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Course Code

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| 2 | 2 | E | C | 3 | 3 |
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Third Semester B.E. Degree Examinations, March/April 2024

NETWORK 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> |
|-----------------|--|--------------|---------------------|
| Module-1 | | | |
| 1. | a. With a neat sketch, illustrate the working principle of Ideal and practical voltage and current source. | 10 | (2 : 1 : 1.3.1) |
| | b. Reduce the network shown in the Fig. Q1 (b) into a single voltage source between the terminals A & B. | 10 | (2 : 1 : 2.1.2) |

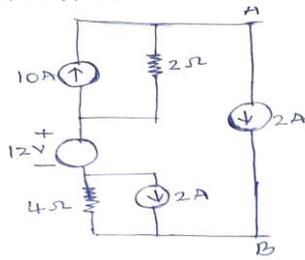


Fig. Q1(b)

(OR)

| | | | |
|----|---|----|-----------------|
| 2. | a. Find the voltage across 2 Ω resistor for the network shown in Fig. Q2 (a) using loop analysis. | 10 | (2 : 1 : 2.1.2) |
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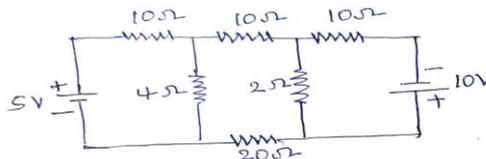


Fig. Q2 (a)

| | | | |
|----|--|----|-----------------|
| b. | Six equal resistors of 4 Ω is connected as shown in Fig. Q2 (b). Find the resistances between any two nodes. | 10 | (2 : 1 : 2.1.2) |
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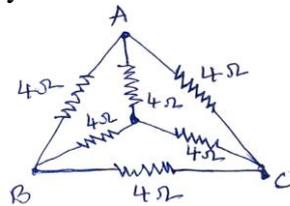


Fig. Q2 (b)

Module-2

| | | | |
|----|--|----|-----------------|
| 3. | a. State and prove Norton's theorem. | 10 | (2 : 2 : 1.3.1) |
| | b. Determine the current through the ammeter of 2 Ω connected in the unbalanced Wheatstone's Bridge as shown in Fig. 3(b). | 10 | (2 : 2 : 2.1.2) |

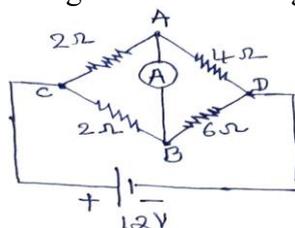


Fig. Q3 (b)

(OR)

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

4. a. Verify reciprocity theorem for the circuit shown in Fig. Q4 (a). **10** (2 : 2 : 2.1.2)

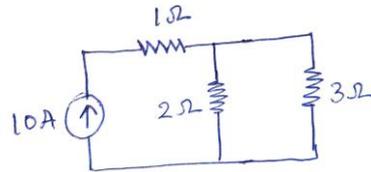


Fig. Q4 (a)

- b. Using Milliman's theorem, find I_L for the network shown in Fig. Q4 (b). **10** (2 : 2 : 2.1.2)

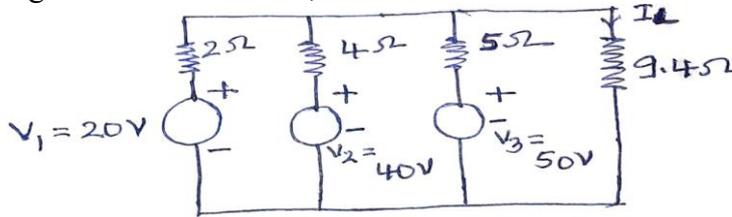


Fig. Q4 (b)

Module-3

5. a. Find the Laplace Transform of the wave form shown in Fig. Q5 (a). **10** (2 : 3 : 2.1.2)

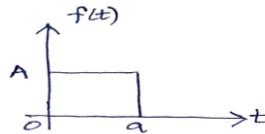


Fig. Q5 (a)

- b. Obtain the response of the current $i(t)$ in the circuit shown in Fig. Q5 (b) **10** (2 : 3 : 2.1.2)

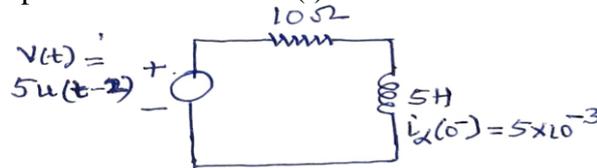


Fig. Q5 (b)

(OR)

6. a. Find the first order unit step response of system using Simulink when system function is $\frac{1}{S+1}$. **10** (2 : 3 : 2.1.2)

- b. Using Laplace Transform, determine the current in the circuit shown in Fig. Q6(b), when the switch is closed at $t=0$. Assume zero initial conditions **10** (2 : 3 : 2.1.2)

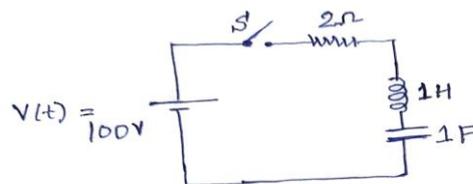


Fig. Q6 (b)

Module-4

7. a. Show that resonant frequency of series resonant circuit is equal to the geometric mean of two half power frequencies **10** (2 : 4 : 2.1.2)
 b. A series RLC circuit consists of $R=10 \Omega$, $L=0.01H$ and $C=0.01\mu F$ is connected across a supply of 10 mV. Determine (i) f_0 (ii) Q-factor (iii) Bandwidth (iv) f_1 and f_2 (v) I_0 **10** (2 : 4 : 2.1.2)

(OR)

8. a. Find the quality factor of Inductance and capacitance of a series resonant circuit **10** (2 : 4 : 2.1.2)
 b. Find the value of ω_{ar} , Quality factor, bandwidth of parallel resonant RLC circuit if $R=25 \Omega$, $L=0.5 \Omega$ and $C=5 \mu F$. **10** (2 : 4 : 2.1.2)

Module-5

9. a. Derive the expressions of Z- parameters in terms of Y-parameters, h-parameters and ABCD-parameters. **10** (2 :5 : 2.1.2)
 b. Find Y-parameter for the network shown in the Fig. Q9 (b). **10** (2 :5 : 2.1.2)

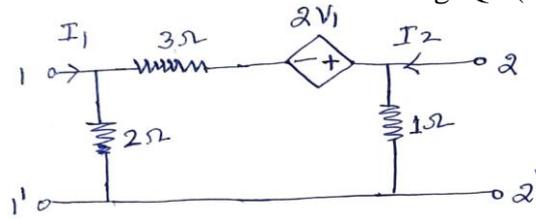


Fig. Q9 (b)

(OR)

- 10 a. Derive the expressions of y- parameters in terms of Z-parameters, h-parameters and ABCD-parameters. **10** (2 :5 : 2.1.2)
 b. Find the Z- parameters of the network shown in Fig. Q10 (b). **10** (2 :5 : 2.1.2)

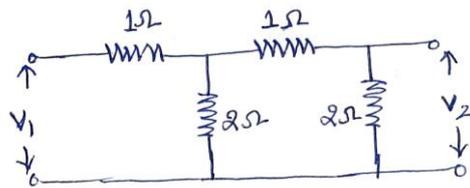


Fig. Q10 (b)

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