QUESTION BANK

EXERCISE - 1

Q.1 What are the factors on which resistance depends ?

Q.2 Which combination have maximum value of equivalent resistance ?

Q.3 If one coulomb charge flows in a circuit for one second then what will be the value of current in the circuit.

Q.4 Define one ohm resistance.

Q.5 Write Ohm's law. Explain it by giving diagram of an electric circuit.

Q.6 Write the expression for the equivalent resistance R of three resistors R_1, R_2 and R_3 joined in (i) parallel, (ii) series.

Q.7 Define the term current and state its SI unit.

Q.8 Define the term resistance.

Q.9 How does the resistance of a metallic wire depend on its temperature ? Explain the reason to your answer.

Q.10 A lamp draws a current of 0.5A when it is connected to a 230 V supply. What is the resistance of the filament of the lamp ?

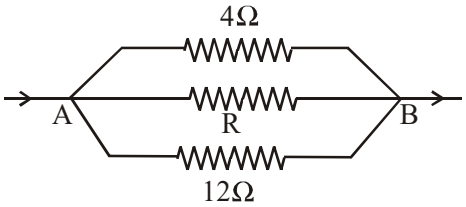
Q.11 A circuit consists of a 1Ω wire in series with a parallel arrangement of 6Ω and 3Ω with a P.D. of 12V is connected across the whole circuit. Draw the circuit diagram and calculate the main current in the circuit.

Q.12 A 4Ω resistance wire is bent in the middle by 180° and both the halves are twisted with each other. Find its new resistance.

Q.13 Two resistors of 15Ω and 30Ω are connected in parallel. What resistance should be connected in series of the combination to get an equivalent resistance of 20Ω ?

Q.14 There are three bulbs marked 40W-110V, 40W-110V and 80W-110V. How should they be mutually joined so that on being connected to a supply of 220V they glow with normal brightness ?

Q.15 The equivalent resistance between the point A and B in the adjoining circuit is 2 Ω. Determine the value of R.



Q.16 Join three resistances of 2 ohm each such that the total resistance of the circuit is 3 ohm.

Q.17 Name a device that helps to maintain a potential difference across a conductor. What is meant by saying that the potential difference between two points is 1 V ?

Q.18 A 60W auto lamp allows 5 amps to pass through it. Find
(i) The p.d. across its terminal.
(ii) the resistance of the filament of the lamp
(iii) energy consumed in 2 hours

Q.19 An electric bulb is connected to a 220V generator. The current is 0.50V. What is the power of the bulb ?

Q.20 What uses more energy, a 250 W TV set in 1 hr. or a 1200W toaster in 10 minutes ?

Q.21 A copper wire has diameter 0.5 mm and resistivity of 1.6×10^{-8} Ωm. What will be the length of this wire to make its resistance 10Ω? How much does the resistance change if the diameter is doubled ?

Q.22 Name two devices which use the heating effect of current.

Q.23 Why is the filament of an electric bulb not made of carbon?

Q.24 Obtain an expression for the (i) electrical energy (ii) electrical power, spent in flow of current through a conductor.

Q.25 How is a fuse put in an electric circuit ? State the purpose of using a fuse in a circuit.

Q.26 60W-220V is written on a bulb. What does it mean ?

Q.27 What is the electric power ? Derive a formula for it ?

Q.28 How does an electric circuit is kept safe with fuse ?

Q.29 A 60-W bulb is switched on in a room. A 240-W heater is also turned on in the same room. The voltage of the mains is 120V and the resistance of the connecting leads is 6Ω. What is the change in the voltage at the bulb when the heater is turned on.

Q.30 Calculate the cost of electric bill of a house for the month of March. The following appliances were used in the house for the duration shown respectively. The cost of electrical energy is 50 paise per unit.
6 – 100 W lamps 4h each ; 5 – 60 W lamps 5h each ; 1 – 750 W iron 2 h ; 1 – 2 kW geyser 2h

Q.31 An electric iron consumes energy at a rate of 840W when heating is at the maximum rate and 360W when the heating is at the minimum. The voltage is 220V. What are the current and the resistance in each case

Q.32 A hot plate of an electric oven connected to a 220V line has two resistance coils A and B, each of 24Ω resistance, which may be used separately, in series, or in parallel. What are the currents in the three cases ?

Q.33 Three resistors of 20 ohm, 30 ohms and 50 ohm resistance are joined in series. Across this combination a source of 150 volts is connected then determine the current in each resistor and potential difference across their ends.

Q.34 A heating coil is immersed in a calorimeter of heat capacity 50 $J°C^{-1}$ containing 1.0 kg of a liquid of specific heat capacity 450 J kg^{-1} $°C^{-1}$. The temperature of liquid rises by 10°C when 2.0 A current is passed for 10 minutes. Find (i) the resistance of the coil (ii) the potential difference across the coil. State the assumption used in your calculations.

Q.35 A geyser is rated 1500W, 250V. This geyser is connected to 250V mains. Calculate : (i) the current drawn, (ii) the energy consumed in 50 hours. (iii) the cost of energy consumed at Rs. 220 per kWh.

Q.36 When a potential difference of 2 volt is applied across the ends of a wire of 5m length, a current of 1A is found to flow through it. Calculate : (i) the resistance per unit length of the wire (ii) the resistance of 2m length of this wire (iii) the resistance across the ends of the wire it is doubled on itself.

Q.37 Name the instrument used to measure electric current.

Q.38 Write the unit of electrical resistance.

Q.39 Name the best conductor of electricity.

Q.40 In domestic wiring do we connect various distribution circuits in series ?

Q.41 What do you mean by a 'fuse' ?

Q.42 What do you mean by a circuit diagram ?

Q.43 Name the term used to represent the values of the voltage and wattage (power) of an electrical appliance taken together.

Q.44 Draw a schematic diagram of a current consisting of a battery of three cells of 2V each, a 5Ω resistor, an 8Ω resistor and a 12Ω resistor and a plug key, all connected in series.

EXERCISE - 2

FILL IN THE BLANKS

Q.1 Kilowatt is the unit of electrical ..... but kilowatt-hour is the unit of electrical .....

Q.2 Energy spent in kilowatt-hour = $\frac{\text{volt} \times ..... \times .....}{1000}$

Q.3 A fuse is a short piece of wire of high ..... and low .....

Q.4 Fuse wire has a ..... melting point and is made of an alloy of .....and ..... If the current in a circuit rises too high, the fuse wire .....

Q.5 A fuse is connected in ..... to the ..... wire.

Q.6 The colour coding of wires is ..... for earth ..... for live and ..... for neutral.

Q.7 Electric energy is produced by the ..... of charges.

Q.8 The rate of flow of electric charge is called .....

Q.9 Current is measured with an instrument called a (an).....

Q.10 Energy converted per unit charge is measured with an instrument called a (n).....

Q.11 If there is no current, a voltmeter connected across a resistor will register.

Q.12 Between any two points in a circuit, the sum of all ..... is the same through any pathway.
Q.13 Combined resistance is the sum of separate resistances provided that the various conductors are connected in .....
Q.14 In a parallel circuit, each circuit element has the same .....
Q.15 Copper is a preferred material for making wire because of its low.....

TRUE-FALSE STATEMENTS –

Q.16 The filament resistance of glowing bulb is greater, to its resistance when it is not glowing ?
Q.17 The quantity of charge flowing past a point multiplied by time is a current.
Q.18 The resistivity of all pure metals increases with the rise in temperature.
Q.19 Ohm's law is a relation between the power used in a circuit to the current and the potential difference.
Q.20 Direction of current is taken opposite to the direction of flow of electrons.
Q.21 A cell generates a potential difference across its terminals
Q.22 The equivalent resistance of several resistors in series is equal to the sum of their individual resistances.
Q.23 The commercial unit of electrical energy is kilowatt hour (kWh).
Q.24 In parallel combination, the reciprocal of equivalent resistance is the sum of the reciprocal of individual resistance.

EXERCISE - 3

Q.1 A cylindrical rod is reformed to twice its length with no change in its volume. If the resistance of the rod was R, the new resistance will be –
(A) R (B) 2R (C) 4R (D) 8R

Q.2 What is the current through a 5.0 ohm resistor if the voltage across it is 10V –
(A) zero (B) 0.50 A (C) 2.0 A (D) 5.0 A

Q.3 A wire carries a steady current of 1.0 A over a period of 20s. What total charge passes through the wire in this time interval –
(A) 200 C (B) 20 C (C) 2.0 C (D) 0.20 C

Q.4 The length of a wire is doubled and the radius is doubled. By what factor does the resistance change–
(A) 4 times as large (B) twice as large (C) unchanged (D) half as large

Q.5 A 1500 watt heater is connected to a 120 volt source for 2.0 h. How much heat energy is produced –
(A) 1.1×10^7 J (B) 1.8×10^5 J (C) 9.0×10^4 J (D) 3.0×10^3 J

Q.6 A circular conductor is made of a uniform wire of resistance 2×10^{-3} ohm/metre and the diameter of this circular conductor is 2 metres. Then the resistance measured between the ends of the diameter is (in ohms) –
(A) $\pi \times 10^{-3}$ (B) $2\pi \times 10^{-3}$ (C) $4\pi \times 10^{-3}$ (D) 4×10^{-3}

Q.7 A 24V potential difference is applied across a parallel combination of four 6 ohm resistor. The current in each resistor is –
(A) 1 A (B) 4 A (C) 16 A (D) 36 A

Q.8 Two electric lamps each of 100 watts 220V are connected in series to a supply of 220 volts. The power consumed would be –
(A) 100 watts (B) 200 watts (C) 25 watts (D) 50 watts

Q.9 Three resistances of 2, 3 and 5Ω are connected in parallel to a 10V battery of negligible internal resistance. The potential difference across the 3Ω resistance will be –
(A) 2V (B) 3V (C) 5V (D) 10V

Q.10 Two unequal resistances are connected in parallel. Which of the following statement is true –
(A) current in same in both (B) current is larger in higher resistance
(C) voltage-drop is same across both (D) voltage-drop is lower in lower resistance

Q.11 You are given n identical wires, each of resistance R. When these are connected in parallel, the equivalent resistance is X. When these will be connected in series, then the equivalent resistance will be –
(A) X/n^2 (B) n^2X (C) X/n (D) nX

Q.12 A piece of wire of resistance R is cut into five equal parts. These parts are then connected in parallel. If the equivalent resistance of this combination is R', then the ratio R/R' is –
(A) 1/25 (B) 1/5 (C) 5 (D) 25

Q.13 An electric bulb is rated 220V and 100W. When it is operated on 110V, the power consumed will be –
(A) 100W (B) 75W (C) 50W (D) 25W

Q.14 2 ampere current is flowing through a conductor from a 10 volt emf source then resistance of conductor is
(A) 20 Ω (B) 5 Ω (C) 12 Ω (D) 8 Ω

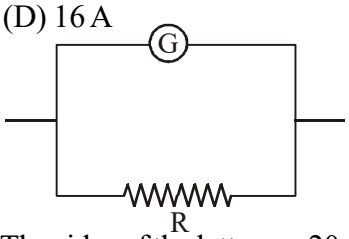
Q.15 Charge on an electron is 1.6×10^{-19} coulomb. Number of electrons passing through the wire per second on flowing of 1 ampere current through the wire will be–
(A) 0.625×10^{-19} (B) 1.6×10^{-19} (C) 1.6×10^{-19} (D) 0.625×10^{19}

Q.16 20 coulomb charge is flowing in 0.5 second from a point in an electric circuit then value of electric current in amperes will be –
(A) 10 (B) 40 (C) 0.005 (D) 0.05

Q.17 Three resistors of 4.0 Ω, 6.0 Ω and 10.0 Ω are connected in series. What is their equivalent resistance–
(A) 20 Ω (B) 7.3 Ω (C) 6.0 Ω (D) 4.0 Ω

Q.18 The following three appliances are connected to a 120 volt house circuit : (A) computer and printer, 3.50W, (B) coffee pot, 650W, and (C) microwave, 900W. If all were operated at the same time what total current would they draw –
(A) 0.063 (B) 2.9 A (C) 5.4 A (D) 16 A

Q.19 In the following simple circuit, G is a galvanometer and R is a resistor. What is this arrangement likely to be used to measure in a circuit –
(A) voltage (B) current
(C) resistance (D) power



Q.20 A letter 'A' is constructed of a uniform wire of resistance 1 ohm per cm. The sides of the letter are 20 cm. and the cross piece in the middle is 10 cm. long. The resistance between the ends of the legs will be–
(A) 32.4 ohm (B) 28.7 ohm (C) 26.7 ohm (D) 24.7 ohm

Q.21 If it takes 8 minutes to boil a quantity of water electrically, how long will it take to boil the same quantity of water using the same heating coil but with the current doubled –
(A) 32 minutes (B) 16 minutes (C) 4 minutes (D) 2 minutes

Q.22 A wire of resistance R is cut into ten equal parts which are then joined in parallel. The new resistance is –
(A) 0.01 R (B) 0.1 R (C) 10 R (D) 100 R

Q.23 When a current I flows through a resistance R for time t, the electrical energy spent is given by –
(A) IRt (B) I^2Rt (C) IR^2t (D) I^2R/t

Q.24 Kilowatt-hour is the unit of –
(A) potential difference (B) electric power (C) electrical energy (D) charge

Q.25 When main switch of the house circuit is put off, it disconnects the –
(A) live wire (B) neutral wire (C) earth wire (D) live and neutral wires

Q.26 According to international convention of colour coding in a wire –
(A) live is red, neutral is black and earth is green (B) live is red, neutral is green and earth is black
(C) live is brown, neutral is blue and earth is black (D) live is red, neutral is black and earth is green

Q.27 An electric bulb is filled with –
(A) hydrogen (B) oxygen and hydrogen (C) ammonia (D) nitrogen and argon

Q.28 The unit of resistivity is –
(A) ohm (B) ohm/m (C) ohm × m (D) mho

Q.29 For which of the following substances, resistance decreases with temperature –
(A) copper (B) mercury (C) carbon (D) platinum

Q.30 If a wire is stretched to make its length three times, its resistance will become –
(A) three times (B) one-third (C) nine times (D) one-ninth

Q.31 The resistivity of a wire depends on –
(A) length (B) area of cross-section (C) material (D) all the above three factors

Q.32 Which of the following statements does not represent Ohm's law –
(A) current/potential difference = constant (B) potential difference/current = constant
(C) potential difference =current × resistance (D) current = resistance × potential difference

Q.33 When current is passed through an electric bulb, its filament glows, but the wire leading current to the bulb does not glow because –
(A) less current flows in the leading wire as compared to that in the filament
(B) the leading wire has more resistance than the filament
(C) the leading wire has less resistance than the filament
(D) filament has coating of fluorescent material over it

Q.34 From a power station, the power is transmitted at a very high voltage because –
(A) it is generated only at high voltage
(B) it is cheaper to produce electricity at high voltage
(C) electricity at high voltage is less dangerous
(D) there is less loss of energy in transmission at high voltage

Q.35 When a fuse is rated 8A, it means –
(A) it will not work if current is less than 8A (B) it has a resistance of 8 ohm
(C) it will work only if current is 8A (D) it will burn if current exceeds 8A

Q.36 Fuse wire is made of –
(A) platinum (B) copper (C) aluminium (D) alloy in tin and lead

Q.37 Which is not a device based on the heating effect of electricity –
(A) heater (B) toaster (C) refrigerator (D) press

Q.38 Which of the following terms does not represent electrical power in a circuit?
(A) I^2R (B) IR^2 (C) VI (D) V^2/R

Q.39 Two conducting wires of the same material and of equal lengths and equal diameters are first connected in series and then parallel in a circuit across the same potential difference. The ratio of heat produced in series and parallel combinations would be–
(A) 1 : 2 (B) 2 : 1 (C) 1 : 4 (D) 4 : 1

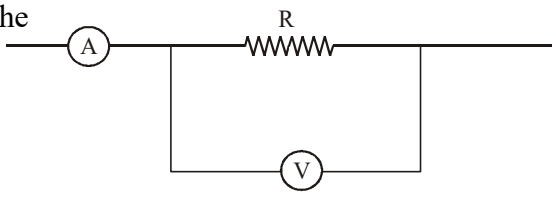
Q.40 Two electric bulbs whose resistance are in the ratio of 1:2 are connected in parallel to a constant voltage source. The ratio of the power dissipated in them will be –
(A) 1 : 4 (B) 1 : 2 (C) 1 : 1 (D) 2 : 1

Q.41 Cost of electricity for home use in Rs. 1.50 per unit. This unit is –
(A) 1 ampere (B) 1 volt (C) 1 joule (D) 1 kilowatt hour

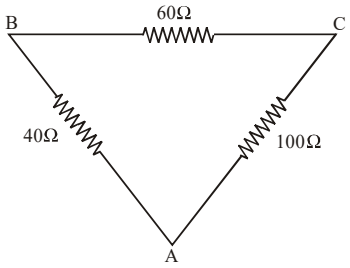
Q.42 A wire of resistance 12 ohms is bent in the form of a circular ring. The effective resistance between the two points on any diameter of the circle is –
(A) 24 ohm (B) 12 ohm (C) 6 ohm (D) 3 ohm

Q.43 Ampere-second stands for the unit of –
(A) power (B) charge (C) emf (D) energy

Q.44 In the circuits shown below the ammeter A reads 4 amp. and the voltmeter V reads 20 volts. The value of the resistance R is –
(A) slightly more than 5 ohms
(B) slightly less than 5 ohms
(C) Exactly 5 ohms
(D) None of the above



Q.45 Three resistors are connected to form the sides of a triangle ABC as shown.The resistance of side AB is 40 ohms, of side BC 60 ohms and of side CA 100 ohms. The effective resistance between the point A and B in ohms is –



(A) 50 (B) 64
(C) 32 (D) 100

Q.46 Which one of the following is bad conductor of electricity–
(A) acid (B) coal (C) distilled water (D) human body

Q.47 On which one of the following the emf of a cell does not depend –
(A) The nature of the metal of electrodes (B) The size of the plates
(C) Nature of the electrolyte (D) The nature of electrodes

Q.48 If one micro-amp. current is flowing in a wire, the number of electrons which pass from one end of the wire to the other end in one second is –
(A) 6.25×10^{12} (B) 6.25×10^{15} (C) 6.25×10^{18} (D) 6.25×10^{19}

Q.49 The primary cell which is used in daily life is –
(A) Leclanche cell (B) Dry cell (C) Daniel cell (D) Simple voltaic cell

Q.50 Which one of the following primary cells has emf 1.08 volts and which remains fairly constant –
(A) Daniel cell (B) Simple voltaic cell (C) Leclanche cell (D) Dry cell

Q.51 Coulomb is equal to –
(A) 1 amp × 1 sec (B) 1 amp/1 sec (C) 1 joule × 1 amp (D) 1 joule/1 sec

Q.52 Which one of the following is non-ohmic resistance –
(A) mercury (B) copper (C) nichrome (D) bulb of a torch

Q.53 Which one of the following is the definition of specific resistance –
(A) It is resistance of a wire of length 1 cm. and volume 2c.c.
(B) It is resistance of a wire of volume 1 c.c.and mass 1gm.
(C) It is the resistance of a wire 1 cm length and 1 sq. cm cross section
(D) It is the resistance of a wire of volume 1 c.c. and potential difference 1 volt.

Q.54 The unit for specific resistance is –
(A) ohm × second (B) ohm × cm (C) ohm (D) ohm/cm

Q.55 Two wires of resistance R_1 and R_2 are joined in parallel. The equivalent resistance of the combination is –
(A) $R_1R_2/R_1 + R_2$ (B) $R_1 + R_2$ (C) $R_1 \times R_2$ (D) R_1/R_2

Q.56 If the temperature of a conductor is increased, its resistance will –
(A) not increase (B) increase (C) decrease (D) change according to the whether

Q.57 The unit for electric conductivity is –
(A) ohm per cm (B) ohm × cm (C) ohm per second (D) mho

Q.58 Primary cell are connected in parallel to –
(A) Increase voltage (B) decrease capacity
(C) decrease internal resistance (D) make electric current constant

Q.59 In a closed circuit drawing current from cell, the emf of a cell is always –
(A) Less than potential difference (B) More than potential difference
(C) Half of the potential difference (D) Double of the potential difference

Q.60 The filament of an electric bulb is of tungsten because –
(A) Its resistance is negligible (B) It is cheaper
(C) Its melting point is high (D) Filament is easily made

EXERCISE - 4

MATCH THE COLUMN–

Each question contains statements given in two columns which have to be matched. Statements (A, B, C, D) in **column I** have to be matched with statements (p, q, r, s) in **column II**.

Q.1 Column II gives nature of temperature coefficient of resistance for materials written in column I.

Column I	**Column II**
(A) Metal	(p) Zero
(B) Insulator	(q) positive
(C) Semi-conductor	(r) negative
(D) Alloys	(s) unknown

Q.2 A voltmeter and an ammeter are connected in series to an ideal cell of emf E. The voltmeter reading is V and the ammeter reading is I.

Column I	**Column II**
(A) Voltmeter resistance	(p) E – V
(B) Potential difference across ammeter	(q) V/I
(C) Voltmeter resistance plus ammeter resistance	(r) E/I
(D)Potential difference across voltmeter	(s) V

Q.3 Column II gives name of material use for device given in column I

Column I	**Column II**
(A) Resistance of resistance box	(p) Tungsten
(B) Fuse wire	(q) maganin
(C) Bulb	(r) tin-leadalloy
(D) Potentiometer wire	(s) nichrome

Q.4 Column II gives order of resistivity for materials in column I

Column I	**Column II**
(A) Semi-conductor	(p) 3×10^3 Ω-m
(B) Conductor	(q) 10^{-8} Ω-m
(C) Insulator	(r) 10^{16} Ω-m
(D) Super conductor	(s) 1 Ω-m

ASSERTION & REASON TYPE

Each question contains STATEMENT-1 (Assertion) and STATEMENT-2 (Reason). Each question has 5 choices (A), (B), (C), (D) and (E) out of which ONLY ONE is correct.

(A) Statement-1 is True, Statement-2 is True; Statement-2 is a correct explanation for Statement-1.
(B) Statement-1 is True, Statement-2 is True; Statement-2 is NOT a correct explanation for Statement-1.
(C) Statement -1 is True, Statement-2 is False. (D) Statement -1 is False, Statement-2 is True.
(E) Statement -1 is False, Statement-2 is False.

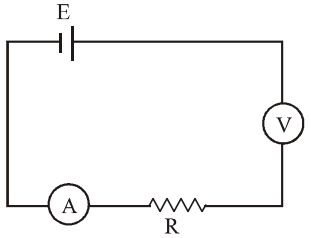
Q.5 **Statement 1 :** When a battery is short-circuited, the terminal voltage is zero.
Statement 2 : In the situation of a short-circuit, the current is zero

Q.6 **Statement 1 :** The equation V = Ri does not apply to those conducting devices which do not obey Ohm's law.
Statement 2 : V = Ri is a statement of Ohm's law.

Q.7 **Statement 1 :** The emf of a battery equal the potential difference between its terminals when the terminals are not corrected externally.
Statement 2 : Terminals potential difference can be greater than emf of cell.

Q.8 **Statement 1 :** A resistor of resistance R is connected to an ideal battery. If the value of R is decreased, the power dissipated in the circuit will decrease.
Statement 2 : The power dissipated in the circuit is directly proportional to the resistance of the circuit.

Q.9 **Statement 1 :** All electric devices shown in the circuit are ideal. The reading of each of ammeter (A) and voltmeter (V) is zero.



Statement 2 : An ideal voltmeter draws almost no current due to very large resistance, and hence (V) and (A) will read zero.

EXERCISE - 5

PREVIOUS YEARS COMPETITION PROBLEMS

Q.1 How much energy in kilowatt hour is consumed in operating ten 50 watt bulbs for 10 hours per day in a month (30 days)
(A) 1500 (B) 5000 (C) 15 (D)150

Q.2 Three resistances 4Ω each of are connected in the form of an equilateral triangle. The effective resistance between two corners is–
(A) 8Ω (B) 12Ω (C) 3/8 Ω (D) 8/3 Ω

Q.3 A current of 2A passing through conductor produces 80J of heat in 10 seconds. The resistance of the conductor is –
(A) 0.5Ω (B) 2Ω (C) 4Ω (D) 20Ω

Q.4 Two wires of same metal have the same length but their cross-sections area in the ratio 3 : 1. They are joined in series. The resistance of the thicker wire is 10Ω. The total resistance of the combination will be –
(A) 40 Ω (B) 40/3 Ω (C) 5/2 Ω (D) 100 Ω

Q.5 A heating coil is labelled 100W, 220V. The coil is cut in half and the two pieces are joined in parallel to the same source. The energy now liberated per second is –
(A) 200 J (B) 400 J (C) 25 J (D) 50 J

Q.6 What is immaterial for an electric fuse wire –
(A) Its specific resistance (B) Its radius (C) Its length (D) Current flowing through it

Q.7 A certain piece of silver of given mass is to be made like a wire. Which of the following combination of length (L) and the area of cross-sectional (A) will lead to the smallest resistance –
(A) L and A (B) 2L and A/2 (C) L/2 and 2A
(D) Any of the above, because volume of silver remains same

Q.8 If R_1 and R_2 are respectively the filament resistance of a 200 watt bulb and 100 watt bulb designed to operate on the same voltage, then –
(A) R_1 is two times R_2 (B) R_2 is two times R_1 (C) R_2 is four times R_1 (D) R_1 is four times R_2

Q.9 A (100W, 200V) bulb is connected to a 160V power supply. The power consumption would be –
(A) 64 W (B) 80 W (C) 100 W (D) 125 W

Q.10 A galvanometer having a resistance of 8 ohm is shunted by a wire of resistance 2 ohm. If the total current is 1 amp, the part of it passing through the shunt will be –
(A) 0.25 amp (B) 0.8 amp (C) 0.2 amp (D) 0.5 amp

Q.11 Three equal resistors connected in series across a source of e.m.f. together dissipate 10 watt. If the same resistors are connected in parallel across the same e.m.f., then the power dissipated will be –
(A) 10 watt (B) 30 watt (C) 10/3 watt (D) 90 watt

Q.12 A 5°C rise in temperature is observed in a conductor by passing a current. When the current is doubled the rise in temperature will be approximately –
(A) 16°C (B) 10°C (C) 20°C (D) 12°C

Q.13 A certain wire has a resistance R. The resistance of another wire identical with the first except having twice its diameter is

(A) 2R (B) 0.25 R (C) 4R (D) 0.5 R

Q.14 The resistance of a wire is R. If the length of the wire is doubled by stretching, then the new resistance will be –

(A) 2R (B) 4R (C) R (D) R/4

Q.15 For driving a current of 2A for 6 minutes in a circuit, 1000 J of work is to be done. The e.m.f. of the source in the circuit is

(A) 1.38 V (B) 1.68 V (C) 2.04 V (D) 3.10 V

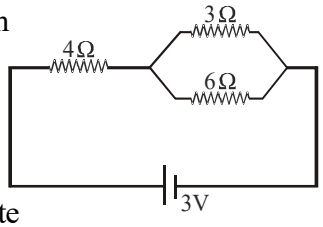
Q.16 The resistance of a wire is 10 Ω. Its length is increased by 10% by stretching. The new resistance will now be

(A) 12 Ω (B) 1.2 Ω (C) 13 Ω (D) 11 Ω

Q.17 What length of the wire of specific resistance 48×10^{-8} Ω-m is needed to make a resistance of 4.2 Ω (diameter of wire = 0.4 mm)

(A) 4.1 m (B) 3.1 m (C) 2.1 m (D) 1.1 m

Q.18 The potential drop across the 3Ω resistor is –



(A) 1V (B) 1.5V

(C) 2V (D) 3V

Q.19 The resistance of an ideal voltmeter is –

(A) zero (B) very low (C) very large (D) Infinite

Q.20 Two electric bulbs, one of 200 volt 40 watt and the other 200 volt 100W are connected in a house wiring circuit

(A) They have equal currents through them

(B) The resistance of the filaments in both the bulbs is same

(C) The resistance of the filament in 40 watt bulb is more than the resistance in 100 watt bulb

(D) The resistance of the filament in 100 watt bulb is more than the resistance in 40 watt bulb

Q.21 A 25W, 220V bulb and a 100W, 220V bulb are connected in parallel across a 440V line –

(A) Only 100 watt bulb will fuse (B) Only 25 watt bulb will fuse

(C) Both bulbs will fuse (D) None of the bulbs will fuse

Q.22 The potential difference in open circuit for a cell is 2.2 volts. When a 4 ohm resistor is connected between its two electrodes the potential difference becomes 2 volts. The internal resistance of the cell will be –

(A) 1 ohm (B) 0.2 ohm (C) 2.5 ohm (D) 0.4 ohm

Q.23 Masses of 3 wires of same metal are in the ratio 1 : 2 : 3 and their lengths are in the ratio 3 : 2 : 1. The electrical resistances are in ratio –

(A) 1 : 4 : 9 (B) 9 : 4 : 1 (C) 1 : 2 : 3 (D) 27 : 6 : 1

Q.24 The resistance of a conductor increases with –

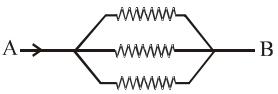
(A) Increase in length (B) Increase in temperature

(C) Decrease in cross-sectional area (D) All of these

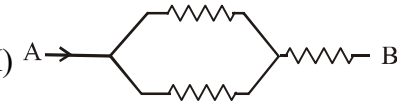
Q.25 When a 12Ω resistor is connected in series with a moving coil galvanometer then its deflection reduces from 50 divisions to 10 divisions. The resistance of the galvanometer is –

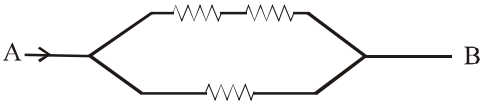
(A) 24 ohm (B) 36 ohm (C) 3 ohm (D) 60 ohm

Q.26 Arrange the order of power dissipated in the given circuits, if the same current is passing through all three resistance and each resistor is r –

(I) 

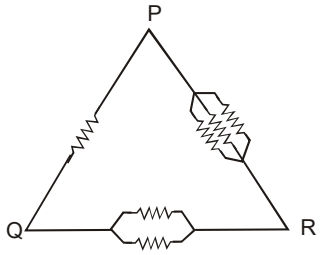
(II) 

(III) 

(IV) 

(A) $P_2 > P_3 > P_4 > P_1$ (B) $P_3 > P_2 > P_4 > P_1$ (C) $P_4 > P_3 > P_3 > P_1$ (D) $P_1 > P_2 > P_3 > P_4$

Q.27 Six equal resistances are connected between points P, Q and R as shown in the figure. Then the net resistance will be maximum between –



(A) P and Q
(B) Q and R
(C) P and R
(D) any two points

Q.28 We have two wires A and B of same mass and same material. The diameter of the wire A is half of that B. If the resistance of wire A is 24 ohm then the resistance of wire B will be –
(A) 12 ohm (B) 3.0 ohm (C) 1.5 ohm (D) None of the above

Q.29 The material of fuse wire should have –
(A) A high specific resistance and high melting point (B) A low specific resistance and low melting point
(C) A high specific resistance and low melting point (D) A low specific resistance and high melting point

Q.30 The electric resistance of a certain wire of iron is R. If its length and radius are both doubled, then –
(A) The resistance will be doubled and the specific resistance will be halved
(B) The resistance will be halved and the specific resistance will remain unchanged
(C) The resistance will be halved and the specific resistance will be doubled
(D) The resistance and the specific resistance, will both remain unchanged

Q.31 A battery is charged at a potential of 15V for 8 hours when the current flowing is 10A. The battery on discharge supplies a current of 5A for 15 hours. The mean terminal voltage during discharge is 14V. The "Watt-hour" efficiency of the battery is –
(A) 82.5% (B) 80% (C) 90% (D) 87.5%

Q.32 Three electric bulbs of rating 60W each are joined in series and then connected to electric mains. The power consumed by these three bulbs will be –
(A) 180 W (B) 60 W (C) 20 W (D) 20/3 W

Q.33 When a wire of uniform cross-section a, length ℓ and resistance R is bent into a complete circle, resistance between any two of diametrically opposite points will be –
(A) R/4 (B) R/8 (C) 4R (D) R/2

Q.34 Which of the following has a negative temperature coefficient –
(A) C (B) Fe (C) Mn (D) Ag

Q.35 The reciprocal of resistance is –
(A) Conductance (B) Resistivity (C) Voltage (D) None of the above

Q.36 A solenoid is at potential difference 60V and current flows through it is 15 ampere, then the resistance of coil will be –
(A) 4 Ω (B) 8 Ω (C) 0.25 Ω (D) 2 Ω

Q.37 The resistance of a discharge tube is –
(A) Ohmic (B) Non-ohmic (C) Both (A) and (B) (D) Zero

Q.38 In a hydrogen discharge tube it is observed that through a given cross-section 3.13×10^{15} electrons are moving from right to left and 3.12×10^{15} protons are moving from left to right. What is the electric current in the discharge tube and what is its direction –
(A) 1mA towards right (B) 1mA towards left (C) 2mA towards left (D) 2mA towards right

Q.39 If a wire of resistance 20 ohm is covered with ice and a voltage of 210 V is applied across the wire, then the rate of melting of ice is –
(A) 0.85 g/s (B) 1.92 g/s (C) 6.56 g/s (D) All of these

Q.40 Masses of three wires of copper are in the ratio of 1 : 3 : 5 and their lengths are in the ratio of 5 : 3 : 1. The ratio of their electrical resistances are –
(A) 1 : 3 : 5 (B) 5 : 3 : 1 (C) 1 : 15 : 125 (D) 125 : 15 : 1

EXERCISE - 6

PREVIOUS YEARS BOARD QUESTIONS

Q.1 What is the S.I. unit electric potential?

Q.2 What is meant by the statement " Potential difference between points A and B in an electric field is l volt"?

Q.3 There are two electric bulbs (i) Marked 60 W, 220 V and (ii)Marked 100 W, 220 V. Which one of two has a higher resistance?

Q.4 Out of the two, a toaster of l k W and an electric heater of 2kw, which has a greater resistance?

Q.5 Name a meatal which offers higher resistance to the passage of electricity other than copper.

Q.6 Which has a higher resistance: a 50 W lamp bulb or a 25 W lamp bulb and how many times?

Q.7 Why is tungsten metal selected for making filaments of incandescent lamp bulbs?

Q.8 A wire of resistance 10Ωis bent in the form of a close circle. What is the effective resistance between the two points at the ends of any diameter of the circle?

Q.9 Define the term resistivity of a material.

Q.10 Calculate the resistance of a conductor, if the current flowing through it is 0.2 A when the applied potential difference is 0.8 volt.

Q.11 A cylinder of a material is 10 cm long and has a cross-section of $2cm^2$. If its resistance along the length be 20Ω, what will its resistivity value be in number and units?

Q.12 Which has greater resistance l kW electric heater or a 100 W filament bulb both marked for 220 V?

Q.13 A heater joined in parallel with a 60 W bulb is replaced by a 100 W bulb, Will the rate of heat produced by the heater be more or less or remains the same ?

Q.14 Nichrome and copper wires of same length and same radius are connected in series. Current l is passed through then. Why does the nichrome wire get heated first?

Q.15 Two bulbs are marked 60 W, 220 V and 100 W, 220V. These are connected in parallel to 220 V main. Which one of the two will glow brighter ?

Q.16 A toaster produces more heat than a light bulb when connected in a parallel to the 220 V mains. Which of the has greater resistance?

Q.17 Two bulbs whose resistances are in the ratio 1 : 2, are connected in parallel to a source of constant voltage. What will be the ratio of power dissipation of these?

Q.18 Two wires, one of manganin and the other of copper have equal lengths and resistances. Which one of these wires will be thicker?

Q.19 Two wire A and B are of the same metal, have the same are of cross-section and have their lengths in the ratio of 2: 1 What will be the ratio of currents flowing through them respectively when the same potential difference is applied across length of each of them?

Q.20 (a) What is the function of an earth wire in electrical instruments? Why is it necessary to earth to earth the metallic electric appliances?
(b) Explain what is short circuiting and overloading in an electric and overloading in an electric supply.
(c) What is the usual capacity of the fuse wire in the line to feed:
(i) light and fans ? (ii) appliances of 2 kW or more power ?

Q.21 How much current will an electric heater rated l kW draw when connected to 250 V?

Q.22 A student obtains resistances 3,4,12 and 16 Ω using only two metallic resistance wires are either separately or joined together. What is the value of resistance of each of these wires?

Q.23 An electric iron has a rating of 750 W, 220 V. Calculate (i) Current passing through it, and (ii) Its resistance, when in use.

Q.24 An electric iron has a rating of 1000 W, 220 V. When in use calculate for it.
(i) Current passing through it. (ii) Its resistance.

Q.25 An immersion heater has a rating of 2 kW, 220 V. While in use calculate
(i) Current passing through it, and (ii) Its resistance.

Q.26 An electric lamp is marked 100 W, 220 V. It is used for 5 hours daily. Calculate
(i) Its resistance while glowing (ii) Energy consumed in kWh per day.

Q.27 An electric lamp is marked 40 W, 220 V. It is used for 4 hours daily calculate
(i) Its resistance while glowing (ii) Energy consumed in k Wh per day.

Q.28 An electric lamp is marked 25 W, 220 V. It is used for 10 hours daily. Calculate
(i) Its resistance while glowing (ii) Energy consumed in k Wh per day.

Q.29 A bulb is rated at 5.0 volt, 100 mA. Calculate its (i) Power and (ii) Resistance.

Q.30 What is the difference between direct and alternating current ? Write one important advantage of using alternating current.

Q.31 A torch bulb is rated 3V and 600 mA. Calculate its resistance if it is lighted for 4 hours.

Q.32 An electric bulb draw a current of 0.2 A When the voltage is 220 Volts. Calculate the amount of electric charge flowing through it in one hour.

Q.33 In a factory, an electric bulb of 500 W is used for 2 hours and electric bulb of 500 W is used for 2 hours and electric motor of 0.5 horse power is used for 5 hours everyday. Calculate the cost of using the bulb and motor for 30 days if cost of electrical energy is three rupees per unit.

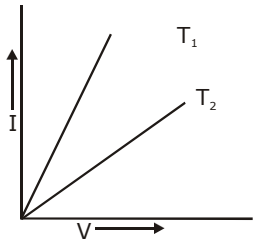
Q.34 State Ohm's law. Express it mathematically. Define S.I. unit of resistance.

Q.35 Define the term resistivity of a conductor. Give its S.I. unit.

Q.36 Define resistivity and state its S.I. unit. Does it vary value with temperature?

Q.37 A heater coil is rated 100 W, 200 V. It is cut into two identical parts. Both parts are connected together in parallel to the same source of 200V.Calculate the energy liberated per second in the new combination.

Q.38 V-I graph for a metallic wire at two different temperatures T_1 and T_2 as shown in the following figure. Which of the two temperatures is higher and why?



Q.39 Calculate the energy supplied by 100 kW of power in one hour

Q.40 A 60 W electric lamp gives off energy in the form of light at a rate of 7.5 joule per second. What percentage of energy does the lamp transform into light energy?

ANSWER KEY

EXERCISE - 1

(10) 460Ω **(11)** 4A **(12)** 1Ω **(13)** 10Ω **(15)** 6 Ω
(18) (i) 12 volts (ii) Resistance = 2.4Ω (iii) 0.12 kWh **(19)** P = VI = 220V × 0.50 A = 110 J/s = 110 W
(20) 250W TV set in 1 hours. **(21)** 122.7 m, 1/4 minutes.
(30) Rs. 145.70 **(31)** (a) 57.60 Ω. (b) 134.15 Ω. **(32)** 9.2 A, 4.6 A, 18.3 A
(33) 1.5 ampere, 30 volts, 45 volts, **(34)** (i) 2.08 Ω (ii) 4.16 V
(35) (i) 6A (ii) 75 kWh (iii) Rs. 165 **(36)** (i) 0.4Ω/m (ii) 0.8 Ω (iii) 1
(37) Ammeter **(38)** Ohm. **(39)** Silver **(40)** No **(43)** Rating. **(44)** 6V

EXERCISE - 2

(1) power, energy **(2)** ampere, hour **(3)** resistance, melting point
(4) low, lead, tin, melts **(5)** series, live **(6)** Green, red, black
(7) separation **(8)** current **(9)** ammeter
(10) voltmeter **(11)** zero **(12)** potential difference

(13) series **(14)** potential difference **(15)** resistivity
(16) True **(17)** False **(18)** True
(19) False **(20)** True **(21)** True
(22) True **(23)** True **(24)** True

EXERCISE - 3											
Q	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
A	C	C	B	D	A	C	B	D	D	C	B
Q	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**
A	D	D	B	D	B	A	D	B	C	D	A
Q	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**32**	**33**
A	B	C	D	D	D	C	C	C	C	D	C
Q	**34**	**35**	**36**	**37**	**38**	**39**	**40**	**41**	**42**	**43**	**44**
A	D	D	D	C	B	C	D	D	D	D	A
Q	**45**	**46**	**47**	**48**	**49**	**50**	**51**	**52**	**53**	**54**	**55**
A	C	C	B	A	B	A	A	D	C	B	A
Q	**56**	**57**	**58**	**59**	**60**						
A	B	D	C	B	C						

EXERCISE - 4

(1) (A) $\rightarrow$ q , (B) $\rightarrow$ t (C) $\rightarrow$ r (D) $\rightarrow$ p **(2)** (A) $\rightarrow$ q , (B) $\rightarrow$ p, (C) $\rightarrow$ r, (D) $\rightarrow$ s
(3) (A) $\rightarrow$ q, (B) $\rightarrow$ r (C) $\rightarrow$ p (D) $\rightarrow$ q **(4)** (A) $\rightarrow$ q, (B) $\rightarrow$ r (C) $\rightarrow$ p (D) $\rightarrow$ q
(5) (C) **(6)** (E) **(7)** (B) **(8)** (E) **(9)** (E)

EXERCISE - 5											
Q	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
A	D	D	B	A	B	C	C	B	A	B	D
Q	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**
A	C	B	B	A	A	D	A	C	C	C	D
Q	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**32**	**33**
A	D	D	C	A	A	C	C	B	D	C	A
Q	**34**	**35**	**36**	**37**	**38**	**39**	**40**				
A	A	A	A	B	A	C	D				

EXERCISE - 6

(1) Volt or joule/coulomb. **(2)** 1 joule. **(3)** 60 W **(11)** 4Ω-cm **(21)** 4 ampere
(22) 12Ω and 4Ω since in parallel they give 3Ω and in series they give 16Ω **(23)** (i) 3.4 A. (ii) 64.5Ω
(24) (i) 4.5A. (ii) 48.4Ω **(25)** (i) 9 A. (ii) 24.2ΩR **(26)** (i) 484Ω (ii) 0.5 k Wh.
(27) (i) 1210Ω (ii) 0.16 k Wh. **(28)** (i) 1936Ω (ii) 0.25 kWh. **(29)** (i) 0.5 W (ii)5Ω
(31) 5Ω **(32)** 720 C **(33)** Rs. 258. **(37)** 400Ω joule
(39) 3600×10^5 joule **(40)** 12.5%