# **EXERCISE - 1**

- A Very Short Answer Type Questions
- Q.1 Define current.
- **Q.2** Define one ampere.
- **Q.3** What is the conventional direction of electric current? How does it differ from the direction of flow of electrons?
- Q.4 What do you mean by elementary charge?
- Q.5 State Ohm's law.
- **Q.6** Define one ohm.
- Q.7 Write the formula for resistance of a wire of length *l* and cross-section A.
- Q.8 Define specific resistance.
- Q.9 Write the unit of specific resistance.
- Q.10 Distinguish between resistance and resistivity.
- Q.11 Two resistors  $R_1$  and  $R_2$  are joined in series. Find the equivalent resistance.
- Q.12 Two resistors  $R_1$  and  $R_2$  are joined in parallel. Find the equivalent resistance.

### **B** Short Answer Type Questions

- **Q.13** Define current. Is it a scalar quantity or a vector quantity ? What is meant by the conventional direction of current ?
- Q.14 Define resistance.
- Q.15 On what factors does the resistance of a conductor depend?
- Q.16 Define resistivity. Write the formula for resistivity.
- Q.17 What is the formula for the combination of resistances when they are combined in : (i) series and (ii) parallel ?
- Q.18 Why is the series arrangement not used for domestic circuits?
- Q.19 How does the resistance of a wire vary with its cross-sectional area?
- Q.20 A Piece of wire is redrawn by pulling it until its length is doubled. Compare the new resistance with the original value.

### **C** Long Answer Type Questions

**Q.21** Define charge. What do you understand by positive and negative charge ? Write down the expression for force between two charges.

- Q.22 State Ohm's law. How it can be verified experimentally?
- Q.23 Describe the conditions for constituting an electric current. Explain the mechanism of flow of electrons in a conductor.
- Q.24 Derive the expression for the equivalent resistance when two resistors are joined in series.
- Q.25 Derive the expression for the equivalent resistance when two resistors are joined in parallel.

### **D** Numerical Problems

- Q.26 If the charge on an electron be  $1.6 \times 10^{-19}$  C, how many electrons should pass through a conductor in 1 second to constitute 1 ampere current ?
- Q.27 How many electrons pass through a lamp in one minute if the current be 200 mA?

(Charge on an electron,  $e = 1.6 \times 10^{-10}$  C).

**Q.28** A conductor carries a current of 0.2A. Find the amount of charge that will pass through the cross-section of the conductor in 30 s. How many electrons will flow in this time-interval?

(Charge on an electron,  $e = 1.6 \times 10^{-19} \text{ C.}$ )

- Q.29 The potential difference between the two points of a wire carrying 2 amperes current is 0.1 volt. Calculate the resistance between these points.
- Q.30 A resistance of 12 ohm is connected in parallel with another resistor X. The resultant resistance of the combination is 4.8 ohms. What is the resistance X?
- Q.31 Three resistances 12 ohms each are connected in parallel. Three such combinations are connected in series. What is the total resistance?
- **Q.32** How will you connect three resistors of 3  $\Omega$ , 4  $\Omega$  and 7  $\Omega$  respectively so as to obtain a resultant resistance, of 3.5  $\Omega$ ?
- **Q.33** Find the current through the circuit shown in figure. Also find the potential difference across the 20- $\Omega$  resistor.



**Q.34** Find (a) the equivalent resistance, (b) the current passing through the cell, and (c) the current passing through the  $30-\Omega$  resistor in the circuit shown in figure.



Q.35 Find the current supplied by the cell in the circuit shown in figure.



**Q.36** Figure shows a part of an electric circuit. The reading of the ammeter is 3.0 A. Find the currents through the 10- $\Omega$  and 20- $\Omega$  resistors.



- **Q.37** Three resistors of resistances  $10 \quad \Omega$ ,  $20 \quad \Omega$  and  $30 \quad \Omega$  are connected in parallel with a 6-V cell. Find (a) the current through each resistor, (b) the current supplied by the cell, and (c) the equivalent resistance of the circuit.
- **Q.38** When two resistors are joined in series, the equivalent resistance is 90  $\Omega$ . When the same resistors are joined in parallel, the equivalent resistance is 20 $\Omega$ . Calculate the resistances of the two resistors.
- **Q.39** Consider the circuit shown in figure. Calculate the current through the  $3-\Omega$  resistor.



**Q.40** (a) How will you join three resistors of resistances  $4\Omega$ ,  $6\Omega$  and  $12\Omega$  to get an equivalent resistance of  $8\Omega$ ? (b) What would be the highest and the lowest equivalent resistances possible by joining these resistors?

## **EXERCISE - 2**

#### **Single Correct Answer Type Questions**

- Q.1How many electrons in 1 s constitute a current<br/>of 1 A?<br/>(A)  $6.25 \times 10^{18}$  (B)  $6.25 \times 10^{12}$ <br/>(C)  $6.25 \times 10^{11}$  (D) 6.25
- Q.2 1 Coulomb is equal to -(A) 1 amp × 1 sec (B) 1 amp / 1 sec
  - (C) 1 joule  $\times$  1 amp
  - (D) 1 joule / 1 sec
- Q.3 When a body is negatively charged by friction, it means(A) the body has acquired excess of electrons
  (B) the body has acquired excess of protons
  (C) the body has lost some electrons
  - (D) the body has lost some electrons
  - (b) the body has lost some neutrons
- Q.4 If a charged body attracts another body, the charge on the other body-(A) must be negative(B) must be positive
  - (C) must be zero
  - (D) may be negative or positive or zero
- Q.5 A suitable unit for expressing the strength of electric field is (A) V/C
  (B) C/m
  (C) N/C
  (D) C/N
- $\begin{array}{ccc} \textbf{Q.6} & & & \\ & & (A) \ 10^{6} \mu A & & (B) \ 10^{-6} \mu A \\ & & (C) \ 10^{-3} \mu A & & (D) \ 10 \text{mA} \end{array}$
- Q.7 What constitutes current in a metal wire ? (A) Electrons (B) Protons (C) Atoms (D) Molecules
- **Q.8** If I is the current through a wire and 'e' is the charge of electron then the number of electrons in *t* seconds will be given by -

(A)  $\frac{\text{Ie}}{\text{t}}$  (B) e/It

(C) It/e (D) Ite

Q.9 Conventionally, the direction of the current is taken as-

(A) the direction of flow of negative charges

- (B) the direction of flow of atoms
- (C) the direction of flow of positive charges
- (D) the direction of flow of molecules
- Q.10 Figure shows, current in a part of electrical circuit, then the value of current is-



- Q.11 When the temperature of a metallic conductor is increased its resistance-(A) always decrease
  - (B) always increase
  - (C) may increase or decrease
  - (D) remain the same
- Q.12 Specific resistance of wire depends upon-(A) its length (B) its cross-section area (C) its dimensions (D) Its material
- **Q.13** The unit of resistivity is-(A) ohm (B) ohm mete (C) ohm meter<sup>-1</sup> (D) mho metre<sup>-1</sup>
- Q.14 A wire of resistance R is cut into n equal parts. These parts are then connected in parallel. The equivalent resistance of combination will be - (A) nR (B) R/n (C) n/R (D) R/n<sup>2</sup>
- **Q.15** A piece of wire of resistance  $4\Omega$  is bent through  $180^{\circ}$  at its mid point and the two halves are twisted together, then resistance is -

(A) 1 Ω	(B) 2 Ω
(C) 5 Ω	(D) 8 Ω

- **Q.16** Three resistance each of 8  $\Omega$  are connected to a triangle. The resistance between any two terminals will be: (A) 12  $\Omega$  (B) 2  $\Omega$ (C) 6  $\Omega$  (D)  $\frac{16}{3}\Omega$
- **Q.17** In how many parts (equal) a wire of 100  $\Omega$  be cut so that a resistance of 1  $\Omega$  is obtained by connecting them in parallel ? (A) 10 (B) 5
  - (C) 100 (D) 50
- Q.18 The filament of an electric bulb is made of tungsten because-(A) its resistance is negligible
  - (B) it is cheaper
  - (C) its melting point is high
  - (D) its filament is easily made
- **Q.19** If a wire of resistance 1  $\Omega$  is stretched to double its length, then the resistance will become-

(A) 
$$\frac{1}{2}\Omega$$
 (B) 2  $\Omega$   
(C)  $\frac{1}{4}\Omega$  (D) 4  $\Omega$ 

**Q.20.** In the given circuit, the effective resistance between points A and C will be -



Q.21 Rate of heat generated by electric current in a resistive circuit is expressed in-

(A) IR	(B) $IR^2$				
(C) $I^2 R$	(D) $\sqrt{IR}$				

- Q.22 Two heater wires of equal length are first connected in series and then in parallel with a battery. The ratio of heat produced in the two cases is-
  - (A) 2 : 1 (B) 1 : 2 (C) 4 : 1 (D) 1 : 4
- Q.23 How much electrical energy in kilowatt hour is consumed in operating ten, 50 watt bulbs for 10 hours per day in a month of 30 days ?
  (A) 15 (B) 150
  (C) 1500 (D) 15000
- Q.24 An electric iron draws a current of 4A when connected to a 220 V mains. Its resistance must be -(A)  $40\Omega$  (B)  $55\Omega$ (C)  $100\Omega$  (D) none of these
- Q.25 The resistance of a conductor is reduced to half its initial value. In doing so the heating effects in the conductor will become.(A) half (B) one-fourth
  - (C) four times (D) double
- Q.26 Laws of heating are given by-(A) faraday (B) joule (C) Ohm (D) Maxwell
- Q.27 An electric iron is based upon the principle of(A) magnetic effect of current
  (B) heating effect of current
  (C) chemical effect of current
  (D) none of these
- Q.28 A fuse wire is always connected to the-
  - (A) neutral wire (B) earth wire
  - (C) live wire (D) none of these
- Q.29 Heating effect of a current carrying conductor is due to-

- (A) Loss of kinetic energy of moving atoms
- (B) Loss of kinetic energy of moving electrons
- (C) Attraction between electrons and atoms
- (D) Repulsion between electrons and atoms
- Q.30 The correct relation between heat produce (H) and electric current I flowing is-

(A) 
$$H \propto I$$
 (B)  $H \propto \frac{1}{I}$ 

- (C)  $H \propto I^2$  (D)  $H \propto \frac{1}{I^2}$
- Q.31 The wire having a red plastic covering is a : (A) live wire (B) neutral wire (C) earth wire (D) none of these
- Q.32 A switch, is always connected to the(A) earth wire(B) neutral wire(C) live wire(D) None of these
- Q.33 The wire having a black plastic covering is a(A) live wire (B) neutral wire(C) earth wire (D) none of these
- Q.34 The wire having a green plastic covering is a (A) live wire (B) neutral wire (C) earth wire (D) none of these
- Q.35 In three pin socket (shoe) the bigger hole is connected to-

(A) any wire	(B) live wire
(C) neutral wire	(D) earth wire

- Q.36 Coming of live wire and neutral wire in direct contact causes:
  - (A) short-circuiting (B) over loading
- (C) no damage (D) unknown effect
  Q.37 In electric fittings in a house:
  (A) the live wire goes through the switch
  (B) the neutral wire goes through the switch
  (C) the earth wire goes through the switch
  (D) no wire goes through the switch
- Q.38 High power electrical appliances are earthed to -
  - (A) avoid shock
  - (B) avoid wastage
  - (C) Make the appliance look beautiful
  - (D) reduce the bill

# **ANSWER KEY**

**EXERCISE - 1** 

**D. NUMERICAL PROBLEMS :** 

26. 6.25 × 10<sup>18</sup>
27. 7.5 × 10<sup>19</sup>
28. 6C, 3.75 × 10<sup>19</sup>
29. 0.05Ω
30. 8Ω
31. 12 Ω
32. 3Ω & 4Ω in series corrected, in parallel with 7Ω.
33. 0.2A, 4V
34. (A) 10Ω (B) 0.6A (C) 0.2A
35. 0.5A
36. 2A, 1A
37. (A) 0.6 A, 0.3 A, 0.2 A (B) 1.1A (C) ≈ 5.5 Ω
38. 60 Ω, 30 Ω
39. 1.33 A

**40.** (b) 22 Ω, 2 Ω

### **EXERCISE - 2**

Ques	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Ans	А	А	Α	D	С	А	Α	С	С	А	В	D	В	D	А
Ques	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Ans	D	А	С	D	С	С	D	В	В	D	В	В	С	В	С
Ques	31	32	33	34	35	36	37	38							
Ans	A	С	В	С	D	A	A	A							