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Krishna School of Emerging Technology & Applied Research (KSET)

Department of Electrical Engineering

Subject: Basic Electrical and Electronics Engineering

**Assignment No.1**

Module-1: DC Circuits and AC Circuits

Part-1: DC Circuits (Questions and Examples)
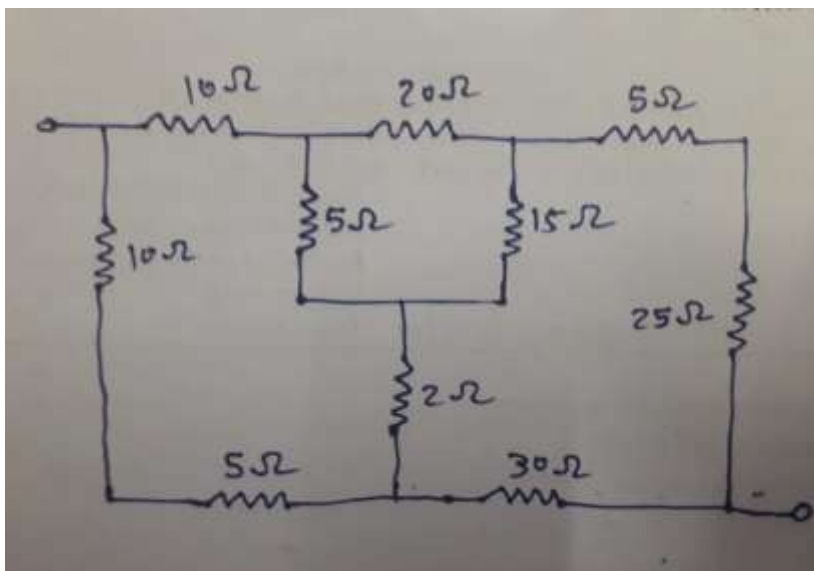
Questions

1. Define: Voltage, E.M.F, Current, Power, Energy, Resistivity, and Conductivity.
2. State and explain ohm's law.
3. State and explain Kirchoff's laws.
4. Explain effect of temperature on resistance of: (i) Pure metals (ii) Alloys (iii) insulators, Semiconductors & Alloys.
5. Derive expression for current in a branch in case of two resistance in parallel
6. Write equations to transform electrical networks from star to delta and vice versa.
7. Explain in brief why most of the equipment is connected in parallel to the supply.
8. Discuss voltage distribution rule for two resistors in series. Derive expression for it.
9. Discuss current distribution rule for two resistors in parallel. Derive expression for it.

Examples

1. The resistance of two coils is 25 ohm when connected in series and 6 ohm when connected in parallel. Determine the individual resistance of the coil.
2. Two bulbs are connected in series. A is 100 W, 200 V bulb and B is 100 W, 250 V bulb. They are connected across a 250 V supply. Calculate (i) Circuit current (ii) Voltage across each assuming the bulb resistance to remain unchanged.
3. Using Star/ Delta transformation, find the current and power supplied by the battery.
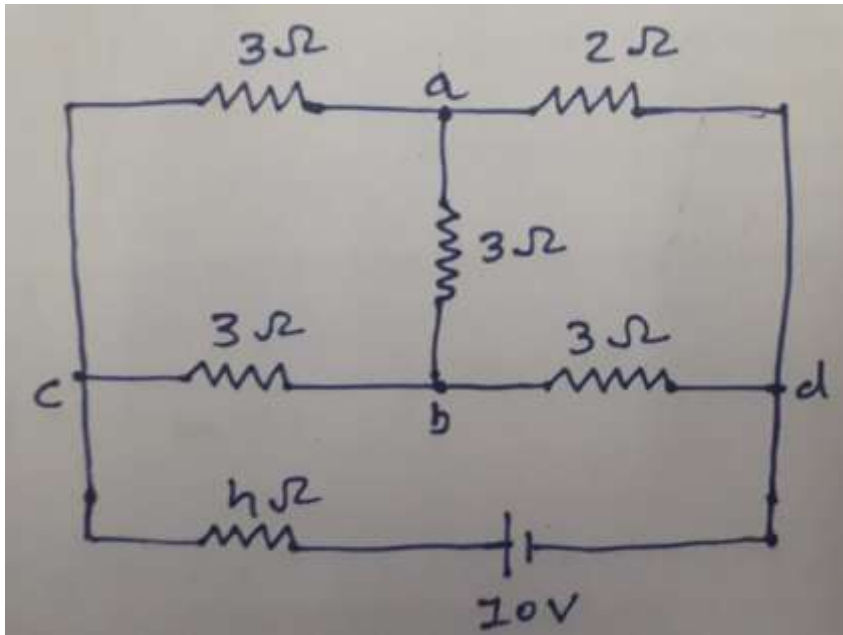
4. Determine the resistance between the terminals of the network shown in the fig.

Part-2: AC Circuits (Questions and Examples)

1. Derive expression for generation of AC voltage.
2. Derive expression for current in a pure resistive circuit when AC voltage is applied to it.
3. Derive expression for current in a pure inductive circuit when AC voltage is applied to it.
4. Derive expression for current in a pure capacitive circuit when AC voltage is applied to it.
5. Derive expression for current in an R-L series circuit when AC voltage is applied to it.
6. Derive expression for current in an R-C series circuit when AC voltage is applied to it.
7. Derive expression for current in an R-L-C series circuit when AC voltage is applied to it.
8. What is inductive reactance? Explain in brief.
9. What is capacitive reactance? Explain in brief.
10. What is the impedance of a circuit ? Explain in brief.
11. What is admittance of the circuit? Explain in brief.
12. What are the advantages of using three phase supply?

Examples:

1. A coil is connected to a 230 V, 50 HZ supply. The coil carries a current of 10 A and consumes a power of 500 W. Find its resistance, inductance and impedance.
2. A resistance of 10 ohm is connected in series with an inductance of 30mH across a 100 V, 50 Hz, a.c. supply. Determine the current drawn, the power consumed and the power factor.
3. A 10 ohm resistor and a 20 mH inductor are connected in series across a 230 V, 50 Hz supply. Find the circuit impedance, current, active power, reactive power, apparent power and power factor.

Multiple Choice Questions

1.	Which of the following is not an expression of power? (a) $P=VI$ (b) $P=I^2R$ (c) $P=V^2/R$ (d) $P=I/R$ Answer: Option **(d)**
2.	Kilowatt-hour (kWh) is a unit of? (a) Current (b) Power (c) Energy (d) Resistance Answer: Option **(c)**
3.	Out of the following, which is not a source of electrical energy? (a) Solar cell (b) Battery (c) Potentiometer (d) Generator Answer: Option **(c)**
4.	Materials which easily allow the passage of electric current are known as _____ (a) Insulators (b) Conductors (c) Dielectrics (d) Semi-conductors Answer: Option **(b)**
5.	Which of the following statements are true with regard to resistance? (a) Resistance is directly proportional to a length of the wire (b) Resistance is directly proportional to an area of cross-section of the wire (c) Resistance is inversely proportional to the length of the wire (d) Resistance is inversely proportional to the resistivity of the wire Answer: Option **(a)**
6.	Resistivity of a wire depends on

	(a) Length
	(b) Material
	(c) cross sectional area
	(d) none of these
	Answer:
	Option **(b)**
7.	A circuit contains two un-equal resistances in parallel
	(a) current is same in both
	(b) large current flows in larger resistance
	(c) potential difference across each is same
	(d) smaller resistance has smaller conductance
	Answer:
	Option **(c)**
8.	The resistance of a 100 W, 200 V lamp is
	(a) 100 ohm
	(b) 200 ohm
	(c) 400 ohm
	(d) 1600 ohm
	Answer:
	Option **(c)**
9.	Ohm's law is not applicable to
	(a) DC circuits
	(b) high currents
	(c) small resistors
	(d) semi-conductors
	Answer:
	Option **(d)**
10.	It is preferable to connect bulbs in series or in parallel?
	(a) Series
	(b) Parallel
	(c) Both series and parallel
	(d) Neither series nor parallel
	Answer:
	Option **(b)**

11.	The currents in the three branches of a parallel circuit are 3A, 4A and 5A. What is the current leaving it? (a) 0 A (b) Insufficient data provided (c) The largest one among the three values (d) 12 A Answer: Option **(d)**
12.	If two bulbs are connected in parallel and one bulb blows out, what happens to the other bulb? (a) The other bulb blows out as well (b) The other bulb continues to glow with the same brightness (c) The other bulb glows with increased brightness (d) The other bulb stops glowing Answer: Option **(b)**
13.	What happens to the current in the series circuit if the resistance is doubled? (a) It becomes half its original value (b) It becomes double its original value (c) It becomes zero (d) It becomes infinity Answer: Option **(a)**
14.	In a series circuit, which of the parameters remain constant across all circuit elements such as resistor, capacitor and inductor etc.? (a) Voltage (b) Current (c) Both voltage and current (d) Neither voltage nor current Answer: Option **(b)**
15.	Many resistors connected in series will? (a) Divide the voltage proportionally among all the resistors (b) Divide the current proportionally (c) Increase the source voltage in proportion to the values of the resistors (d) Reduce the power to zero Answer: Option **(a)**

16.	A lamp of 100 W at 200 V is supplied current at 100 volts. It will be equivalent to the lamp of (a) 50 W (b) 40 W (c) 25 W (d) 10 W Answer: Option **(c)**
17.	For a fixed supply voltage the current flowing through a conductor will decrease when (a) cross-sectional area of the conductor is increased (b) length of the conductor is increased (c) length of the conductor is reduced (d) cross-sectional area is increased and length is decreased Answer: Option **(b)**
18.	A wire of resistance R has its length and cross section both doubled. Its resistance will become (a) 4 R (b) 2 R (c) R (d) R/4 Answer: Option **(c)**
19.	Many resistors connected in series will? (a) Divide the voltage proportionally among all the resistors (b) Divide the current proportionally (c) Increase the source voltage in proportion to the values of the resistors (d) Reduce the power to zero Answer Option (**A**)
20.	It is preferable to connect bulbs in series or in parallel? (a) Series (b) Parallel (c) Both series and parallel (d) Neither series nor parallel Answer: Option **(b)**

21.	KCL is applied at
	(a) Loop
	(b) Node
	(c) Both loop and node
	(d) Neither loop nor node
	Answer:
	Option **(b)**
22.	A 250V bulb passes a current of 0.3A. Calculate the power in the lamp.
	(a) 75 W
	(b) 50 W
	(c) 25 W
	(d) 90 W
	Answer:
	Option **(a)**
23.	The SI unit of power is?
	(a) kW (kilo-watt)
	(b) J/s (joules per second)
	(c) Ws (watt-second)
	(d) J/h (joules per hour)
	Answer:
	Option **(b)**
24.	One kilowatt hour of electrical energy is the same as
	(a) 36×10^5 watts
	(b) 36×10^5 ergs
	(c) 36×10^5 joules
	(d) 36×10^5 B.T.U.
	Answer:
	Option **(c)**
25.	A circuit contains two un-equal resistances in parallel
	(a) current is same in both
	(b) large current flows in larger resistor
	(c) potential difference across each is same
	(d) smaller resistance has smaller conductance
	Answer:
	Option **(c)**

26.	Conductance is expressed in terms of (a) Ω/m (b) m/Ω (c) $\mho/m$ (d) $\mho$ Answer: Option **(d)**
27.	_____law is used to find the direction of statically induced emf. a) Lenz's b) Faraday's law c) Ohm's law d) Coulomb's law Ans. Option (a)
28.	The charge on each electron is _____ coulomb. (A) 1.9×10^{-19} (B) $- 1.6 \times 10^{-19}$ (C) $- 1.9 \times 10^{-16}$ (D) 1.6×10^{-19} Ans. Option (b)
29.	The value of form factor is [a] 11.1 [b] 1.11 [c] 1.414 [d] 14.14 Ans. Option (b)