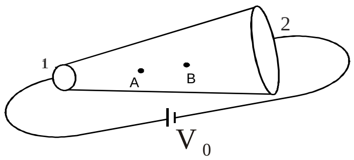
IIT PHYSICS CENTRE

BY D.B. Singh

2-Ka-35, Vigyan Nagar, Kota. Phone No. (0744) 2428962, 977288 1234, 98285 35802
E-mail : dbsiit@gmail.com

Situation:- **Suppose a current carrying metal wire has a croos section area that gradually becomes larger along the wire, so that the wire has a shape of a very long cone**



1. The electric current through face 1 is
(A) same as face 2 (B) lesser then face 2
(C) greater than face 2 (D) None.

2. The electric current density at face 1 is
(A) same as face 2 (B) lesser then face 2
(C) greater then face 2 (D) None.

3. If resistitvity at A is $°_A$ **and at the point B is** $°_B$ **.**
(A) $°_A = °_B$ **(B)** $°_A > °_B$ **(C)** $°_A < °_B$ **(D) None.**

4. If the conductivity at A is $±_A$ **and at B is** $±_B$**. Then**
(A) $±_A = ±_B$ **(B)** $±_A > ±_B$ **(C)** $±_A < ±_B$ **(D) None.**

5. If electric field at A is E_A **and that of B is** E_B**. Then**
(A) $E_A = E_B$ **(B)** $E_A = E_B = 0$
(C) $E_A > E_B$ **(D)** $E_A < E_B$

6. The drift speed at A is V_A **and that of at point B is** V_B**. Then**
(A) $V_A = V_B$ **(B)** $V_A > V_B$ **(C)** $V_A < V_B$ **(D) None.**

7. The electric potential of A is V_A **and that of B is** V_B**. Then**
(A) $V_A = V_B$ **(B)** $V_A > V_B$ **(C)** $V_A < V_B$ **(D) None.**

Situation:- **Two charges, each equal to q, are kept at x = – a and x = a on the x - axis. A particle of mass m and charge** q_o **= q/2 is placed at the origin.**

8. The charge q_o **is given a small displacement x (<< a) along the x - axis and then released. The restoring force acting on** q_o **is (k = 1/(4®£₋))**

(A) $-\left(\frac{kq^2}{a^3}\right)x$ **(B)** $-\left(\frac{2kq^2}{a^3}\right)x$

(C) $\left(\frac{kq^2}{a^2}\right)x$ **(D)** $\left(\frac{2kq^2}{a^2}\right)x$

9. In Q.25 the time period of oscillation of the particle is

(A) $T = 2®\left(\frac{ma^3}{2kq^2}\right)^{1/2}$ **(B)** $T = 2®\left(\frac{ma^3}{kq^2}\right)^{1/2}$

(C) $T = 2®\left(\frac{2kq^2}{ma^3}\right)^{1/2}$ **(D)** $T = 2®\left(\frac{kq^2}{ma^3}\right)^{1/2}$

10. If charge q_o **is given a small displacement y (<< a) along the y - axis, the net force acting on the particle is proportional to**
(A) y (B) – y (C) 1/y (D) – (1/y)

11. In Q. 27, the particle,
(A) will execute simple harmonic motion.
(B) will execute oscillatory but not simple harmonic motion
(C) will execute a non-periodic and non-oscillatory motion
(D) will never come back to x = 0.