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**PRESIDENCY UNIVERSITY
BENGALURU**

SCHOOL OF ENGINEERING

MID TERM EXAMINATION

Winter Semester: 2021 - 22

Course Code: ECE 2005

Course Name: Network Theory

Program & Sem: B. Tech. IInd Semester

Date: 14/MAY/2022

Time: 01:30PM – 03:00PM

Max Marks: 50

Weightage: 25%

Instructions:

- (i) Read the all questions carefully and answer accordingly.
- (ii) Draw the diagrams wherever required.
- (iii) Use of non-programmable scientific calculator is permitted.

Part A [Memory Recall Questions]

Answer all the Questions. Each question carries TWO mark.

(10Qx 2M=20M)

1. Vth using thevenin's is found across the _____ terminals of the network.
 - a) Input
 - b) Output
 - c) Neither input nor output
 - d) Either input or output

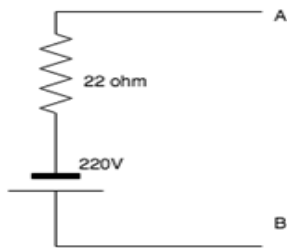
(C.O.No.1) [Knowledge]
2. In Superposition theorem, while considering a source, all other current sources are?
 - a) short circuited
 - b) change its position
 - c) open circuited
 - d) removed from the circuit

(C.O.No.1) [Knowledge]
3. Rab is the resistance between the terminals A and B, Rbc between B and C and Rca between C and A. These 3 resistors are connected in delta connection. After transforming to star, the resistance at A will be?
 - a) $Rab \cdot Rac / (Rab + Rbc + Rca)$
 - b) $Rab / (Rab + Rbc + Rca)$
 - c) $Rbc \cdot Rac / (Rab + Rbc + Rca)$
 - d) $Rac / (Rab + Rbc + Rca)$

(C.O.No.1) [Knowledge]
4. Kirchhoff's current law states that the "algebraic sum of all currents entering and exiting a node must equal zero" where can it be applied
 - a) Junction in a network
 - b) Closed loops in a network
 - c) Electric circuits
 - d) Electronic circuits

(C.O.No.1) [Knowledge]

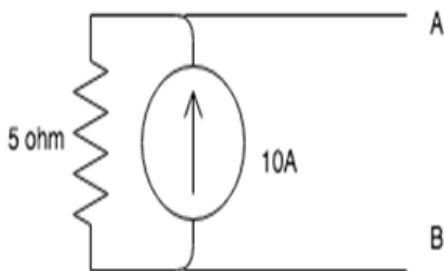
5. what will the value of the current be once source transformation is applied to the circuit?



- a) 10A
- b) 20A
- c) 30A
- d) 40A

(C.O.No.1) [Knowledge]

6. Find the value of voltage once source transformation is applied to the circuit.



- a) 10V
- b) 30V
- c) 50V
- d) 70V

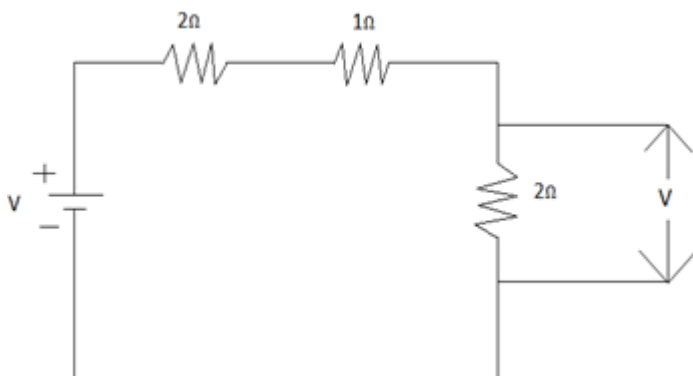
(C.O.No.1) [Knowledge]

7. If a 6 ohm, 2ohm and 4ohm resistor is connected in delta, find the equivalent star connection.

- a) 1ohm, 2ohm, 3ohm
- b) 2ohm, 4ohm, 7ohm
- c) 5ohm, 4ohm, 2ohm
- d) 1ohm, 2ohm, 2/3ohm

(C.O.No.1) [Knowledge]

8. Calculate Voltage across 2Ω Resistor where supply $v = 10$ volts.



- a) 2V
- b) 3V
- c) 10V
- d) 4V

(C.O.No.,2) [Knowledge]

9. In Superposition theorem, while considering a source, all other voltage sources are?

- a) open circuited
- b) short circuited
- c) change its position
- d) removed from the circuit

(C.O.No.2) [Knowledge]

10. Pick out the correct statement from the following about parallel combination of resistors.

- a) The current across the resistors are the same
- b) The resistance offered by all resistors are the same
- c) The potential difference is same across each resistor
- d) The equivalent overall resistance is larger than the largest resistor

(C.O.No.1) [Knowledge]

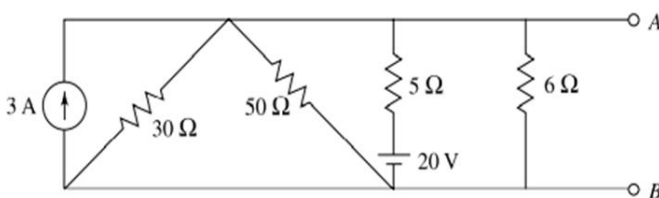
Part B [Thought Provoking Questions]

Answer all the Questions. Each question carries FIVE marks.

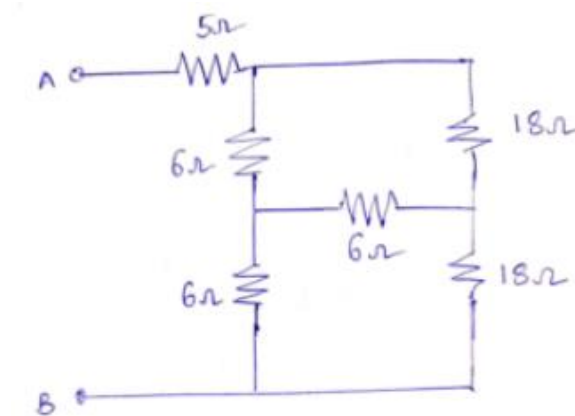
(2Qx5M=10M)

11.A Electric circuit can consist of many elements whether source or passive components interconnected in a fashion. Solve the below circuit using a transformation technique where the reduced circuit has single current source in parallel with resistance across terminals A and B.

[5M] (C. O.No.2) [Comprehension]



12. Mr praise, Mr Tom , Mr Roy are in a process of designing a circuit which has many resistors interconnected in a complex fashion. Each of them are in a process to identify a method to get a equivalent network consisting of one resistance. Suggest a suitable solution and use the same to solve the given network to get an equivalent resistance across terminals A and B.



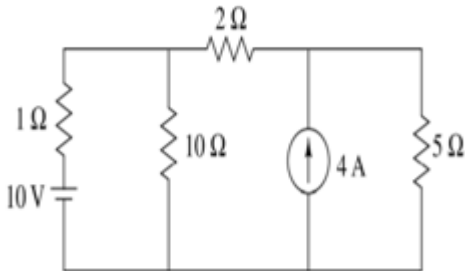
(C. O.No.2) [Comprehension]

Part C [Problem Solving Questions]

Answer all the Questions. Each question carries TEN mark.

(2Qx10M=20M)

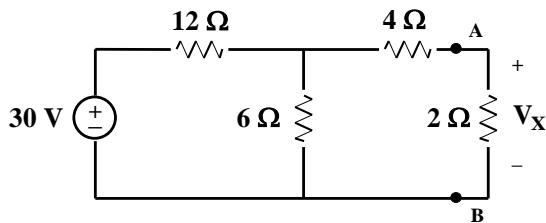
13. Superposition theorem states that in any linear, active, bilateral network having more than one source, the response across any element is the sum of the responses obtained from each source considered separately and all other sources are replaced by their internal resistance. Determine current in 10 ohm Resistor using Super position theorem.



(C.O.No.2) [Application]

14. 11. As the designers of electronic circuit working on various interconnected networks which consists a number of circuit elements it is often difficult to evaluate each circuit components and derive the equivalent voltage and equivalent resistance.

- Identify and state the network theorem suitable to for above statement.
- Find the value of V_x



(C.O.No.2) [Application]



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**PRESIDENCY UNIVERSITY
BENGALURU
SCHOOL OF ENGINEERING**

END TERM EXAMINATION

Winter Semester: 2021 - 22
Course Code: ECE 2005
Course Name: Network Theory
Program & Sem: B. Tech & II Sem

Date: 29th June 2022
Time: 1:00 PM to 04:00 PM
Max Marks: 100
Weightage: 50%

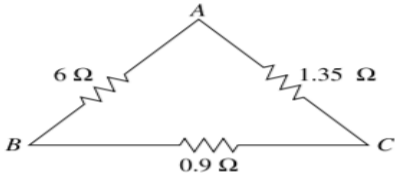
Instructions:

- (iv) Read the all questions carefully and answer accordingly.
- (v) Draw the diagrams wherever required.
- (iii) Use of non-programmable scientific calculator is permitted.

Part A [Memory Recall Questions]

Answer all the Questions. Each question carries TWO marks. (20Qx 2M= 40M)

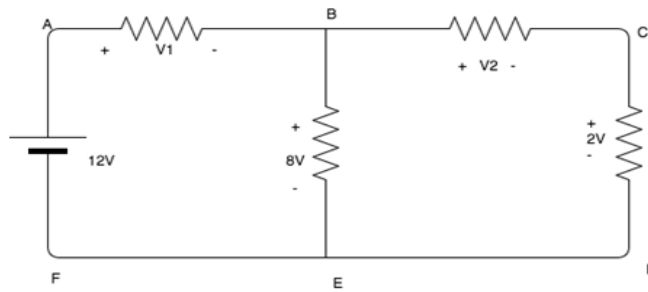
- 1. Which of the following expression is true in case of Z parameters? (C.O.No.1) [Knowledge]
a) $V_1 = Z_{11} V_1 + Z_{12} I_2$
b) $V_1 = Z_{11} I_1 + Z_{12} V_2$
c) $V_1 = Z_{11} I_1 + Z_{12} I_2$
d) $V_2 = Z_{11} I_1 + Z_{12} I_2$
- 2. While applying superposition theorem (Ideal Case) when voltage source is turned off it is replaced by _____ and when current source is turned off it is replaced by _____
a) Open circuit, Short Circuit
b) Short circuit, Open Circuit
c) Low resistance in series, very high resistance in series
d) High resistance in series, very low resistance in series (C.O.No.1) [Knowledge]
- 3. Calculate the equivalent resistance from the following diagram (C.O.No.1) [Knowledge]



- a) 1.64 Ohm
b) 2 Ohm
c) 100 Ohm
d) None of the above
- 4. The expression of current in R-L circuit is? (C.O.No.1) [Knowledge]
a) $i = (V/R)(1 + \exp((R/L)t))$
b) $i = -(V/R)(1 - \exp((R/L)t))$
c) $i = -(V/R)(1 + \exp((R/L)t))$
d) $i = (V/R)(1 - \exp((R/L)t))$

5. Calculate the value of V_1 and V_2 .

(C.O.No.1) [Knowledge]



- a) 4V, 6V
- b) 5V, 6V
- c) 6V, 7V
- d) 7V, 8V

6. KCL deals with the conservation of ___ and it is applied at _____

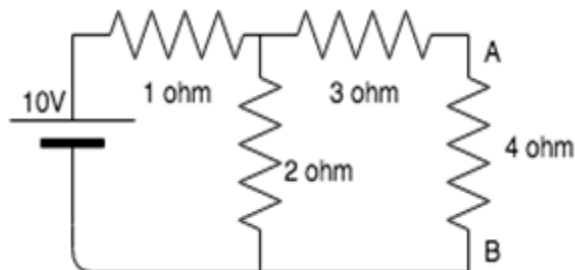
(C.O.No.1) [Knowledge]

- a) Momentum & Loop
- b) Mass & Node
- c) Potential Energy & Loop
- d) Charge & Node

7. Once the circuit is transformed to a voltage source where will the resistance be connected?

- a) In series with the voltage source
- b) In parallel with the voltage source
- c) The resistance is removed from the circuit
- d) Resistance is multiplied by 10 and connected in series with the source (C.O.No.1) [Knowledge]

8. Calculate the Thevenin's resistance across the terminal AB for the following circuit.



- a) 4.34 ohm
- b) 3.67 ohm
- c) 3.43 ohm
- d) 2.32 ohm

(C.O.No.1) [Knowledge]

9. While computing the Thevenin equivalent resistance and the Thevenin equivalent voltage, which of the following steps are undertaken?

- a) Both the dependent and independent voltage sources are short-circuited and both the dependent and independent current sources are open-circuited
- b) Both the dependent and independent voltage sources are open-circuited and both the dependent and independent current sources are short-circuited
- c) The dependent voltage source is short-circuited keeping the independent voltage source untouched and the dependent current source is open-circuited keeping the independent current source untouched
- d) The dependent voltage source is open-circuited keeping the independent voltage source untouched and the dependent current source is short-circuited keeping the independent current source untouched

(C.O.No.1) [Knowledge]

10. In a parallel circuit, with a number of resistors, the voltage across each resistor is _____
- The same for all resistors
 - Is divided equally among all resistors
 - Is divided proportionally across all resistors
 - Is zero for all resistors
- (C.O.No.1) [Knowledge]
11. Condition of reciprocity in Y-parameter representation is
- $Y_{11} = Y_{12}$.
 - $Y_{12} = Y_{21}$.
 - $Y_{11} = Y_{22}$.
 - $Y_{12} = Y_{22}$.
- (C.O.No.1) [Knowledge]
12. Which is the correct condition of symmetry observed in z-parameters?
- $Z_{11} = Z_{22}$
 - $Z_{11} = Z_{12}$
 - $Z_{12} = Z_{22}$
 - $Z_{12} = Z_{21}$
- (C.O.No.1) [Knowledge]
13. If many branches or nodes are present in a parallel configuration in a network, which method approves to be extensively beneficial for network analysis ?
- Mesh method
 - Node method
 - Both a and b
 - None of the above
- (C.O.No.1) [Knowledge]
14. If many loops or meshes are present in a parallel configuration in a network, which method approves to be extensively beneficial for network analysis ?
- Mesh method
 - Node method
 - Both a and b
 - None of the above
- (C.O.No.1) [Knowledge]
15. In two port network the Z parameters are define by the relation $V_1 = \frac{3}{4} I_1 - \frac{1}{4} I_2$ $V_2 = \frac{-1}{2} I_1 + \frac{1}{2} I_2$. Compute the admittance Y_{12}
- 0.5 mho
 - 0.5 mho
 - 1 mho
 - 1 mho
- (C.O.No.1) [Knowledge]
16. A big complex network can be simplified using network theorems. Thevenin's theorem reduces a two port network to a
- One terminal network
 - Current generator in series with an impedance
 - Voltage generator in series with an impedance
 - Combination of voltage and current sources
- (C.O.No.1) [Knowledge]
17. The two networks have various parameters depending upon the components used in the network. The h-parameter h_{12} is called as
- Open circuit output impedance
 - Short circuit output impedance
 - Open circuit reverse voltage gain
 - Short circuit forward current gain
- (C.O.No.1) [Knowledge]

18. In two port network, a pair of terminals constitutes a port and it satisfies the port condition. The port condition indicates

- a) Current entering in one terminal is equal to current leaving the other terminal
- b) Current entering in one terminal and leaving the other terminal is different
- c) No current must enter and leave a port
- d) All the above

C.O.No.1) [Knowledge]

19. In maximum power transfer theorem, the efficiency is 50% when the power delivered to the load is maximum. Choose the right option where the maximum power is preferred in the circuit over maximum efficiency.

- a) All circuits require maximum power
- b) No circuit requires maximum power
- c) All circuits require maximum efficiency
- d) Few circuits like Communication circuits and amplifier circuits require maximum power

(C.O.No.1) [Knowledge]

20. The maximum power transfer theorem is used to transfer the maximum power from source to the load in the network. The maximum power drawn from source depends on the _____

- a) Value of source resistor is not equal to load resistor
- b) Value of load resistor equal to source resistor
- c) Value of source resistor is infinite
- d) Independent of source and load resistor

(C.O.No.1) [Knowledge]

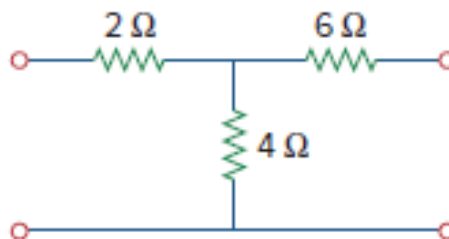
Part B [Thought Provoking Questions]

Answer both the Questions. Each question carries TEN marks.

(2Qx10M=20M)

21) While designing a certain circuit for a particular application, it was noticed that some of the parameters in the circuit components are to be evaluated to perform a proper analysis. Compute the Y parameter for the network shown below.

(C.O.No.2) [Application]



22) Joy is working on RL network in the laboratory. He experiences a change in the network when the switch is closed at $t=0$. To attain a steady state it requires certain time. He is interested in knowing the circuit behavior in transient state. Help him out by deriving an equation for transient behavior of this RL network.

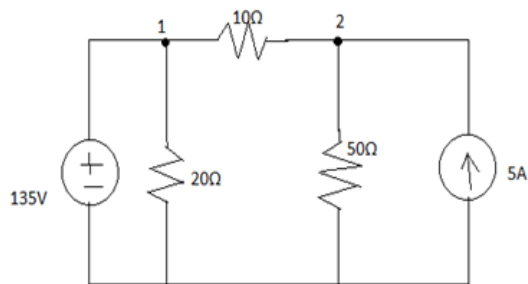
(C.O.No.2) [Application]

Part C [Problem Solving Questions]

Answer all the Questions. Each question carries TEN marks.

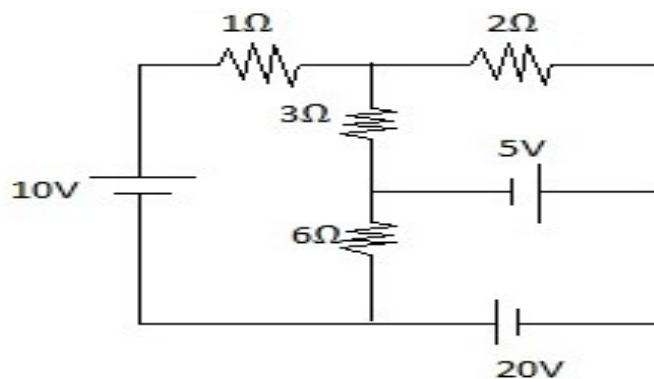
(4Qx10M=40M)

23) Nodal analysis or Node-Voltage method is done by identifying the currents at the node and thereby forming equations. By using nodal analysis find out the voltages at nodes 1 & 2.

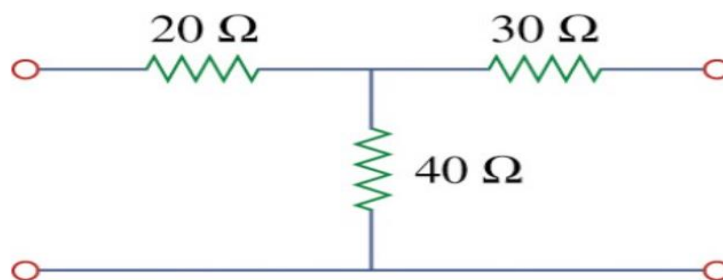


(C.O.No.2) [Application]

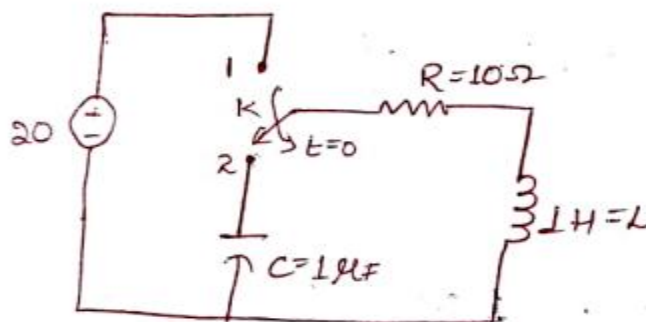
24) A mesh is defined as a loop which does not contain any other loop within it. Mesh analysis (or the mesh current method) is a method that is used to solve planar circuits for the currents (and indirectly the voltages) at any place in the electrical circuit. Find out the current flowing in all the three loops.
(C.O.No.2) [Application]



25) Explain the Z parameter for two port network and also derive the parameters used for the representation. Determine the Z parameters for the below network.
(C.O.No.2) [Application]



26) The switch "K" is changed from position 1 to position 2 at $t=0$ steady-state condition having been reached at position 1 find the value of i , di/dt , di^2/dt^2 at $t=0^+$.



(C.O.No.2) [Application]



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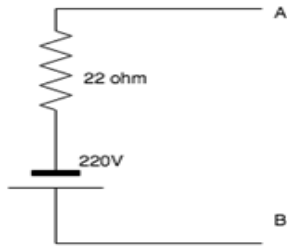
Part A [Memory Recall Questions]

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- a) Input
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 - c) Neither input nor output
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- (C.O.No.1) [Knowledge]
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- a) short circuited
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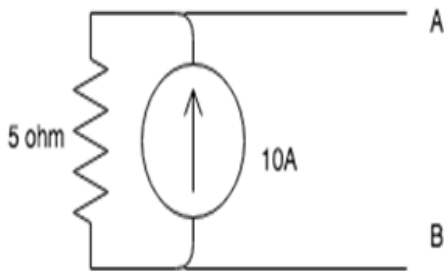
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- a) 10A
- b) 20A
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- a) 10V
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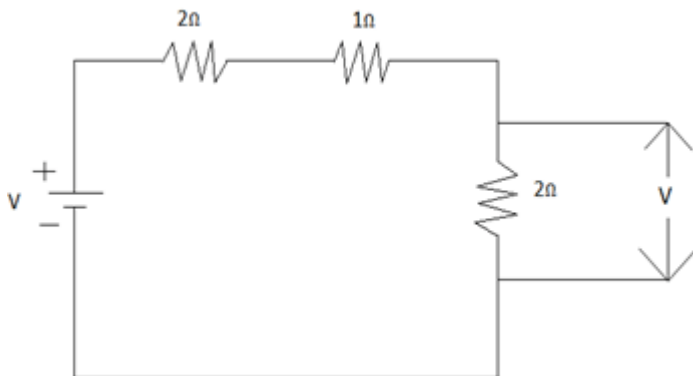
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- a) 1ohm, 2ohm, 3ohm
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(C.O.No.1) [Knowledge]

8. Calculate Voltage across 2Ω Resistor where supply v= 10volts.



- a) 2V
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(C.O.No.,2) [Knowledge]

9. In Superposition theorem, while considering a source, all other voltage sources are?

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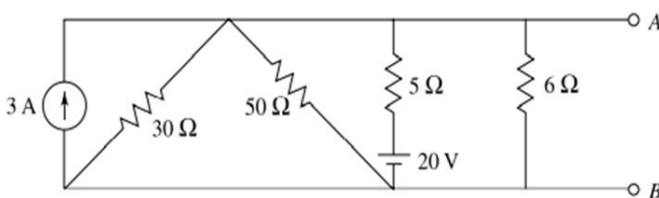
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Answer all the Questions. Each question carries FIVE marks.

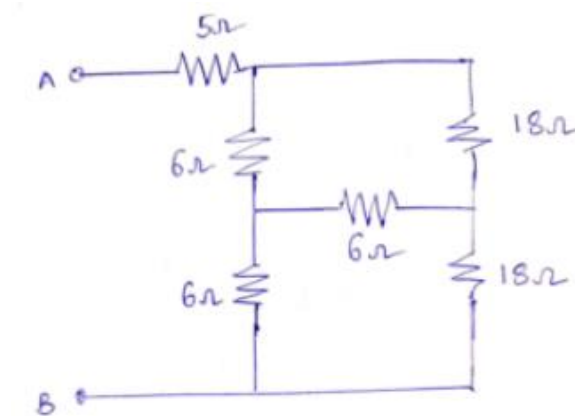
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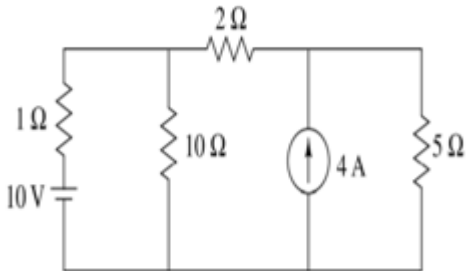
(C. O.No.2) [Comprehension]

Part C [Problem Solving Questions]

Answer all the Questions. Each question carries TEN mark.

(2Qx10M=20M)

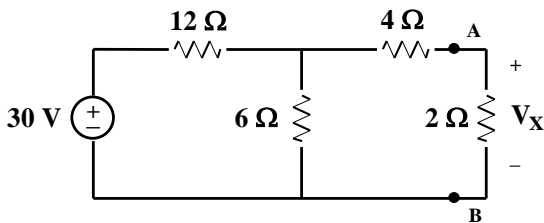
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- c. Identify and state the network theorem suitable to for above statement.
- d. Find the value of V_x



(C.O.No.2) [Application]