CLASS-X SUBJECT-SCIENCE (PHYSICS)

ASSIGNMENT: ANSWERS /SOLUTIONS

Q.1 d

Q2 c

Q3. d

Q4. For the given metal wire,

length, l = 2 m

area of cross-section, A = 1.55 × 10^{-6} m^2

resistivity of the metal, p = 2.8 × 10^{-6} Ω m

Since, resistance, R = ρl/A

So R = (2.8×10^{-8}×2/1.55×10^{-6})Ω

= 5.6/1.55 × 10^{-2} Ω = 3.6 × 10^{-2}Ω or R = 0.036Ω

Q5. When wire is melted, its volume remains same, so,

V' = V or A'l' = Al

Here, l' = l2

Therefore, A' = 2 A

Resistance, R = ρl/A = 16 Ω

Now, R' = ρl/'A'=ρ(l/2)/2A=14ρl/A

So, R' = R4 = 16/4 = 4 Ω

Percentage change in resistance,

= (R−R'/R)×100=(16−4/16) × 100 = 75%

Q6. In given in circuit diagram, two 3 Ω resistors are connected in series to form R1; so R1 = 3 Ω + 3 Ω = 6 Ω

And, R1 and R2 are in parallel combination, Hence, equivalent resistance of circuit (Req) given by

Req = 2 Ω

Using Ohm's law, V = IR

We get,

3 V = I × 2 Ω

or I = 3/2 A = 1.5 A

Current drawn from the battery is 1.5 A.

Q7. 1 kWh = 1000 W × 1 h

= 1000 W × 3600 s = 3600000 J = 3.6×10^6J

(ii) Here, V = 5 V, I = 500 mA = 0.5 A

Power rating of bulb is

P = VI = (5 × 0.5)W = 2.5W

Resistance of the bulb is R = V/I = (5/0.5) Ω =10Ω

Q8. There is either a convergence or a divergence of magnetic field lines near the ends of a current carrying straight solenoid because it behaves similar to that of a bar magnet and has a magnetic field line pattern similar to that of a bar magnet. Thus the ends of the straight solenoid behaves like poles of the magnet, where the converging end is the south pole and the diverging end is the north pole.

(ii) The current carrying solenoid behaves similar to that of a bar magnet and when freely suspended aligns itself in the north-south direction.

Q9.(i) No, alpha particle will not experience any force if it is at rest, because only moving charge particle can experience force when placed in a magnetic field.

(ii) No, alpha particle will not experience any force if it moves in the magnetic field parallel to field lines because charge particle experiences force only when it moves at an angle other than 0° with magnetic field.

(iii) Alpha particle will experience a force in the direction perpendicular to the direction of magnetic field and direction of motion of alpha particle.

Q10. a) When a high electric current flows through the circuit, the fuse wire melts due to joule heating effect and breaks the circuit. Hence, it keeps an eye on the amount of current flowing and also stops the current if exceeds the maximum value. So, fuse acts like a watchman in an electric circuit.

(b) (i) A fuse of rating 5A is usually used for lights and fans.
(ii) A fuse of rating 15 A is usually used for appliance of 2 kW or more power.