ELECTRIC CIRCUITS ANALYSIS

TWO MARK QUESTION AND ANSWERS

1. What are the classification of circuit elements?

The classification of circuit elements are
  i) Active elements
  ii) Passive elements.
  iii) Lumped and distributed elements
  iv) Bilateral and unilateral elements
  v) Linear and non linear elements

2. What are active elements and passive elements?

The elements which can deliver energy are ca lled **active elements**. These are voltage and current sources.
The elements which consume energy either by absorbing or storing are called **passive elements**. These are resistor, inductors and capacitors.

3. What are lumped and distributed elements?

Physically separate elements such as resistors , capacitors and inductors are called **lumped elements**.
A **distributed element** is one which is not separable for electrical purposes.
A transmission line has distributed resistance , capacitance and inductance along its length.

4. What are bilateral and unilateral elements?

In bilateral element, the voltage-current rela tion is the same for current flowing in either direction.
E.g: resistor, inductor and capacitor.
In a unilateral element, it has different relations between voltage and current for two possible directions of currents E.g: vacuum tu be, silicon diode.

5. What are linear and non-linear elements?

An element is said to be linear, if it satisfies the linear current voltage relationship that is the relation between V and I is linear.
The elements which do not satisfy the Linear v oltage-Current relationship is called as non-linear elements.

6. What are dependent and independent sources?

The electrical energy supplied by an dependent source depends on another source of electrical energy
The electrical energy supplied by an independent so urce does not depend on another electrical source. They convert energy in s ome form to electrical energy.

7. State Kirchoff's current law?

Krichoff's current law states that "the algebraic sum of the currents meeting at a junction is equal to zero".

8. State Kirchoff's voltage law?

Krichoff's voltage law states "The algebraic sum of electromotive forces plus the algebraic sum of voltages across the impedances, in any closed electrical circuit is equal to zero".

$$\Sigma \, emf + \Sigma \, IZ = 0.$$

9. State Ohm's law?

Ohm's law states the ratio between the potential difference across two terminals of a conductor and the current through it remains constant, when the physical conditions of the conductor remain unchanged.

$$V = IR.$$

10. Define series and parallel connection?

If the resistors are connected end to end, the combination is said to be series.
If one end of all the resistors is joined to a common point and the other ends are joined to another common point, the combination is said to be parallel combination between two common points.

11. What are the advantages of parallel circuits?

The advantages of parallel connections are
1) The electrical appliances of different power ratings may be rated for the same voltage
2) In case a break (open) occurs in any of the branch circuit it will not affect the other branch circuits

12. Define ideal voltage source?

For ideal voltage source, source impedance is zero, such voltage source gives a constant voltage V irrespective of current drawn from it.

13. Define an ideal current source?

For an ideal current source, source impedance is infinite, such an ideal current source gives a constant current irrespective of voltage across it.

14.Two resistor of 4Q and 6Q are connected in parallel. If the total currerit is 30A. Find the current through each resistor.

Ans:
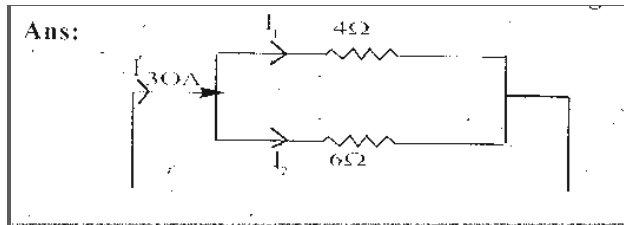
$$R_1 = 4\Omega, R_2 = 6\Omega, I = 30A$$

$$I_1 = \frac{IR_2}{R_1 + R_2}$$
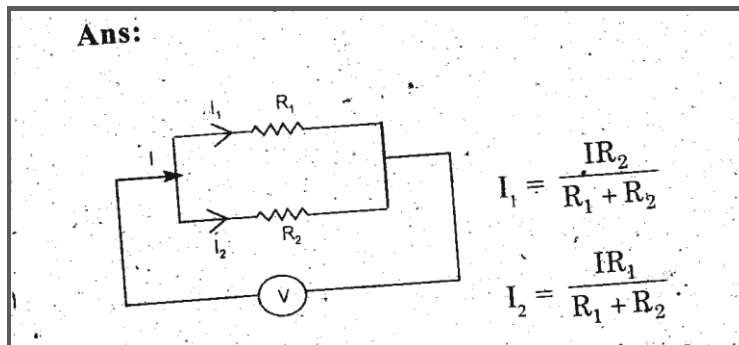
$$I_1 = 30 \times \frac{6}{6+4} = 18A$$

W.K.T. $I = I_1 + I_2$

$$30 = 18 + I_2$$

$$I_2 = 12A.$$

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15.Write the current division formula when only two resistance is connected in parallel?

Ans:

$$I_1 = \frac{IR_2}{R_1 + R_2}$$

$$I_2 = \frac{IR_1}{R_1 + R_2}$$

16. Comparison of series and parallel circuits.

| Series Circuit	Parallel Circuit
1. The current is same through all the elements.	The current is divided, inversely proportional to resistance.
2. The voltage is distributed.	The voltage is same across each element.
3. There is only one path for flow of current.	There are more than one path for the flow of current.
4. The total resistance is greater than the greatest resistance in the circuit.	Total resistance is lesser than the smallest of the resistance.

17.In the figure determine the equivalent resistance.
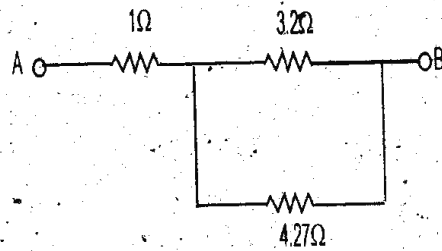
$$\text{Ans: } \frac{3.2 \times 4.277}{3.2 + 4.277} = 1.83\Omega$$

$$R_{req} = 1 + 1.83$$
$$= 2.83\Omega.$$

18. What is the voltage across the 10 Ω resistor?
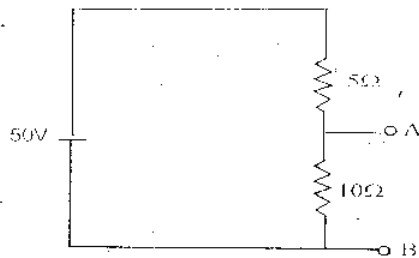
Ans: Voltage across 10Ω, $V_w - 50 \times \frac{10}{5} = \frac{500}{15} = 33.3V.$

20.What is an independent voltage source?
An independent voltage source is an ideal source characterized by a terminal voltage which is completely independent of the current through it

21.What is an independent current source?
An independent current source is an ideal source in which the current through the element is completely independent of the voltag e across it.

22.What are called dependent sources?
The sources in which voltage or current is dependent of the voltage or current existing at some other location in the circuit are called dependent sources. They are also known as controlled sources.

23.What is a node?
A node is a point in a network in which two or m ore elements have a common connection

24. What is a super node?
The region surrounding a voltage source which connects the two nodes directly is called super node.

25. What is principle node?
The meeting point of three or more elements is called principle node.

26. What is a closed path?
A closed path is a path, which starts at a node and travels through some part of the circuit and arrives to the same node without crossing a node more than once

27. What is a node, a junction and a branch?
A node of a network is an equipotential surface at which two or more circuit elements are joined

A junction is that point in a network where three or more circuit elements are joined.
A branch is that part of a network which lies between two junction points.

28. What is the difference between a loop and a mesh?
A loop is any closed path of a network. A mesh is the most elementary form of a loop and can not be further divided into other loops.

29. State voltage division rule.
Voltage across a resistor in a series circuit is equal to the total voltage across the series elements multiplied by the value of that resistor divided by the total resistance of the series elements

30. State current division rule.
The current in any branch is equal to the ratio of the opposite parallel branch resistance to the total resistance value, multiplied by the total current in the circuit.

31. Define mesh.
A mesh is defined as a loop which does not contain any other loops within it.

32. What is a planar circuit?
A circuit is said to be planar, if it can be drawn on a plane surface without crossovers.

33. What is a non-planar circuit?
A circuit is said to be non-planar, if it cannot be drawn on a plane surface without a crossovers.

34. Define super mesh.
The loop existing, around a current source which is common to the two loops is called super mesh.