (a).	**06**	(2 :1 : 1.3.1)
		 **Fig. Q2(a)**		
	b.	Explain how to measure AC and DC quantities using oscilloscope.	**08**	(2 :1 : 1.3.1)
	c.	Obtain node voltages V_1, V_2 for the network shown in Fig. Q2 (c) using node analysis.	**06**	(3 :1 : 1.3.1)
		 **Fig. Q2 (c)**		
		MODULE – 2		
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		

Note: (**RBTL - Revised Bloom's Taxonomy Level: CO - Course Outcome: PI - Performance Indicator)**

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 of 10 Ω for the network shown in Fig. Q4 (b) using Millman's theorem.	**10**	(3 :2 : 1.3.1)

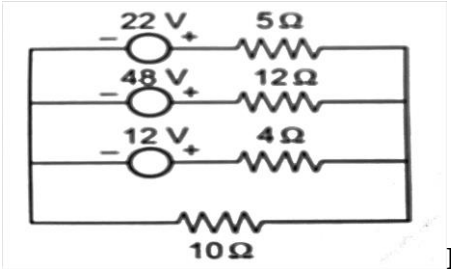


Fig. Q4 (b)

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. Q5 (b).	**12**	(3 :3 : 1.3.1)

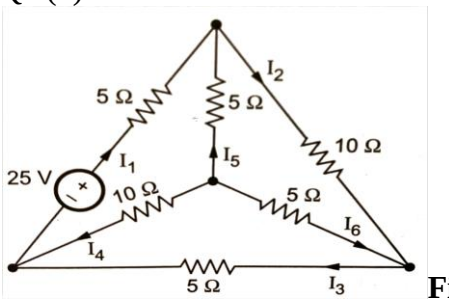


Fig. Q5 (b)

OR

6.	**a.**	Derive resonant frequency for both series and parallel RLC circuit.	**10**	(2 :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. Q7 (a), switch 'K' is closed at t=0. Find $i(t)$, and $di(t)/dt$ at $t=0^+$.	**10**	(3 :4 : 1.3.1)

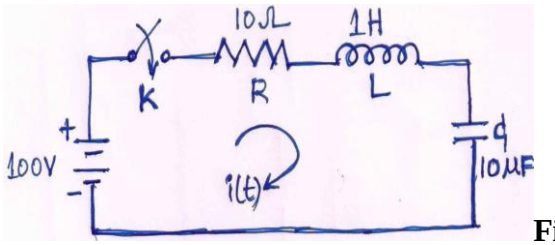


Fig. Q7(a)

	b.	Find the values of $i(t), di(t)/dt$ and $d^2i(t)/dt^2$ at $t=0^+$ for the network shown in Fig. Q7 (b) when switch 'K' is moved from 1 to 2.	**10**	(3 :4 : 1.3.1)

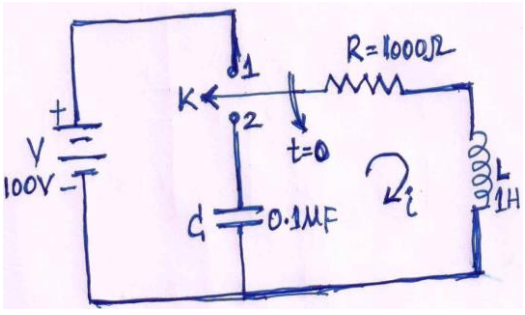


Fig. Q7(b)

OR

8.	**a.**	State and prove initial and final value theorem.	**10**	(3 :4 : 1.3.1)

Note: (**RBTL - Revised Bloom's Taxonomy Level: CO - Course Outcome: PI - Performance Indicator)**

b. Obtain the Laplace transform of the square wave as shown in Fig. Q8 (b). **10** (3 :4 : 1.3.1)

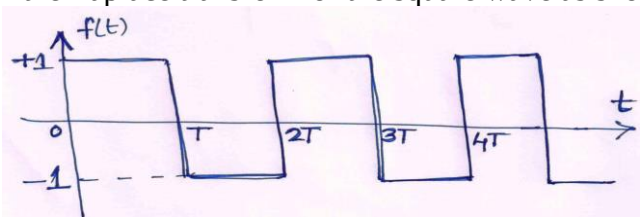


Fig. Q8 (b)

MODULE – 5

9. **a.** Determine Z and Y parameters for the network shown in Fig. Q9 (a). **10** (3 :5 : 1.3.1)

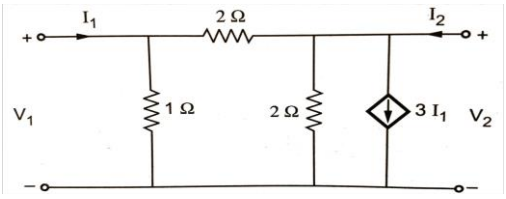


Fig. Q9 (a)

b. Determine ABCD parameters of given network as shown in Fig. Q9 (b). **10** (3 :5 : 1.3.1)

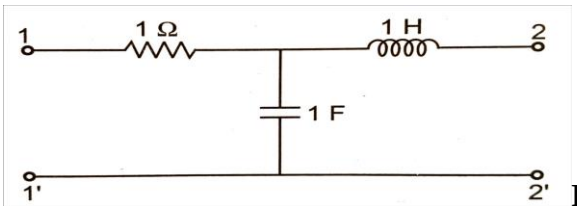


Fig. Q9 (b)

fig.(i)

OR

10. **a.** Obtain Y-parameters in terms of Z-parameters. **10** (3 :5 : 1.3.1)

b. Two identical networks as shown in Fig. Q10 (b) are connected in cascade. Determine the overall transmission parameters of combined network. **10** (3 :5 : 1.3.1)

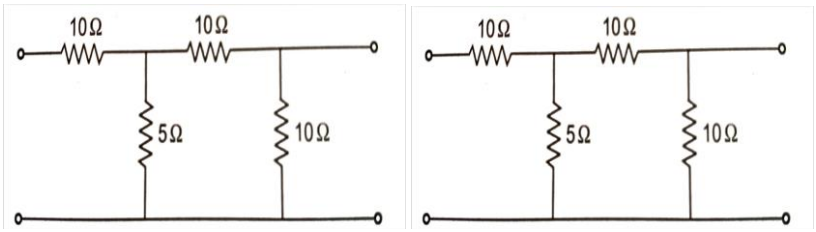


Fig. Q10 (b)

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Note: (**RBTL - Revised Bloom's Taxonomy Level: CO - Course Outcome: PI - Performance Indicator)**