QB365 Question Paper Software
12th Standard - Physics
Current Electricity Assertion and reason

Exam Time: 00:20 Hrs | Date: 2025-09-30

Total Marks: 10

Questions:

1. **Assertion:** Current is a scalar quantity.
   Reason: Electric current arises due to continuous flow of charged particles or ions.
   Codes:
   (a) Both A and R are true and R is the correct explanation of A
   (b) Both A and R are true but R is NOT the correct explanation of A
   (c) A is true but R is false
   (d) A is false and R is also false

2. **Assertion:** If the length of the conductor is doubled, the drift velocity will become half of the original value (keeping potential difference unchanged).
   Reason : At constant potential difference, drift velocity is inversely proportional to the length of the conductor.
   Codes:
   (a) Both A and R are true and R is the correct explanation of A
   (b) Both A and R are true but R is NOT the correct explanation of A
   (c) A is true but R is false
   (d) A is false and R is also false

3. **Assertion:** Two bulbs of same wattage, one having a carbon filament and the other having a metallic filament are connected in series. Metallic bulbs will glow more brightly than carbon filament bulb.
   Reason: Carbon is a semiconductor.
   Codes:
   (a) Both A and R are true and R is the correct explanation of A
   (b) Both A and R are true but R is NOT the correct explanation of A
   (c) A is true but R is false
   (d) A is false and R is also false

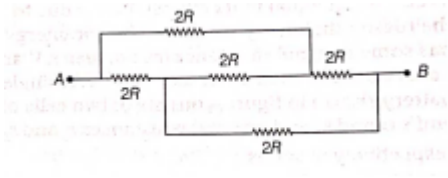
4. **Assertion:** Though the same current flows through the live wires and the filament of the bulb but heat produced in the filament is much higher than that in live wires.
   Reason: The filament of bulbs is made of a material of high resistance and high melting point.
   Codes:
   (a) Both A and R are true and R is the correct explanation of A
   (b) Both A and R are true but R is NOT the correct explanation of A
   (c) A is true but R is false
   (d) A is false and R is also false

5. (a) Both Assertion and Reason are true and Reason is the correct explanation ofAssertion.
   (b)Both Assertion and Reason are true but Reason is not the correct explanation ofAssertion.
   (c) Assertion is true but Reason is false.

(d) Assertion is false but Reason is true.

Assertion (A) The equivalent resistance between' points A and B in the given network is 2R.

Reason (R) All the resistors are connected in



6. **Assertion:** The potentiometer wire is made of manganin.
Reason: For manganin, the temperature coefficient of resistance is almost zero and its resistivity very less.
Codes:
(A) If both Assertion & Reason are true & the Reason is a correct explanation of the Assertion.
(B) If both Assertion and Reason are true but Reason is not a correct explanation of the Assertion.
(C) If Assertion is true but the Reason is false
(D) If Assertion & Reason both are false.

7. **Assertion:** Electric field inside a current carrying wire is zero.
Reason: Net charge on wire is non zero.
Codes:
(A) If both Assertion & Reason are true & the Reason is a correct explanation of the Assertion.
(B) If both Assertion and Reason are true but Reason is not a correct explanation of the Assertion.
(C) If Assertion is true but the Reason is false
(D) If Assertion & Reason both are false.

8. **Assertion:** Current is a scalar quantity.
Reason: Electric current arises due to continuous flow of charged particles or ions.
Codes:
(A) If both Assertion & Reason are true & the Reason is a correct explanation of the Assertion.
(B) If both Assertion and Reason are true but Reason is not a correct explanation of the Assertion.
(C) If Assertion is true but the Reason is false
(D) If Assertion & Reason both are false.

9. **Assertion :** The total resistance in series combination of resistors increases and in parallel combination of resistors decreases.
Reason : In series combination of resistors, the effective length of resistors increases and in parallel combination of resistors, the area of cross-section of the resistors increases.
Codes:
(A) If both Assertion & Reason are true & the Reason is a correct explanation of the Assertion.
(B) If both Assertion and Reason are true but Reason is not a correct explanation of the Assertion.

(C) If Assertion is true but the Reason is false
(D) If Assertion & Reason both are false.

10. **Assertion :** In series combination of electrical bulbs of lower power emits more light than that of higher power bulb.
Reason : The lower power bulb in series gets more current than the higher power bulb.
Codes:
(A) If both Assertion & Reason are true & the Reason is a correct explanation of the Assertion.
(B) If both Assertion and Reason are true but Reason is not a correct explanation of the Assertion.
(C) If Assertion is true but the Reason is false
(D) If Assertion & Reason both are false.

Answers Key:

1. **(b):** Current is a scalar quantity, it is justified by the following two observations
(i) If current carrying wire is bent at some point, then also current in the wire remains same, while a vector quantity always changes by changing its direction.
(ii) Current flowing in the circuit do not follow the laws of vector addition. It follows according to ordinary rule of algebra. This makes it clear that current is not a vector but a scalar quantity. Also current is defined as rate of flow of charge through the wire 1= dq/ dt.
2. (a): Drift velocity of free electrons is given by $v_d = \frac{eE}{m}\tau$
where, $E = \frac{\text{Potential difference}}{\text{length}} = \frac{V}{l}$
$\therefore \quad v_d = \frac{eV}{ml}\tau$ i.e., $v_d \propto 1/l$ where, $\frac{eV\tau}{m}$
It mean if I is doubled, the drift velocity will become half of the original value.
3. **(d):** When two bulbs are connected in series, the resistance of the circuit increases and so the voltage in each decreases, hence the brightness and the temperature also decreases. Due to decrease in temperature, the resistance of the carbon filament will slightly increase while that of metal filament will decrease. Hence, carbon filament bulb will glow more brightly ($P = i^2R$). Also carbon is not a semiconductor
4. **(b)**: As filament of bulb and live wire are in series, hence current through both is same. Now, because $H = \frac{i^2Rt}{4.2}$ and resistance of the filament of the bulb is much higher than that of live wires, hence heat produced in the filament is much higher than that in line wires.
5. (c) Assertion is true but Reason is false.
6. (A) If both Assertion & Reason are true & the Reason is a correct explanation of the Assertion.
7. (D) If Assertion & Reason both are false.
8. (B) If both Assertion and Reason are true but Reason is not a correct explanation of the Assertion.
9. (A) If both Assertion & Reason are true & the Reason is a correct explanation of the Assertion.
10. (C) If Assertion is true but the Reason is false