SCIENCE

(PHYSICS)

PRACTICE SET-TERM II

SESSION- 2021-2022

Praadis Education

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CHAPTER-12

ELECTRICITY

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NUMERICAL PROBLEMS

1. What current must flow if 0.24 coulombs is to be transferred in 15 ms?
2. If a current of 10 A flows for four minutes, find the quantity of electricity transferred.
3. An electric bulb draws a current of 0.25A for 20 minutes. Calculate the electric charge that flows through the circuit.
4. If the amount of electric charge passing through a conductor in 10min is 300C, find the current.
5. How many electrons are flowing per second past a point in a circuit in which there is a current of 4A?
6. A lamp of resistance 80Ω draw a current of 0.75A. Find the line voltage.
7. A electric heater draw a current of 5A when connected to 220V mains. Calculate the resistance of its filament.
8. How much current will an electric bulb draw from a 200V source, if the resistance of the filament is 1200Ω?
9. How much current will an electric heater draw from a 200V source, if the resistance of the filament is 100Ω?

26. The potential difference between the terminals of an electric heater is 60 V when it draws a current of 4 A from the source. What current will the heater draw if the potential difference is increased to 120 V?

27. When a 12 V battery is connected across an unknown resistor, there is a current of 2.5 mA in the circuit. Find the value of the resistance of the resistor.

28. An electric heater is connected to the 230 V mains supply. A current of 8A flows through the heater (a) How much charge flows around the circuit each second. (b)How much energy is transferred to the heater each second?

29. How many electrons are flowing per second past a point in a circuit in which there is a current of 5A?

30. An electric iron draws a current of 3.4A from the 220V supply line. What current will this electric iron draw when connected to 110V supply line?

31. A simple electric circuit has a 24V battery and a resistor of 60Ω. What will be the current in the circuit?

32. When a 4Ω resistor is connected across the terminal of 12V battery, find the number of coulombs passing through the resistor per second.

33. An electric room heater draw a current of 2.4A from the 120V supply line. What current will this room heater draw when connected to 240V supply line?

34. A current of 200mA flows through a 4kΩ resistor. What is the p.d. across the resistor?

35. A p.d. of 10V is needed to make a current of 0.02 A flow through a wire. What p.d. is needed to make a current of 250mA flow through the same wire?

36. A TV draws a current of 5 A from the 240V supply line. What current will this TV draw when it is connected to 100V supply line.

37. The potential difference between the terminals of an electric heater is 60V when it draw a current of 4A from the source. What current will the heater draw if the potential difference is increased to 120V?

38. A bulb of resistance 400Ω is connected to 220V mains. Calculate the magnitude of current.

39. A battery of two cells is used to light a torch bulb of resistance 5Ω. The cells maintain a potential difference of 3V across the bulb. How much current will flow through the bulb?

40. A steady current of 5A flows through a circuit for 30minutes. How much charge has circulated through the circuit in this time?

NUMERICAL PROBLEMS ON RESISTIVITY

1. Calculate the resistance of a copper wire of length 2m and area of cross section $10^{-6}m^2$. Resistivity of copper is $1.7 \times 10^{-8}\ \Omega m$

2. A copper wire of length 2m and area of cross section $1.7 \times 10^{-6}m^2$ has a resistance of 2×10^{-2} ohms. Calculate the resistivity of copper.

3. The amount of charge passing through a cell in 12 seconds is 3C. What is the current supplied by the cell?

4. A 12 V battery of a car is connected across a 4Ω resistor. Calculate the current passing through the resistor.

5. Resistivity of a given copper wire of length 2m is $1.7 \times 10^{-8}\ \Omega m$. The wire is stretched so that its length becomes 4m. Find new resistivity of the copper wire.

6. Resistance of a given wire of length 'l' is 3Ω. The wire is stretched uniformly such that its length becomes $2l$. Find the new resistance of the stretched wire.

7. Resistance of a given wire of length 'l' is 4Ω. The wire is stretched uniformly such that its length becomes $3l$. Find the new resistance of the stretched wire.

8. A copper wire has a diameter of 0.5 mm and resistivity of $1.6 \times 10^{-8}\ \Omega m$. What will be the length of this wire to make its resistance 10Ω? How much does the resistance change if the diameter is doubled?

9. A 6Ω resistance wire is doubled up by folding. Calculate the new resistance of the wire.

10. Calculate the resistance of an aluminium cable of length 10km and diameter 20mm if the resistivity of aluminum is $2.7 \times 10^{-8}\ \Omega m$.

11. Calculate the area of cross section of a wire if its length is 1.0m, its resistance is 23Ω and the resistivity of the material of the wire is $1.84 \times 10^{-6}\ \Omega m$.

12. A piece of wire of resistance 20Ω is drawn out so that its length is increased to twice its original length. Calculate the resistance of the wire in the new situation.

13. Two cylindrical wires of the same material have their lengths in the ratio of 4 : 9. What should be the ratio of their radii so that their resistances are in the ratio of 4 : 1?

14. Two wires of the same metal, have the same area of cross section but their lengths in the ratio of 3 : 1. What should be the ratio of current flowing through them respectively, when the same potential difference is applied across each of their length?

15. Two wires A and B of length 30m and 10m have radii 2cm and 1cm respectively. Compare the resistances of the two wires. Which will have less resistance?

16. Calculate the resistance of 1km long copper wire of radius 1mm. Resistivity of copper is $1.7 \times 10^{-8}\ \Omega\,m$

17. A 4Ω wire is doubled on it. Calculate the new resistance of the wire.

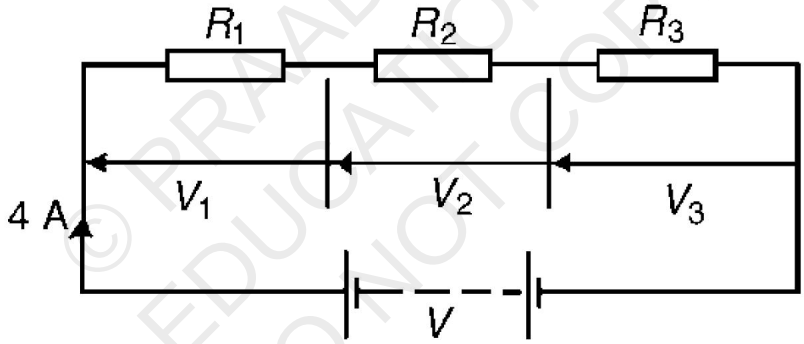
18. What should be the length of the nichrome wire of resistance 4.5Ω, if the length of a similar wire is 60cm and resistance 2.5Ω?

19. A metal wire of resistivity $64 \times 10^{-6}\ \Omega\,m$ and length 198cm has a resistance of 7Ω. Calculate its radius.

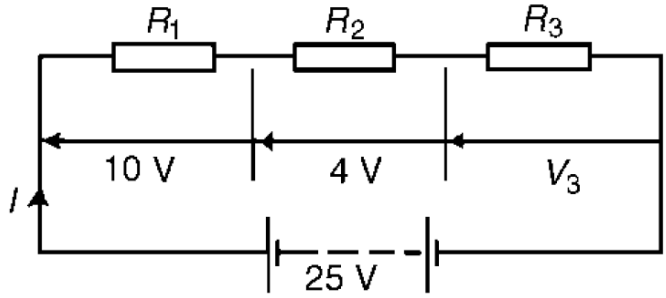
20. Calculate the resistivity of the material of a wire 1.0m long, 0.4mm in diameter and having a resistance of 2.0Ω.

NUMERICAL PROBLEMS

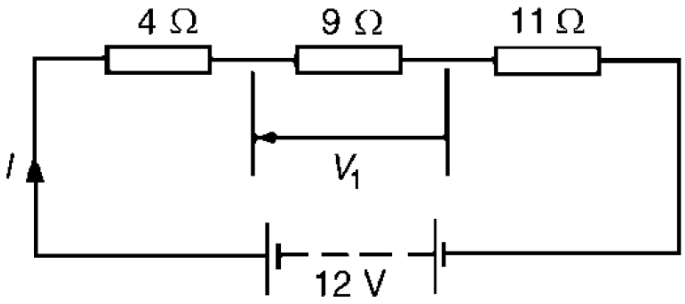
1. For the circuit shown in below Figure, determine (a) the battery voltage V, (b) the total resistance of the circuit, and (c) the values of resistance of resistors R1, R2 and R3, given that the p.d.'s across R1, R2 and R3 are 5 V, 2 V and 6 V respectively.



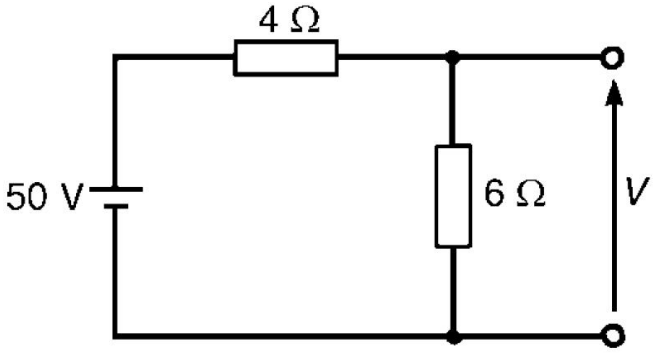
2. For the circuit shown in below Figure, determine the p.d. across resistor R_3. If the total resistance of the circuit is 100Ω, determine the current flowing through resistor R_1. Find also the value of resistor R_2



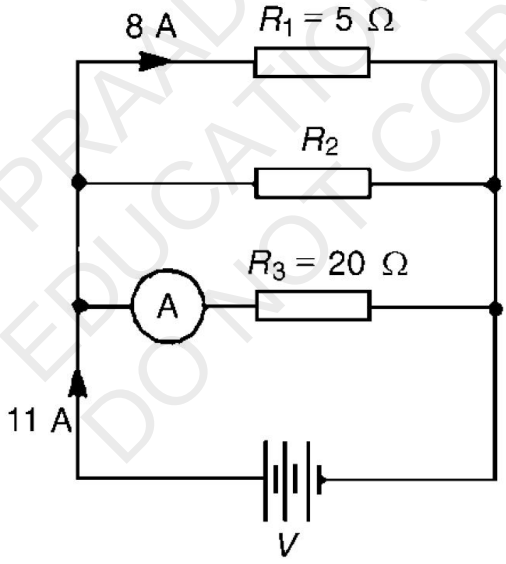
3. A 12 V battery is connected in a circuit having three series-connected resistors having resistances of 4Ω, 9Ω and 11Ω. Determine the current flowing through, and the p.d. across the 9Ω resistor.



4. Find the voltage V in the given figure.

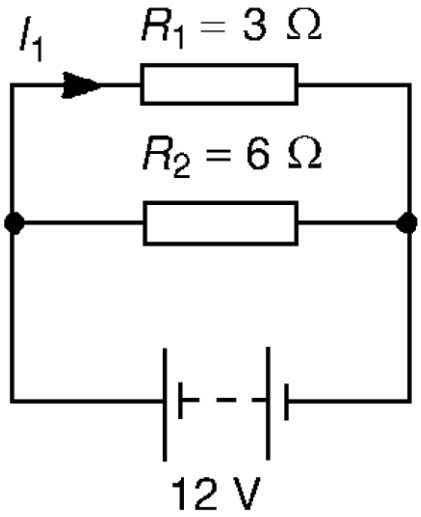


5. For the circuit shown in given Figure, determine (a) the reading on the ammeter, and (b) the value of resistor R_2



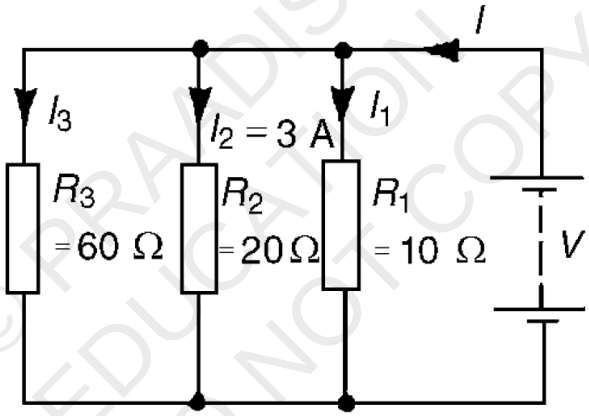
6. Two resistors are connected in series across a 24 V supply and a current of 3 A flows in the circuit. If one of the resistors has a resistance of 2Ω determine (a) the value of the other resistor, and (b) the p.d. across the 2Ω resistor. If the circuit is connected for 50 hours, how much energy is used?

7. Two resistors, of resistance 3Ω and 6Ω, are connected in parallel across a battery having a voltage of 12 V. Determine (a) the total circuit resistance and (b) the current flowing in the 3Ω resistor.

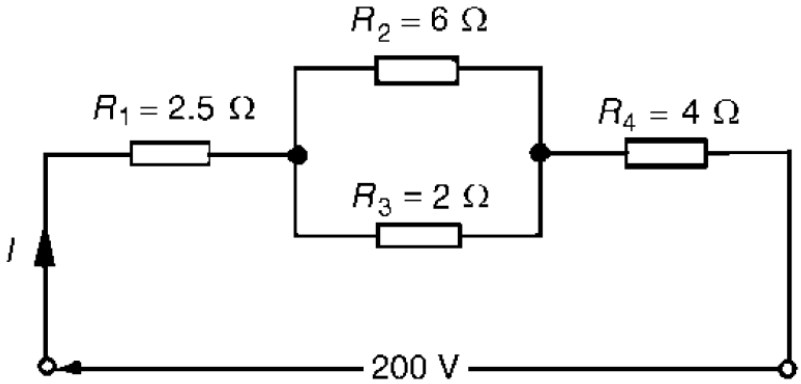


8. Given four 1 _ resistors, state how they must be connected to give an overall resistance of (a) $\frac{1}{4}\Omega$ (b) 1Ω (c) $1\frac{1}{3}\Omega$ (d) $2\frac{1}{2}\Omega$, all four resistors being connected in each case.

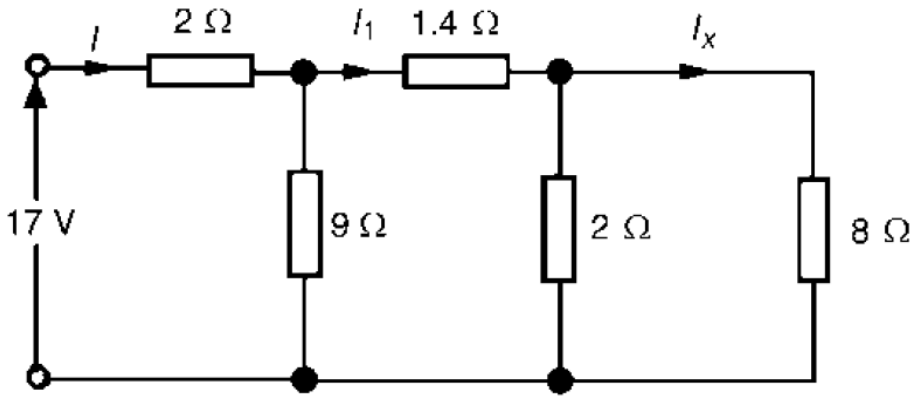
9. For the circuit shown in below Figure, find (a) the value of the supply voltage V and (b) the value of current I.



10. For the series-parallel arrangement shown in below Figure, find (a) the supply current, (b) the current flowing through each resistor and (c) the p.d. across each resistor.



11. For the arrangement shown in below Figure, find the current I_x.

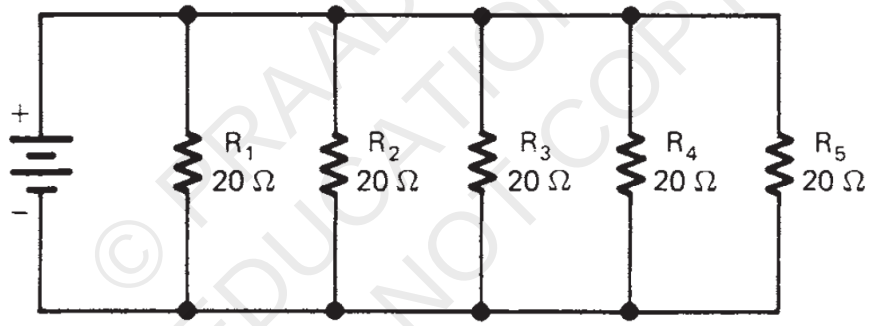


12. Four resistances of 16Ω each are connected in parallel. Four such combinations are connected in series. What is the total resistance?

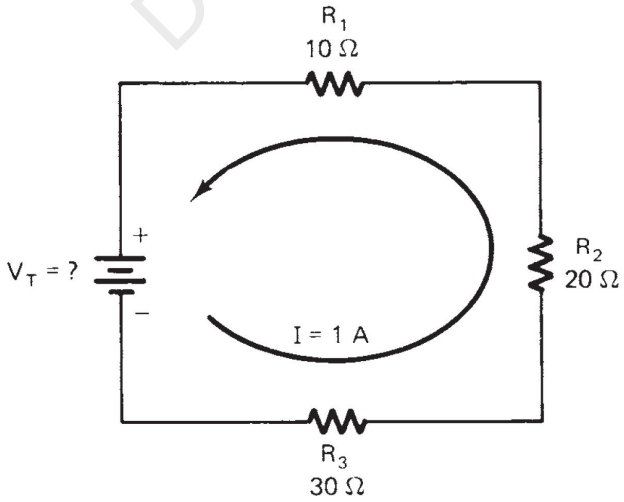
13. A battery of 9 V is connected in series with resistors of 0.2Ω, 0.3Ω,0.4Ω,0.5Ω and 12Ω. How much current would flow through the 12Ω resistor?

14. An electric bulb of resistance 20Ω and a resistance wire of 4Ω are connected in series with a 6V battery. Draw the circuit diagram and calculate: (a) total resistance of the circuit (b) current through the circuit (c) potential difference across the electric bulb (d) potential difference across the resistance wire.

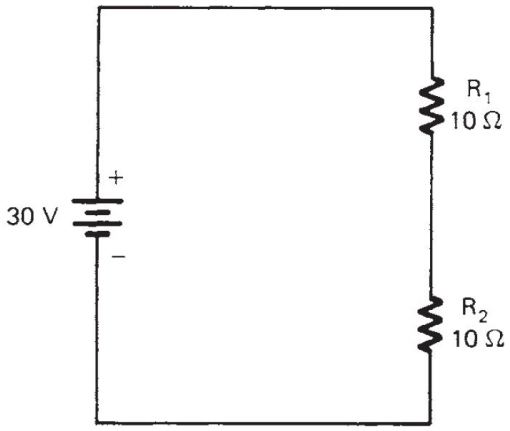
15. Find the equivalent resistance of the given circuit.



16. Find the value of V_T in the given circuit.



17. Find the voltage across each resistance in the given circuit.

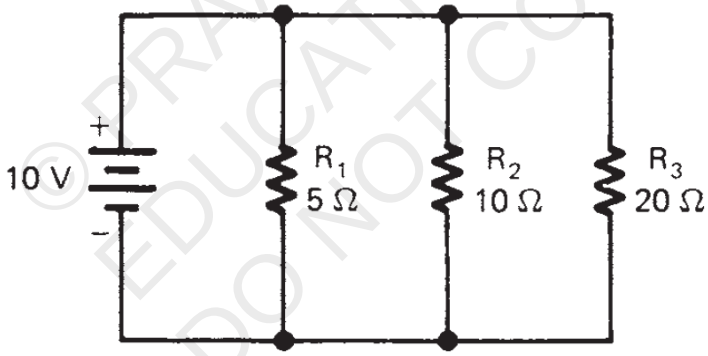


18. A potential difference of 4V is applied to two resistors of 6Ω and 2Ω connected in series. Calculate: (a) the combined resistance (b) the current flowing (c) the potential difference across the 6Ω resistor

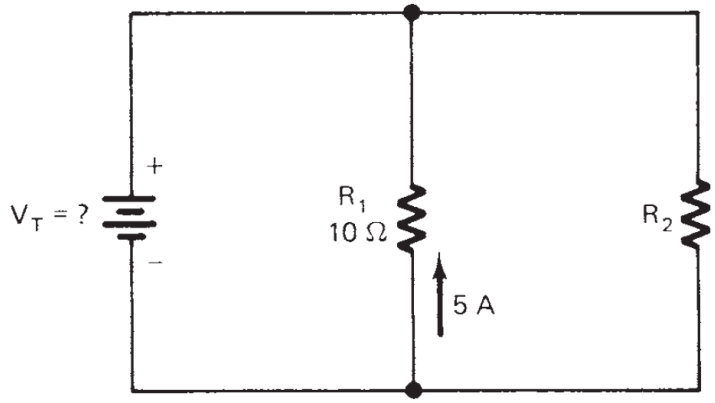
19. Resistors of 20Ω, 20Ω and 30Ω are connected in parallel. What resistance must be added in series with the combination to obtain a total resistance of 10Ω.

20. If four identical lamps are connected in parallel and the combined resistance is 100Ω, find the resistance of one lamp.

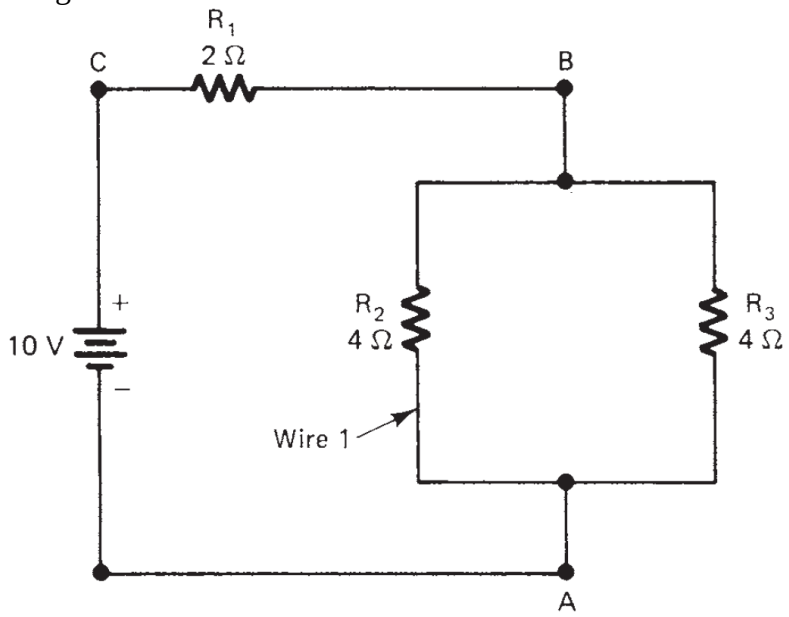
21. Find the current across the each resistance and total current flowing in the given circuit.



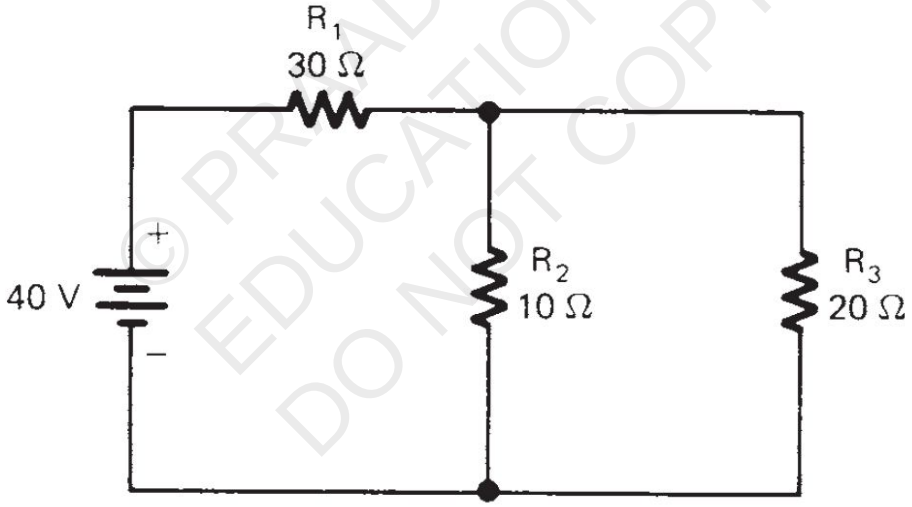
22. In the given circuit, the resistance R_1 and R_2 are connected in parallel. (i) Find the value of V_T. (ii) Find the total current and equivalent resistance in the circuit if resistance $R_2 = 10\,\Omega$



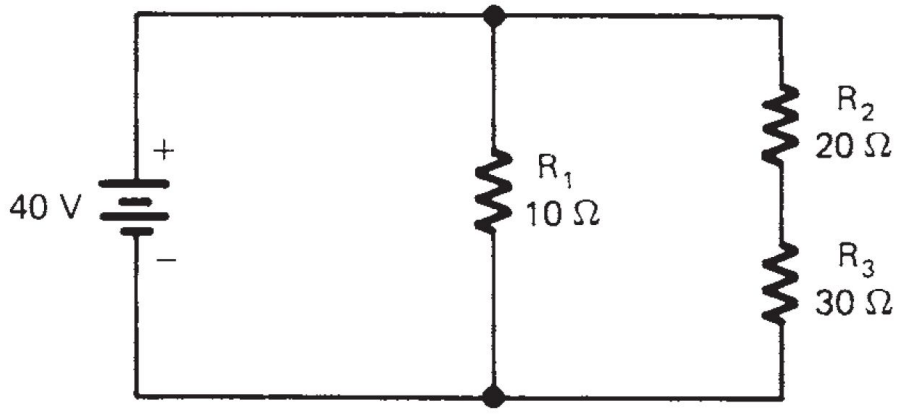
23. In the given circuit, (i) find the equivalent resistance of the circuit and total current flowing in the circuit. (ii) find the current flowing through R_2 and R_3. (iii) find the voltage across each resistance.



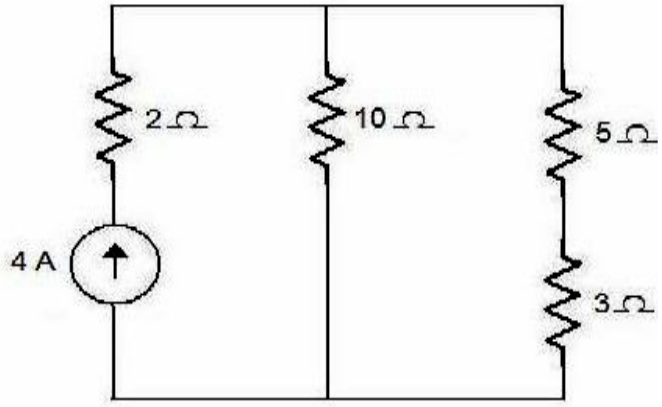
24. In the given circuit, (i) find the equivalent resistance and total current flowing in the circuit. (ii) find the voltage and current across each resistance in the circuit.



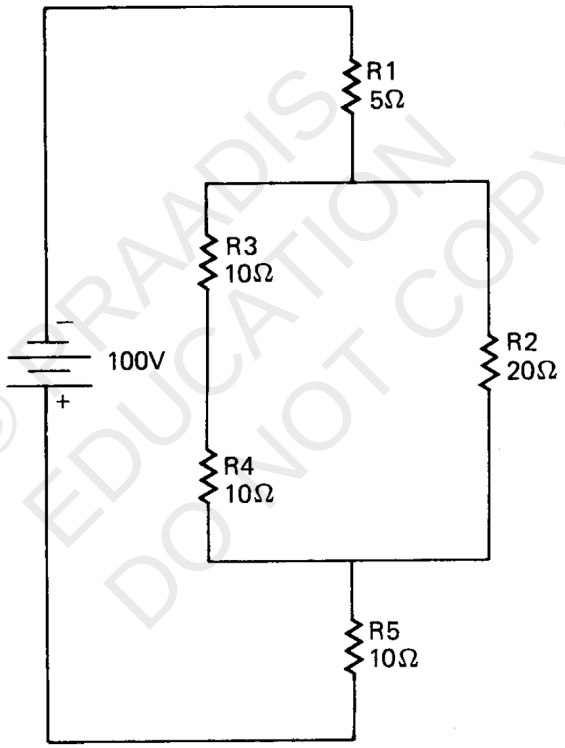
25. In the given circuit, (i) find the equivalent resistance and total current flowing in the circuit. (ii) find the voltage and current across each resistance in the circuit.



26. Find the current through 10 ohm resistor for the following circuit.

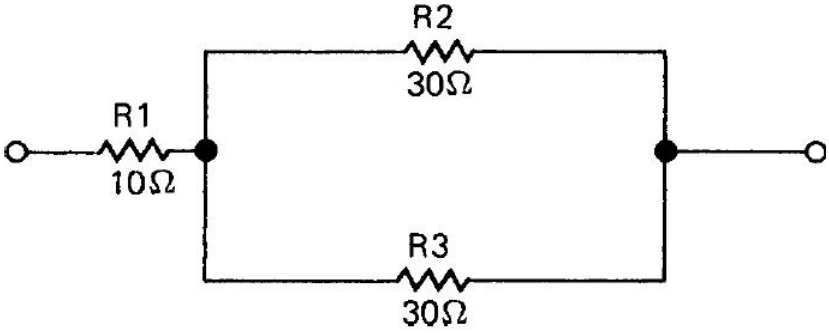


27. In the given circuit, (i) find the equivalent resistance and total current flowing in the circuit. (ii) find the voltage and current across each resistance in the circuit.

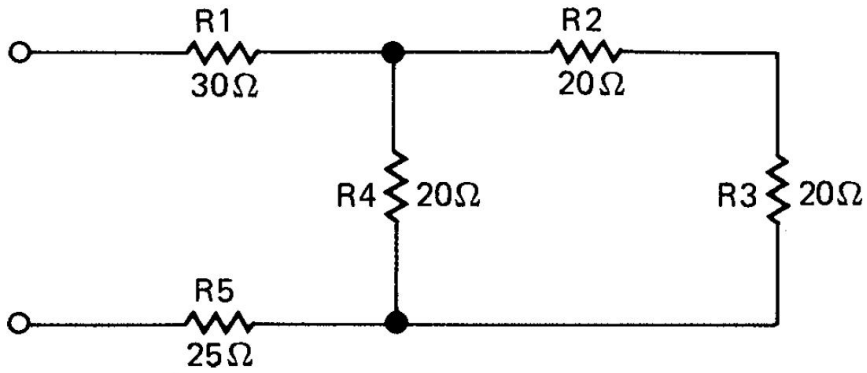


28. Find the equivalent resistance of the following circuits:

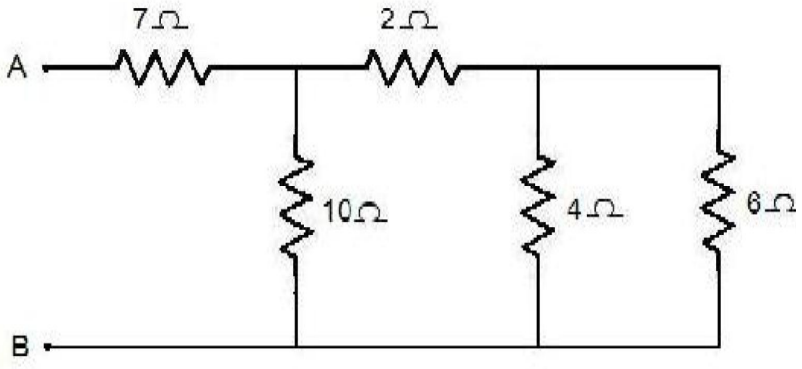
(i)



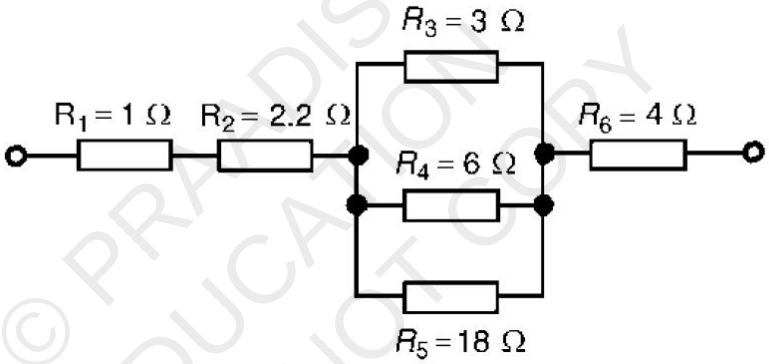
(ii)



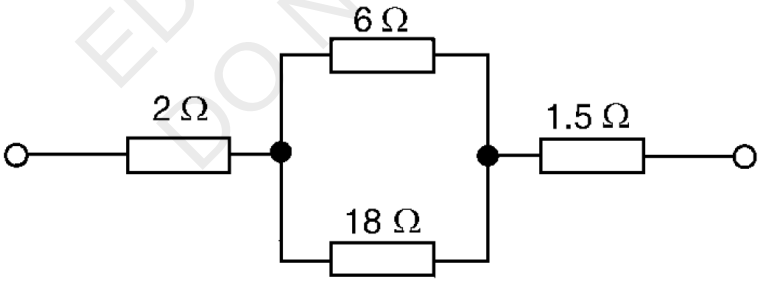
(iii)



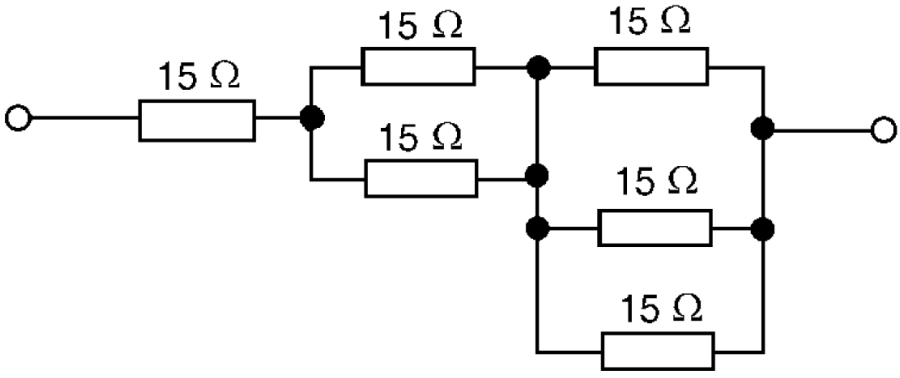
(iv)



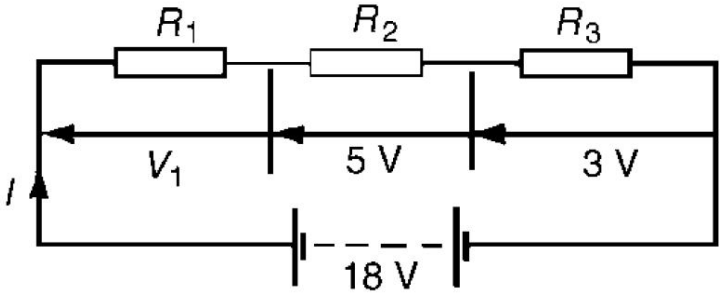
(v)



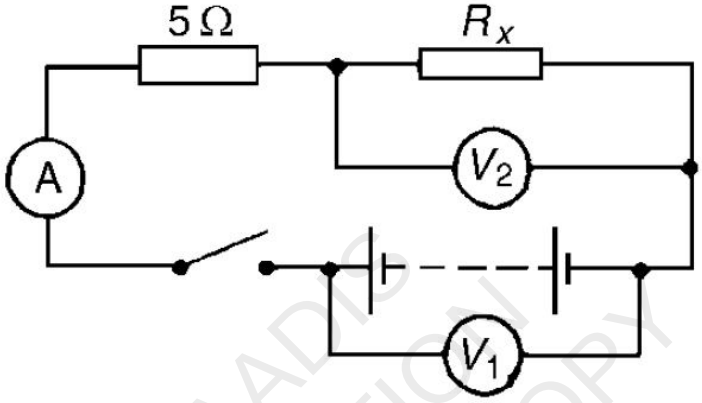
(v)



29. For the circuit shown in below Figure, determine the value of V1. If the total circuit resistance is 36Ω, determine the supply current and the value of resistors R1, R2 and R3.

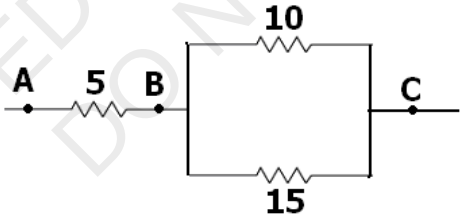


30. When the switch in the circuit in below Figure is closed the reading on voltmeter 1 is 30 V and that on voltmeter 2 is 10 V. Determine the reading on the ammeter and the value of resistor R_x.



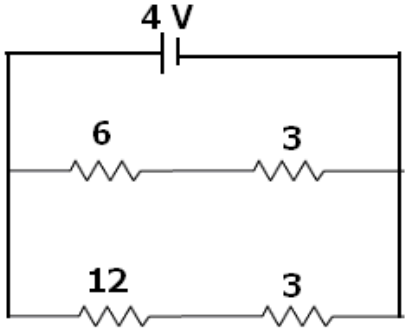
31. A potential difference of 6V is applied to two resistors of 3Ω and 6Ω connected in parallel. Calculate: (a) the combined resistance (b) the current flowing in the main circuit (c) the current flowing in the 3Ω resistor.

32. Three resistors are connected as shown in the diagram:



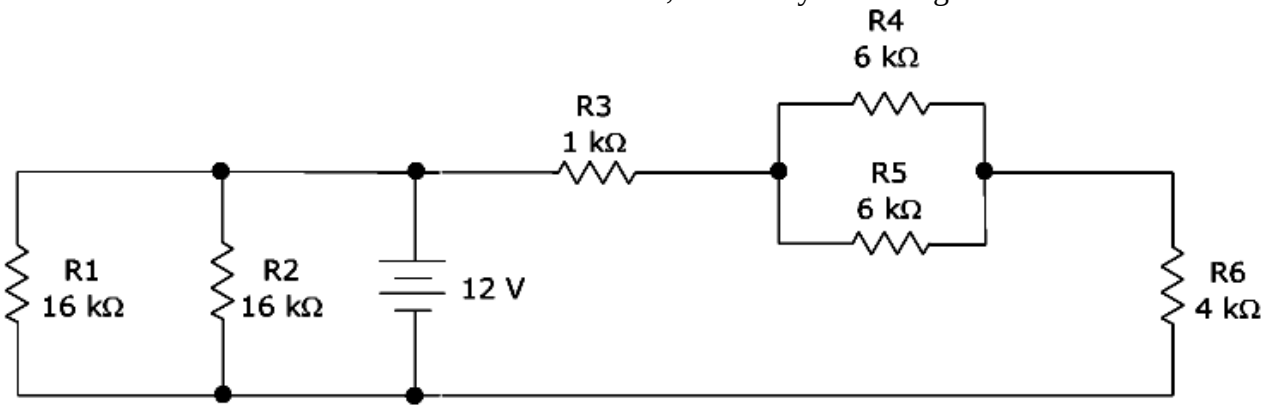
Through the resistor 5Ω ohm, a current of 1A is flowing.
(i) What is the current through the other two resistors?
(ii) What is the p.d. across AB and across AC?
(iii) What is the total resistance?

33. For the circuit shown in the diagram below:

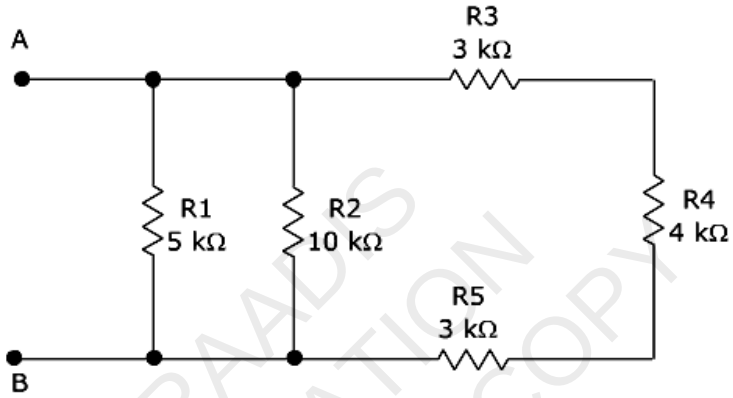


What is the value of: (i) current through 6Ω resistor? (ii) p.d. across 12Ω resistor?

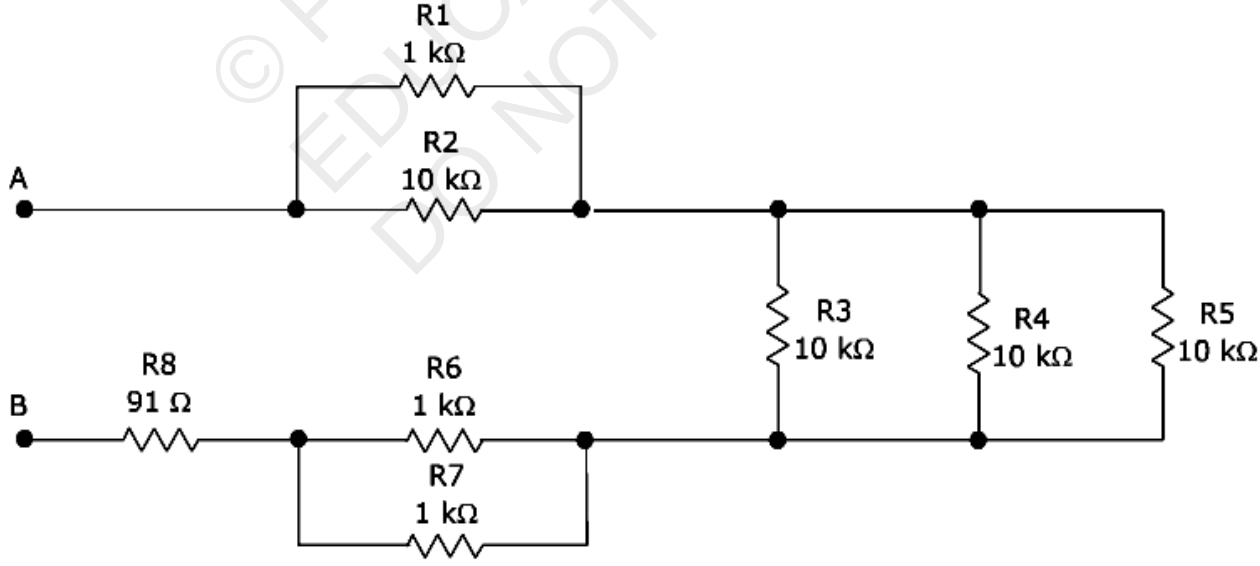
34. Calculate the total resistance of the circuit below, as seen by the voltage source.



35. What is the resistance between A and B in the given figure given below?



36. What is the resistance between A and B in the given figure given below?



37. Resistances of 4Ω and 12Ω are connected in parallel across a 9 V battery. Determine (a) the equivalent circuit resistance, (b) the supply current, and (c) the current in each resistor.

38. Three identical lamps A, B and C are connected in series across a 150 V supply. State (a) the voltage across each lamp, and (b) the effect of lamp C failing.

39. The p.d's measured across three resistors connected in series are 5 V, 7 V and 10 V, and the supply current is 2 A. Determine (a) the supply voltage, (b) the total circuit resistance and (c) the values of the three resistors.

40. If three identical lamps are connected in parallel and the combined resistance is 150Ω, find the resistance of one lamp.

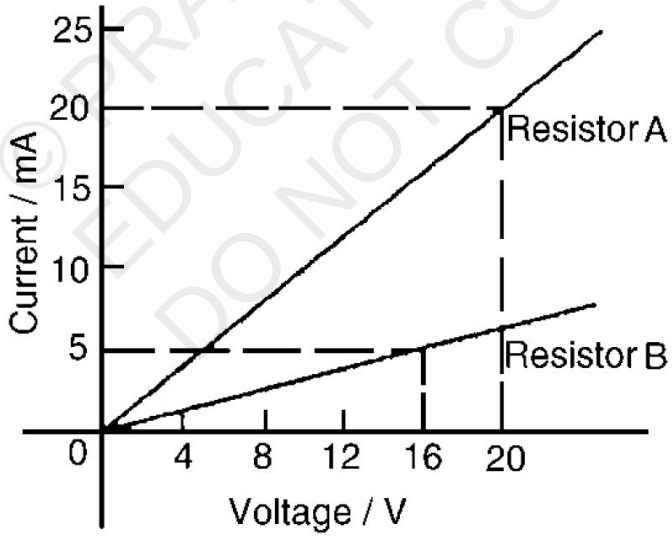
1. **What determines the rate at which energy is delivered by a current?**
   Ans. The rate of consumption of electric energy in an electric appliance is called electric power. Hence, the rate at which energy is delivered by a current is the power of the appliance.

2. **An electric motor takes 5 A from a 220 V line. Determine the power of the motor and the energy consumed in 2 h.**
   Ans. Power (P) is given by the expression, P = VI
   Where,
   Voltage, V = 220 V
   Current, I = 5 A
   P = 220 x 5 = 1100 W
   Energy consumed by the motor = Pt
   Where,
   Time, $t = 2\ h = 2 \times 60 \times 60 = 7200$ s
   $\therefore P = 1100 \times 7200 = 7.92 \times 10^6$ J
   Therefore, power of the motor = 1100 W
   Energy consumed by the motor = 7.92×10^6 J

NUMERICAL PROBLEMS

1. What will be the current drawn by an electric bulb of 40 W when it is connected to a source of 220V?
2. A bulb is rated as 250V;0.4A. Find its power and resistance.
3. An electric bulb is connected to a 220V power supply line. If the bulb draw a current of 0.5A, calculate the power of the bulb.
4. An electric bulb is connected to a 250 V generator. The current is 0.50 A. What is the power of the bulb?

5. What current will be taken by a 920W appliance if the supply voltage is 230V?
6. When an electric lamp is connected to 12V battery, it draws a current 0.5A. Find the power of the lamp.
7. Calculate the power used in 2Ω resistor in each (i) a 6V battery in series with 1Ω and 2Ω resistor (ii) a 4V battery in parallel with 12Ω and 2Ω resistor.
8. A 100 W electric light bulb is connected to a 250 V supply. Determine (a) the current flowing in the bulb, and (b) the resistance of the bulb.
9. Calculate the power dissipated when a current of 4 mA flows through a resistance of 5 kΩ
10. An electric kettle has a resistance of 30Ω. What current will flow when it is connected to a 240 V supply? Find also the power rating of the kettle.
11. A current of 5 A flows in the winding of an electric motor, the resistance of the winding being 100Ω. Determine (a) the p.d. across the winding, and (b) the power dissipated by the coil.
12. The current/voltage relationship for two resistors A and B is as shown in below Figure. Determine the value of the resistance of each resistor and also find the power dissipated through each resistor.



13. The hot resistance of a 240 V filament lamp is 960Ω. Find the current taken by the lamp and its power rating.
14. A 12 V battery is connected across a load having a resistance of 40Ω. Determine the current flowing in the load, the power consumed and the energy dissipated in 2 minutes.
15. A source of e.m.f. of 15 V supplies a current of 2 A for six minutes. How much energy is provided in this time?

16. Electrical equipment in an office takes a current of 13 A from a 240 V supply. Estimate the cost per week of electricity if the equipment is used for 30 hours each week and 1 kWh of energy costs 7p

17. An electric heater consumes 3.6 MJ when connected to a 250 V supply for 40 minutes. Find the power rating of the heater and the current taken from the supply.

18. Determine the power dissipated by the element of an electric fire of resistance 20Ω when a current of 10 A flows through it. If the fire is on for 6 hours determine the energy used and the cost if 1 unit of electricity costs 7p.

19. A business uses two 3 kW fires for an average of 20 hours each per week, and six 150 W lights for 30 hours each per week. If the cost of electricity is 7p per unit, determine the weekly cost of electricity to the business.

20. If 5 A, 10 A and 13 A fuses are available, state which is most appropriate for the following appliances which are both connected to a 240 V supply (a) Electric toaster having a power rating of 1 kW (b) Electric fire having a power rating of 3 kW

21. The hot resistance of a 250 V filament lamp is 625 . Determine the current taken by the lamp and its power rating.

22. Determine the resistance of a coil connected to a 150 V supply when a current of (a) 75 mA (b) 300 μA flows through it. Determine the power dissipated through it.

23. Determine the resistance of an electric fire which takes a current of 12A from a 240 V supply. Find also the power rating of the fire and the energy used in 20 h.

24. Determine the power dissipated when a current of 10 mA flows through an appliance having a resistance of 8 k.

25. 85.5 J of energy are converted into heat in nine seconds. What power is dissipated?

26. A current of 4 A flows through a conductor and 10 W is dissipated. What p.d. exists across the ends of the conductor?

27. Find the power dissipated when:

(a) a current of 5 mA flows through a resistance of 20 k

(b) a voltage of 400 V is applied across a 120 k resistor

(c) a voltage applied to a resistor is 10 kV and the current flow is 4 mA.

28. A battery of e.m.f. 15 V supplies a current of 2 A for 5 min. How much energy is supplied in this time?

29. In a household during a particular week three 2 kW fires are used on average 25 h each and eight 100 W light bulbs are used on average 35 h each. Determine the cost of electricity for the week if 1 unit of electricity costs 7p.

30. Calculate the power dissipated by the element of an electric fire of resistance 30 when a current of 10 A flows in it. If the fire is on for 30 hours in a week determine the energy used. Determine also the weekly cost of energy if electricity costs 7.2p per unit.

31. A television set having a power rating of 120 W and electric lawnmower of power rating 1 kW are both connected to a 240 V supply. If 3 A, 5 A and 10 A fuses are available state which is the most appropriate for each appliance.

32. For a heater rated at 4kW and 220V, calculate: (a) the current (b) the resistance of the heater (c) the energy consumed in 2 hours and (d) the cost if 1kWh is priced at Rs. 4.60

33. A radio set of 60W runs for 50hrs. How much electrical energy consumed?

34. A current of 4A flows through a 12V can headlight bulb for 10min. How much energy transfer occurs during this time?

35. Calculate the energy transferred by a 5A current flowing through a resistor of 2Ω for 30min.

36. A bulb is rated at 200V-100W. What is its resistance? 5 such bulbs burn for 4 hrs. What is the electrical energy consumed? Calculate the cost if the rate is Rs. 4.60 per unit.

37. A refrigerator having a power rating of 350W operates for 10hours a day. Calculate the cost of electrical energy to operate it for a month of 30days. The rate of electrical energy is Rs. 3.40 per KWh.

38. What will be the current drawn by an electric bulb of 40W when it is converted to a source of 220V?

39. An electric bulb is rated 220V and 100W. When it is operated on 110V, find the power consumed.

40. An electric heater draws a current of 10A from a 220V supply. What is the cost of using the heater for 5 hrs everyday for 30days if the cost of 1 unit is Rs. 5.20?

41. In house two 60W electric bulbs are lighted for 4 hrs and three 100W bulbs for 5 hrs everyday. Calculate the electrical energy consumed in 30days.

42. An electric motor takes 5A current from a 220V supply line. Calculate the power of the motor and electrical energy consumed by it in 2 hrs.

43. An electric iron consumes energy at a rate of 840 W when heating is at the maximum rate and 360 W when the heating is at the minimum. The voltage is 220 V. What are the current and the resistance in each case?

44. An electric refrigerator rated 400 W operates 8 hour/day. What is the cost of the energy to operate it for 30 days at Rs 3.00 per kW h?

45. An electric motor takes 5 A from a 220 V line. Determine the power of the motor and the energy consumed in 2 h.

46. Two lamps, one rated 100 W at 220 V, and the other 60 W at 220 V, are connected in parallel to electric mains supply. What current is drawn from the line if the supply voltage is 220 V?

47. Which uses more energy, a 250 W TV set in 1 hr, or a 1200 W toaster in 10 minutes?

48. Two bulbs A and B are rated 100W – 120V and 10W – 120V respectively. They are connected across a 120V source in series. Which will consume more energy.

49. Two bulbs A and B are rated 100W – 120V and 10W – 120V respectively. They are connected across a 120V source in series. Find the current in each bulb. Which will consume more energy.

50. An electric kettle is rated at 230V, 1000W. What is the resistance of its element? What maximum current can pass through its element?

51. An electric geyser has the rating 1000W, 220V marked on it. What should be the minimum rating in whole number of a fuse wire that may be required for safe use with this geyser?

52. The mains power supply of a house is through a 5A fuse. How many 100W, 220V bulbs can be used in this house at the correct voltage?

53. An electrician puts a fuse of rating 5A in that part of domestic electrical circuit in which an electrical heater of rating 1.5kW, 220V is operating. What is likely to happen in this case and why? What change if any needs to be made/

54. Two bulbs of ratings 40W-220V and 60W-220V are connected in series and this combination is connected with a supply of 220V. Calculate the current from the supply line.

55. Two bulbs have the ratings 40W-200V and 20W-110V. What is the ratio of their resistances?

56. I can spend Rs. 9 per month (30days) on electric light. If power is 30paise per kWh and I use 5 identical bulbs for 5 hours a day, what should be the power of each bulb?

57. Compute the number of electrons passing through per minute through an electric bulb of 60W, 220V.

58. If electrical energy costs Rs.3 per unit, what is the total cost of leaving 4 light bulb rated at 100W each switched on for 8 hours.

59. An electric heater of resistance 8Ω draws 15 A from the service mains 2 hours. Calculate the rate at which heat is developed in the heater.

60. 100 J of heat are produced each second in a 4 Ω resistance. Find the potential difference across the resistor.

61. Compute the heat generated while transferring 96000 coulomb of charge in one hour through a potential difference of 50 V.

62. An electric iron of resistance 20 Ω takes a current of 5 A. Calculate the heat developed in 30 s.

63. A p.d. of 250V is applied across a resistance of 500 Ω in an electric iron. Calculate (i) current (ii) heat energy produced in joules in 10s.

64. Calculate the heat produced when 96000C of charge is transferred in 1 hour through a p.d. of 50V.

65. A resistance of 40 Ω and one of 60 Ω are arranged in series across 220V supply7. Find the heat in joules produced by this combination of resistances in half a minute?

66. When a current of 4A passes through a certain resistor for 10min, 2.88 x 10^4 J of heat are produced. Calculate (a) power of the resistor (b) the voltage across the resistor.

67. A heating coil has a resistance of 200 Ω. At what rate will heat be produced in it when a current of 2.5 Ω flows through it.

68. An electric heater of resistance 8 Ω takes a current of 15A from the mains supply line. Calculate the rate at which heat is developed in the heater.

69. A resistance of 25 Ω is connected to a 12V battery. Calculate the heat energy in joule generated per minute.

70. How much heat will an instrument of 12W produce in one minute if its is connected to a battery of 12V?

ASSIGNMENT QUESTIONS
ELECTRICITY

VERY SHORT ANSWER TYPE QUESTIONS (1 MARK)

1. Define Electrostatic potential.

2. What is potential difference?

3. Define 1 volt.

4. Name the SI unit of potential difference.

5. Is potential difference a scalar or a vector quantity?

6. Name the instrument used to measure potential difference.

7. Does a voltmeter have a high or low resistance?

8. Write the other name of Joule/Coulomb?

9. How much work is done when one coulomb of charge moves against a potential difference of 1 volt?

10. Name the SI unit of electric current.

11. Is electric current a scalar or vector quantity?

12. Name the instrument used to measure electric current.

13. Does an ammeter have low or a high resistance?

14. Write the other name of variable resistance.

15. How do we connect an ammeter in a circuit?

16. Write the unit of electrical resistance.

17. State the factors on which the resistance of a conductor depends.

18. What is the term for the reciprocal of resistance?

19. What is the nature of the graph between I and V for a metallic conductor?

20. Does Ohm's law hold for a copper wire?

21. Does Ohm’s law hold for a liquid electrolyte?

22. Does Ohm’s law hold for a vacuum tube?

23. Following are the I vs V graphs for a (a) metallic conductor (b) liquid electrolyte and (c) vacuum tube. In which case dows the Ohm/s law hold good?

24. What do you mean by resistance?

25. Dows the resistance of a metal change when we raise the temperature of the metal?

26. Name the substance having the largest and smallest electrical resistance amongst the following: Silver, copper, nichrome, rubber, acidulated water.

27. Name the best conductor of electricity.

28. Name an excellent insulator.

29. Is wood a good conductor of electricity.

30. When are two resistances said to be in series?

31. When are two resistances said to be in parallel?

32. How many different resistance-combinations are possible with two equal resistors, taking both of them together?

33. The unit of resistance is ohm. What is the unit of conductance?

34. Define electric power.

35. What is the SI unit of electrical power?

36. Name the quantity which is the product of potential difference and current.

37. Express power P in terms of I and R.

38. Write various formulae for electric power.

39. What does 220V, 100W written on an electrical appliance mean? What do you mean by power rating?

40. Which of the following electrical appliances usually has the (a) highest (b) least, power ratings? Tube light, Electric fan, Electric heater, Immersion heater.

41. Which of the following electrical appliances usually draws the (a) highest and (b) least, current when operated at 220V? Tube light, Electrical fan, Electrical heater, Immersion heater.

42. What do you mean by electrical energy being consumed by an electrical appliance?

43. Write the SI unit of electrical energy.

44. Write the commercial unit of energy.

45. Define one Kilowatt-hour.

46. Convert 1 Kwh to MJ.

47. What is the ratio of SI units to C.G.S. unit of electrical energy?

48. What are the factors on which electrical energy consumed by an eletrcial appliance depends?

49. What do you mean by one unit of electrical energy?

50. How many joules are in one watt-hour?

51. List some important effects of electric current.

52. Name the quantity whose role in mechanics is similar to the role of resistance in electrical circuits.

53. Write a formula for calculating the amount of heat (H) produced in a resistor of resistance R when current I is passed through it for time t.

54. List of factors on which heating effect of electric current depends.

55. How is the heat produced by a current passing through a constant resistance related to the strength of the current?

56. Name the Scientist who gave the formula for finding the heating produced in a conductor.

57. Is joule's heating a reversible effect?

58. How much can be Joule's heating produced in an ideal insulator?

59. Name three electrical appliances that involve the heating effect of electric current.

60. Is electric fuse an application of heating effect of current?

61. Out of 5A fuse and 15A fuse which will you prefer to use for the lighting circuit?

62. In domestic wiring do we connect various distribution circuits in series?

63. Usually three insulated wires of different colours are used in electrical appliance. Name the three colours.

64. What do you mean by short circuiting?

65. What do you mean by a fuse?

66. Should a fuse wire be connected in series or in parallel in the main circuit?

67. Can we use a copper wire as a fuse wire?

68. Name the instrument used to measure current in a circuit.

69. Name the instrument used to detect weak currents in a circuit.

70. Is ammeter connected in series or parallel in a circuit?

71. What does the potential of a charged body determine?

72. Is potential difference between two points in an electric field a vector quantity?

73. What does a voltmeter measure?

74. Is a voltmeter same as a voltameter?

75. What are the conditions under which charges cane move in a conductor?

76. How will you maintain a potential difference between the ends of a conductor?

77. Name the quantity that determines the rate of flow of charge through a conductor.

78. What determines the direction of flow of charge: Potential of a body or Quantity of charge on a body?

79. When the two ends of copper wire are connected to the two terminals of a battery some potential difference is created between its ends. Do electrons start flowing from high potential end to low potential end?

80. In the question above, does current flow from the low potential end to the high potential end of the wire?

81. What is the difference between a cell and a battery?

82. What do you mean by an electric circuit?

83. What do you mean by a circuit diagram?

84. How does a cell maintain some constant potential difference across its terminals?

85. Do all substances have the same resistivity?

86. Give two substances having very low resistivities.

87. Give two substances having moderate resistivities.

88. Give two substances having high resistivities.

89. What is the name given to substances which are used for making heating soils?

90. Why do electricians wear rubber shoes or sandals or rubber hand gloves while working?

91. What are the two ways in which the resistances are combined?

92. What is meant by an equivalent resistance?

93. Name the SI unit of electrical energy.

94. Name the commercial unit of energy.

95. Name the property of a conductor by virtue of which it opposes the flow of electric current through it.

96. Is resistance a scalar or a vector quantity?

97. Name the property of a conductor by virtue of which it allows the flow of charge through it.

98. Is conductance a scalar or a vector quantity?

99. Which has a greater resistance: thin wire or thick wire of the same material?

100. What happens to the resistance of a copper wire when its temperature is raised?

101. What happens to the conductance of a copper wire when its temperature is raised?

102. What happens to the resistance of the following substances when its temperature is raised?

(i) Aluminium (ii) Silicon (iii) Silver (iv) Germanium

103. Define 1KWh.

104. Name the quantity that represents the electric work done per unit time.

105. Express electric power (P) in terms of current (I) and resistance (R).

106. Express electric power (P) in terms of current (I) and potential difference (V).

107. Name the quantity that represents the product of power rating and time.

108. What voltage for the electrical appliance is kept in India?

109. What voltage is kept for the domestic electric supply in USA?

110. An electric heater is rated as 220V, 1KW. What does it mean?

111. Name the term used to represent the values of the voltage and wattage(power) of an electrical appliance taken together.

112. Which bulb has the lesser resistance: 100W or 60W?

113. Which electrical appliance generally draws more current for the same applied voltage: Electric iron or Electric bulb?

114. What do you understand by the heating effect of electric current?

115. A number of bulbs are to be connected to a single source. Will they provide more illumination if connected in parallel, or in series?

116. What do you mean by the overloading of the electrical circuit?

117. All electrical circuits consist of three wires: a live wire, a neutral wire and an earth wire, what colours are assigned to these wires?

118. What do you understand by short circuiting?

119. What will happen when the live and the neutral wires ina circuit touch each other due to defective wiring?

120. What is the use of electrical fuse in an electrical circuit?

121. Name the effect of current on which a fuse works.

122. Where do we connect a fuse in an electrical circuit?

123. By what symbol is earthing represented?

124. Why do we do the earthing of an electrical appliance?

125. What does an electric meter in the house hold electric circuit measure?

126. Are distribution circuits connected to each other in series or in parallel?

127. Are switches connected in the neutral wire?

128. What do you mean by earthing of an electrical appliance?

SHORT ANSWER TYPE – I QUESTIONS (2 MARKS)

1. Why can't we use a copper wire as a fuse wire?

2. What is usual colour code followed for connecting live, neutral and earth wires? Why is it so important?

3. Define Electric current. How can you measure the magnitude of electric current?

4. What is the direction of conventional current?

5. State the law, which relates the current in a conductor to the potential difference across its ends.

6. Differentiate between conductors and insulators.

7. What is the law of combination of resistances in series?

8. What is the law of combination of resistances in parallel?

9. What do you mean when we say that the electric appliance is earthed? What is its importance?

10. What causes electric resistance? What is the physical significance of resistance?

11. What are the limitations of Ohm's law? What are ohmic conductors?

12. A graph is plotted between V(potential difference) and I(current) for a metal at two different temperatures T_1 and T_2. What is the relationship between T_1 and T_2?

13. How many different resistances are possible with two equal resistors?

14. Draw a diagram used for a fuse to be used in an electrical appliance. Write the symbol for an electrical fuse in circuit diagram.

15. One billion electrons pass from a point A towards another point B in 10^{-4} s. What is the current in amperes? What is its direction?

SHORT ANSWER TYPE – II QUESTIONS (3 MARKS)

1. Given five equal resistances; each of the value 5 ohms. (a) What is the maximum resistance that can be obtained from them? (b) What is the minimum resistance that can be obtained from them?

2. How many different resistance combinations are possible with three equal resistors taken all of them together?

3. Write symbols for the following:

(a) Cell (b) Battery (c) Fixed resistance (d) Wires crossing without contact

(e) Variable resistance (f) A wire joint

4. Write symbols for the following: (a) Ammeter (b) Voltmeter (c) Galvanometer (d) Open switch (e) Closed switch

5. Draw a labelled circuit diagram for the verification of Ohm's law. Plot a I-V graph for an ohmic conductor.

6. With the help of a diagram, derive the formula for the equivalent resistance of three resistances connected in series.

7. With the help of a diagram, derive the formula for the equivalent resistance of three resistances connected in parallel.

8. Write the SI and commercial unit of energy. Derive the relation between them.

9. What do you mean by resistivity of a conductor? What are the factors on which the resistance of a conductor depends?

10. State Joule's law of heating. Derive the formula for the Heat produced due to current flowing in a conductor.

LONG ANSWER TYPE QUESTIONS (5 MARKS)

1. Discuss series and parallel combinations of resistors with their salient features.

2. What is electric energy and electric power? Derive their expressions and define their units.

3. What is Ohm's law? How is it represented graphically? Derive an expression for the resultant resistance of series combinations of resistors.

4. State Ohm's law? Derive an expression for the equivalent resistance of parallel combinations of resistors.

5. What is Joule's heating effect? How can it be demonstrated experimentally? List its four applications in daily life.

6. What is electrical resistivity of a material? What is its unit? Describe an experimentally to study the factors on which the resistance of conducting wire depends?

All Numerical based on series and parallel combinations of resistances come under this section

ASSIGNMENT QUESTIONS FOR PRACTICE
MAGNETIC EFFECTS OF ELECTRIC CURRENT

VERY SHORT ANSWER TYPE QUESTIONS (1 MARK)

1. Name the scientist who discovered the magnetic effect of current.

2. Does a current flowing in a wire always give rise to a magnetic field around it?

3. State any two properties of magnetic field lines.

4. Why does a compass needle get deflected when brought near a bar magnet?

5. Name the effect of current on which an electromagnetic works.

6. What name is given to the combination of a solenoid and a soft iron core?

7. Can steel be used for making electromagnets?

8. Name the scientist who discovered that a current carrying conductor when placed in a magnetic field experiences a mechanical force.

9. When is the maximum force exerted on a current carrying conductor while it is kept in a magnetic field?

10. Does a current carrying conductor experience some force when kept parallel to the magnetic field?

11. Which rule is employed to find the direction of force on a current carrying conductor when kept in a magnetic field? State the rule and explain it by a diagram.

12. Name the transformation of energy involved in the electric motor.

13. What is the function of commutator rings in the electric motor?

14. What is the function of carbon brushes in the electric motor?

15. Name one application of electromagnetic induction.

16. What is the other name of electric generator?

17. Name the transformation of energy in an electric generator.

18. What is a turbine used for?

19. Name the different types of electric power plants for generating electricity on large scale.

20. Name the fuel used in a thermal power plant.

21. Name the fuel used in an atomic power plant.

22. What do you understand by magnetic field?

23. What do you mean by electromagnetism?

24. What is meant by magnetic effect of current?

25. Can you observe the magnetic field?

26. What do you mean by a magnetic line of force?

27. Is a magnetic line of force always a straight line?

28. What do you conclude from Oersted's experiment?

29. Can you magnetic line of force ever intersect each other?

30. What kind of magnetic field is produced by a straight current carrying conductor?

31. What kind of magnetic field is produced by a current carrying circular field?

32. What do you mean by a solenoid?

33. State the clock rule for a current carrying solenoid.

34. How does a current carrying solenoid behave?

35. What is the nature of magnetic field produced by a current carrying solenoid?

36. What is the magnitude and direction of the magnetic field inside a current carrying solenoid?

37. Name the effect of current upon which electromagnets are based?

38. Are electromagnets permanent magnets?

39. Name the material used for making the core of an electromagnet.

40. Can we use steel, instead of soft iron, for making the core of an electromagnet? Why?

41. Can we change the polarity of a permanent magnet?

42. Can we change the polarity of an electromagnet?

43. Is the strength of an electromagnet always constant?

44. Name the rule applied to know direction of the force acting on a current carrying conductor when placed in a magnetic field.

45. Name the transformations of energies takes place in an electric motor.

46. Name the two kinds of motors.

47. Which kind of motor is used in a fan?

48. Which kind of motor used in a battery-operated toy?

49. Name the experiment which formed the basis of an electric motor.

50. What forms the commutator of an electric motor?

51. State quantitatively, the effect of inserting an iron core into a current carrying solenoid.

52. Name the types of electromagnets commonly used.

53. What happens to the strength of an electromagnet when the magnitude of current decreases?

54. What will you prefer, soft iron or steel to make an electromagnet?

55. Can we produce electricity from magnetism?

56. Name the phenomenon in which an electric current could be produced in a circuit by changing the magnetic field.

57. What do you mean by electromagnetic induction?

58. What is e.m.i. or E.M.I.?

59. What do you understand by electric motor effect?

60. What is the cause of electromagnetic induction?

61. Does the AC generator have any slip ring?

62. Does the DC generator have two slip rings?

63. What is the frequency DC?

64. Name the fuel used by nuclear power station.

65. Name the device which converts electrical energy into kinetic energy.

66. What is the SI unit of induced emf?

67. State two factors on which the strength of induced current depends.

68. What is the SI unit of induced current?

69. What is electromagnetic induction?

70. What do you mean by a solenoid?

SHORT ANSWER TYPE – I QUESTIONS (2 MARKS)

1. Draw a labeled diagram of an electric motor.

2. State and explain Fleming's right hand rule for the direction of induced current.

3. What do you mean by DC? Show by a diagram.

4. What do you mean by AC? Show by a diagram.

5. Draw a labeled to show the magnetic field pattern due to a straight wire carrying current.

6. With the help of a diagram, indicate the direction of magnetic field produced by a current carrying conductor. Name the rule employed and state it.

7. With the help of a diagram, indicate the direction of magnetic field produced due to a circular wire carrying current.

8. Indicate the direction of the magnetic field produced in a solenoid when some current is passed through it.

9. How can we increase the strength of magnetic field produced by a circular coil carrying conductor?

10. What are the factors on which the strength of magnetic field produced by a current carrying solenoid depends?

11. List the factors affecting the strength of an electromagnet.

12. Show that magnetic lines of force due to a bar magnet.

SHORT ANSWER TYPE – II QUESTIONS (3 MARKS)

1. Briefly describe Oersted's experiment to demonstrate the magnetic effect of current.

2. What are magnetic field lines? Give their important properties.

3. How will your experimentally show the magnetic field produced by a straight current carrying conductor? Also state Maxwell's right hand grip rule.

4. What kind of magnetic field is produced by a current carrying circular coil? Show it with the help of a labeled diagram.

5. What do you mean by a solenoid? With the help of a labeled, show the magnetic field due to a current carrying solenoid.

6. What do you mean by an electromagnet? With the help of diagram show the two types of electromagnets. Give two uses of electromagnets.

7. How does AC differ from DC? What are the advantages and disadvantages of AC over DC?

8. What is the basic difference between an AC generator and a DC generator?

9. Briefly explain the phenomenon of earthing using examples.

10. Describe the salient features of tree system of wiring.

LONG ANSWER TYPE QUESTIONS (5 MARKS)

1. Why does a magnetic compass needle pointing North and South in the absence of a nearby magnet get deflected when a bar magnet or a current carrying loop is brought near it. Describe some salient features of magnetic lines if field concept.

2. With the help of a labeled circuit diagram, illustrate the pattern of field lines of the magnetic field around a current carrying straight long conducting wire. How is the right hand thumb rule useful to find the direction of magnetic field associated with a current carrying conductor?

3. Explain with the help of a labeled diagram the distribution of magnetic field due to a current through a circular loop. Why is it that if a current carrying coil has 'n' turn, the field produced at any point is a times as large as that produced by a single turn?

4. (a) State the factors on which the strength of an electromagnet depends. (b)How does an electromagnet differ from a bar magnet or permanent magnet?

5. How will you experimentally show that a current carrying conductor experiences a force when kept in a magnetic field?

6. What is the principle of an electric motor? Briefly explain the construction and working of an electric motor using a labeled diagram. State the factors on which the strength of a motor depends.

7. What is meant by electromagnetic inductions? How will you demonstrate this phenomenon with the help of an experiment? State the factors on which the strength the induced current depends.

8. Briefly describe the principle, construction and working of an AC generator or dynamo.

9. (a) How are electrical installations carried out in a house? (b) What is the main function of electric fuse? Briefly explain it.

10. What safety measures do you employ in the use of electricity?