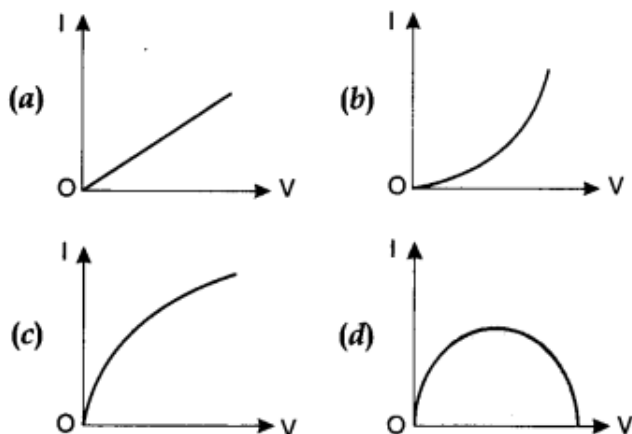


SECTION A (1 MARK)

- If temperature of the current carrying conductor increases then the relaxation time of electrons in the current carrying conductor
a) increases b) decreases c) remain same d) can't say
- A cell of emf E is connected with an external resistance R , then potential difference across is V . the internal resistance of the cell will be
a) $\frac{(E-V)R}{E}$ b) $\frac{(E-V)R}{V}$ c) $\frac{(V-E)R}{E}$ d) $\frac{(V-E)R}{E}$
- If gap of a parallel plate capacitor is fully filled with conductor, then its capacitance becomes
(a) zero (b) infinite (c) same (d) None
- Area under Q - V graph gives
(a) capacitance (b) resistance (c) energy (d) current
- Which of the following is the correct relation
(a) $V_d = \mu/E$ (b) $E = \mu/V_d$ (c) $\mu = V_d/E$ (d) None of these
- Which of the following I - V graph represents ohmic conductors?



- In the equation $AB = C$, A is the current density, C is the electric field, Then B is
(a) resistivity (b) conductivity (c) potential difference (d) resistance
- Two charges $+q$ each are kept at $2a$ distance apart. A third charge $-2q$ is placed midway between them. The potential energy of the system is
(a) $q^2/8\pi\epsilon_0 a$ (b) $-6q^2/8\pi\epsilon_0 a$ (c) $-7q^2/8\pi\epsilon_0 a$ (d) $9q^2/8\pi\epsilon_0 a$
- Assertion:** The 200 W bulbs glow with more brightness than 100 W bulbs.
Reason: A 100 W bulb has more resistance than a 200 W bulb.
(a) If both Assertion and Reason are correct and the Reason is a correct explanation of the Assertion.
(b) If both Assertion and Reason are correct but Reason is not a correct explanation of the Assertion.
(c) If the Assertion is correct but Reason is incorrect.
(d) If both the Assertion and Reason are incorrect.
- Assertion:** when electrons drift in a conductor, it does not mean that all free electrons in the conductor are moving in the same direction.
Reason: the drift velocity superposed over large random velocities of the electrons.
(a) If both Assertion and Reason are correct and the Reason is a correct explanation of the Assertion.
(b) If both Assertion and Reason are correct but Reason is not a correct explanation of the Assertion.
(c) If the Assertion is correct but Reason is incorrect.
(d) If both the Assertion and Reason are incorrect

SECTION B (2 MARKS)

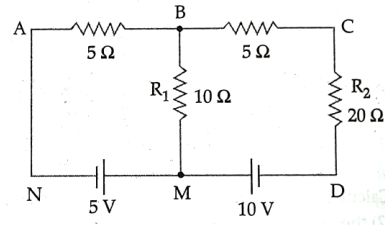
- If two wires A and B are of same material and length is taken, and the radius of A is doubled and radius of B, then what happened to its resistivity ratio of A:B?

12. N small conducting liquid droplets, each of radius r are charged to potential V . These droplets are combined to form a single drop without any charge leakage. Find the potential of the large drop.
13. State Ohm's law. show that resistivity is independent of length and area of cross section of the wire.

SECTION C (3 MARKS)

14. Deduce the expression for electric potential due to point charge placed at a distance r from $+q$ in a dielectric medium of constant k .
15. Potential of a field is given as $V = 2x^2 + 3xy - 6z^3$ V. find the expression for electric field in x axis at $(2,0,2)$

16. Find the current flowing through AB, BC and MB.



SECTION D (5 MARKS)

- 17.
- Define terms drift velocity and relaxation time.
 - Derive the expression for drift velocity of an electron in a wire.
 - If the length of conductor is increased by 5 times, then what happened to drift velocity.
- 18.
- Define term capacitance. Deduce the expression for capacitance of parallel plate capacitor of area A and separation d filled with dielectric constant k and thickness t .
 - In a parallel plate capacitor half of the area is filled with dielectric of constant k_1 and another half area is filled with dielectric of constant k_2 keeping distance of separation constant, then find expression for equivalent capacitance.