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**PRESIDENCY UNIVERSITY
BENGALURU**

SCHOOL OF ENGINEERING

MID TERM EXAMINATION

Winter Semester: 2021 - 22

Course Code: EEE 2002

Course Name: Electric Circuit Analysis

Program & Sem: B.Tech & 2nd Sem

Date: 12/May/2022

Time: 10:00 AM – 11:30 PM

Max Marks: 50

Weightage: 25%

Instructions:

- (i) Read the all questions carefully and answer accordingly.
- (ii) All students should bring their calculator in the examination hall.

Part A [Memory Recall Questions]

Answer all the Questions. Each question carries two marks.

(5Qx 2M= 10M)

1. Thevenin's theorem provides a technique by which the fixed part of the circuit is replaced by an equivalent circuit. While applying Thevenin's theorem (Ideal Case) across load resistance it is replaced by ___ to find the ___ and independent sources are turned off while finding ___

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

- a) Short circuit, Thevenin's Voltage, Internal Resistance of the circuit
- b) Short circuit, Open circuit Voltage, Internal Resistance of the circuit
- c) Open circuit, Thevenin's Voltage, Thevenin's Resistance
- d) Open circuit, Thevenin's Voltage, External Resistance of the circuit

2. The most common use for capacitors is energy storage. Additional uses include power conditioning, signal coupling or decoupling, electronic noise filtering, and remote sensing. Capacitor stores energy in _____ field.

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

- a) Magnetic field
- b) Electrostatic Field
- c) Gravitational field
- d) Magneto static Field

3. Superposition theorem states that in a linear network containing more than one independent sources and dependent sources, the resultant current in any element is the algebraic _____ of the currents that would be produced by each independent source acting alone, all the other independent sources being represented meanwhile by their respective internal resistances.

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

- a) Multiplication
- b) Sum
- c) Subtraction
- d) Division

4. Maximum Power theorem states that the maximum power is delivered from a source to a load when the load resistance is equal to the _____ resistance. (C.O.No.1) [Knowledge]

- a) Source b) Parallel c) Battery d) Series

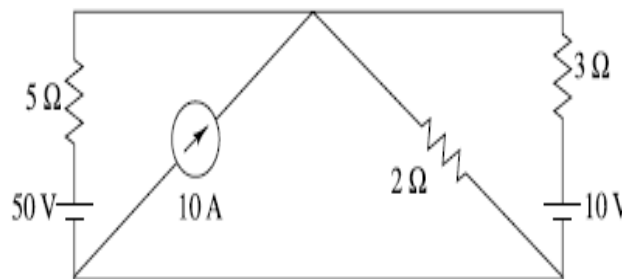
5. There are two general approaches to network analysis viz. (a) direct method (b) network reduction method. In direct method, the network is left in its original form and different voltages and currents in the circuit are determined as in the case of Nodal analysis, Mesh analysis & Superposition theorem. The nodal method of circuit analysis is based on (C.O.No.1) [Knowledge]

- a) KVL and Ohm's law
 b) KCL and Ohm's law
 c) KCL and KVL
 d) KCL, KVL and Ohm's law

Part B [Thought Provoking Questions]

Answer all the Questions. Each question carries eight marks. (3Qx8M=24M)

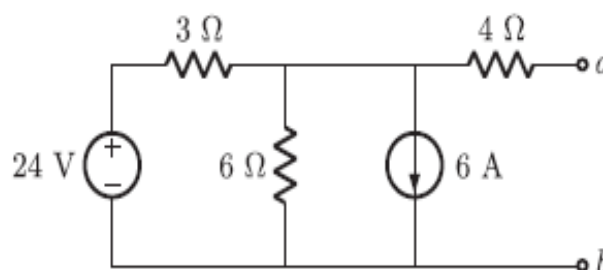
6. Nodal analysis provides a general procedure for analyzing circuits using node voltages as the circuit variables. Choosing node voltages instead of element voltages as circuit variables is convenient and reduces the number of equations one must solve simultaneously. Compute the power dissipated in 5Ω resistor in the circuit given below.



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

7. A voltage source with a series resistance can be converted into an equivalent current source with a parallel resistance. Conversely, a current source with a parallel resistance can be converted into voltage source with a series resistance. The following circuit is used in fault current or short circuit analysis of power system by connecting variety loads across a and b terminals. Redraw a circuit which consists of only one current source and parallel resistance across a&b terminals.

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



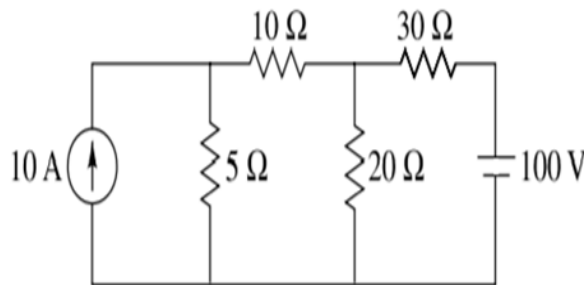
8. A smart phone Li-ion battery has a voltage of 3.8V and internal resistance of 1 ohms is connected across a non-linear load whose V-I characteristic is given by $5I-2V=0$. Compute the current delivered by the battery? (C.O.No.2) [Comprehension]

Part C [Problem Solving Questions]

Answer the Question. The question carries sixteen marks.

(1Qx16M=16M)

09. The Thevenin-equivalent voltage V_{Th} is the open-circuit voltage at the output terminals of the original circuit. When calculating a Thevenin-equivalent voltage, the voltage divider principle is often useful, by declaring one terminal to be V_{out} and the other terminal to be at the ground point. The Thevenin-equivalent resistance R_{Th} is the resistance measured across points A and B "looking back" into the circuit. The resistance is measured after replacing all voltage- and current-sources with their internal resistances. That means an ideal voltage source is replaced with a short circuit, and an ideal current source is replaced with an open circuit. (C.O.No.2) [Comprehension]



a) Identify the unknown quantities that could be computed from the given data after applying thevenin's theorem across any resistance of your choice [6M]

b) Compute the unknown parameters [10M]



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SCHOOL OF ENGINEERING

END TERM EXAMINATION

Winter Semester: 2021-22

Course Code: EEE2002

Course Name: Electric Circuit Analysis

Program & Sem: B.Tech EEE & II Sem

Date: 8th July 2022

Time: 01.00 PM to 04:00 PM

Max Marks: 100

Weightage: 50%

Instructions:

- (i) Read the question properly and answer accordingly.
(ii) Scientific and non-programmable calculators are permitted.

Part A [Memory Recall Questions]

Answer all the Questions. Each question carries TWO marks. (5Qx 2M=10M)

Q.NO.1 A battery of 12V dc is connected to a series RC circuit with a switch. Initially capacitor is uncharged. The switch is closed at $t=0$. Comment on the behavior of capacitor at $t=0+$

[2M] (C.O.No.4) [Knowledge]

Q.NO.2 Summarize the steps for applying maximum power transfer theorem for purely resistive circuits with no dependent sources and AC sources

[2M] (C.O.No.3) [Knowledge]

Q.NO.3 If the output of an electric circuit for an input varies with respect to time, then it is called as time response. The time response consists of following two parts.1).Transient Response and 2.)Steady state Response. In a series RL circuit excited by a battery, summarize the steps of how the current will vary in the circuit from $t=0$ to $t=\infty$

[2M] (C.O.No.4) [Knowledge]

Q.NO.4 Discuss about the concept and unit of inductance.

[2M] (C.O.No.1) [Knowledge]

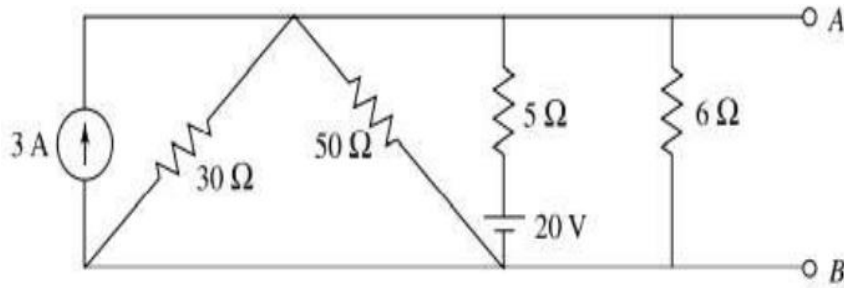
Q.NO.5 Summarize the steps for Superposition theorem for purely resistive circuits with no dependent sources and AC sources.

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

Part B [Thought Provoking Questions]

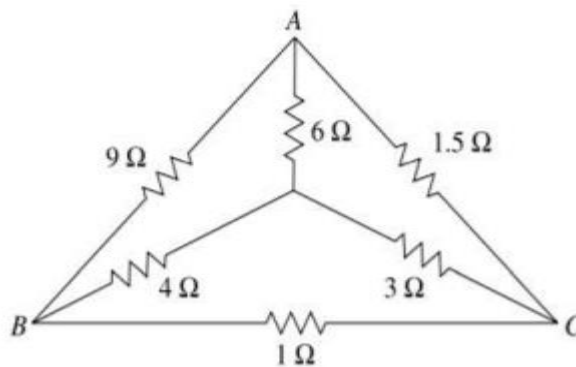
Answer all the Questions. Each Question carries TEN marks. (5Qx10M=50 M)

Q.NO.6 When a circuit cannot be simplified by normal series–parallel reduction technique, the source transformation can be used. An electrical source transformation (or just “source transformation”) is a method for simplifying circuits by replacing a voltage source with its equivalent current source, or a current source with its equivalent voltage source. Simply the network given in figure using suitable transformations to find an equivalent resistance between A and B.



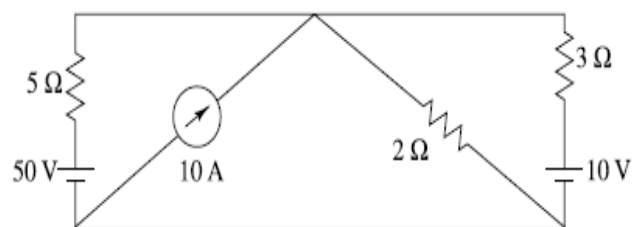
(C.O.No.1) [Comprehension]

Q.NO.7 When a circuit cannot be simplified by normal series reduction of circuits, the star-delta transformation can be used. These two networks will be electrically equivalent if the resistance as measured between any pair of terminals is the same in both star and delta arrangements. Simply the network given in figure using suitable transformations to find an equivalent resistance between A and B.



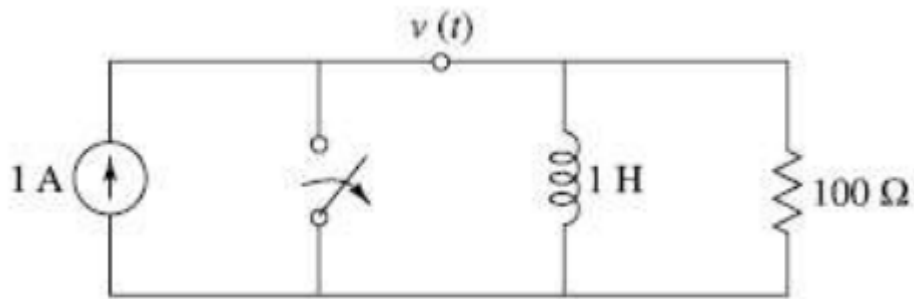
(C.O.No.1) [Comprehension]

Q.NO.8 Nodal analysis provides a general procedure for analyzing circuits using node voltages as the circuit variables. Choosing node voltages instead of element voltages as circuit variables is convenient and reduces the number of equations one must solve simultaneously. Compute the power delivered by the 50 V voltage source.



(C.O.No.3) [Comprehension]

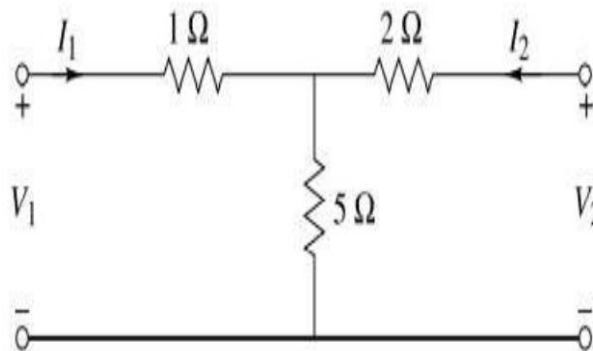
Q.NO. 9. Transient analysis calculates a circuit's response over a period of time defined by the user. The accuracy of the transient analysis is dependent on the size of internal time steps, which together make up the complete simulation time known as the Run to time or Stop time. Compute the double differential of rate of change of voltage with respect to time.



(C.O.No.4) [Comprehension]

Q.NO.10 ABCD parameters (also known as chain or transmission line parameters) are generalized circuit constants used to help model transmission lines. More specifically, ABCD parameters are used in the two port network representation of a transmission line. So it's important for power system engineers to be thorough with the mathematical modeling of how this power is transmitted. ABCD parameters and a two-port model is used to simplify these complex calculations. Compute the ABCD parameters of the network.

(C.O.No.4) [Comprehension]



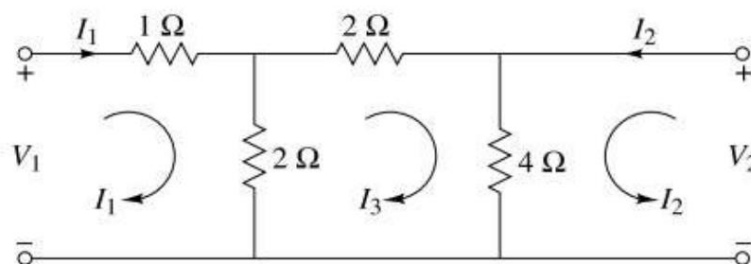
Part C (Problem Solving Questions)

Answer both the Questions. Each Question carries TWENTY marks.

(2Qx20M=40M)

Q.NO.11 In the circuit given below

- Identify the two port network parameters that could be computed. .
- compute any 5 parameters by framing the two port network equations



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

Q.NO.12 In the circuit given below the switch in the figure is shifted from position 1 to position 2 at $t=0$.

- Identify the transient parameters that could be computed from the given circuit. .
- Compute any 5 parameters after carrying out the transient analysis.

(C.O.No.4) [Comprehension]

