B.K. BIRLA CENTRE FOR EDUCATION

SARALA BIRLA GROUP OF SCHOOLS
A CBSE DAY-CUM-BOYS' RESIDENTIAL SCHOOL

PERIODIC TEST-1 2025-26

PHYSICS

MARKING SCHEME

Class: XII **Time: 1hr**
Date: 04.07.25 **Max Marks: 25**

Section A

1. a) 1.875×10^{20}.
2. c) Electronic current
3. b) tesla
4. d) Zero
5. d) α-particle

Section B

6. In the case of electrical wiring in houses, two factors are involved while choosing the wiring materials, the cost of the conducting material (in most cases metal) and the conductivity of the wire. Silver has the greatest conductivity, but it is generally ignored due to its high cost. Just after silver, aluminum and copper are the next ideal conductors. Their production cost is also lower than silver. Thus, aluminum and copper are used for electrical wiring in houses
7. The current direction in the circuit will be exactly as represented in the diagram. Therefore, point B has a greater potential than A ($V_B > V_A$).

Current in the circuit, $I = \frac{E_1+E_2}{r_1+r_2}$

$= \frac{(6–4)}{V}(2+8)\Omega = 0.2\text{amp}$

The potential across E_1 and E_2 are

$E_1 = V–Ir_1 = 6–0.2 \times 2 = 6–0.4 = 5.6V$

$E_2 = V + Ir_2 = 4 + 0.2 \times 8 = 4 + 1.6 = 5.6V$

Therefore, the potential between B and A is

$E_2 = 5.6Volt$

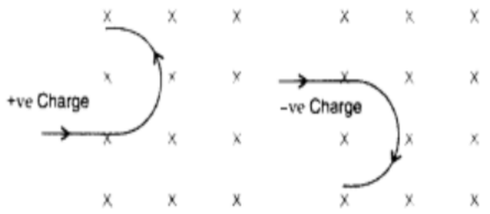
Since the current is flowing from B to A, the potential at point B is greater than A.

8.

$$F = \frac{\mu_0}{2\pi}\frac{I_1 I_2}{r}$$

"One ampere of current is the value of steady current, which when maintained in each of the two very long, straight, parallel conductors of negligible cross-section; and placed one metre apart in vacuum, would produce on each of these conductors a force of equal to 2×10^{-7} newtons per metre (Nm^{-1}) of length. "

9.



The force acting on the charge particle will be perpendicular to both v and S and therefore will describe a circular path.

SECTION-C

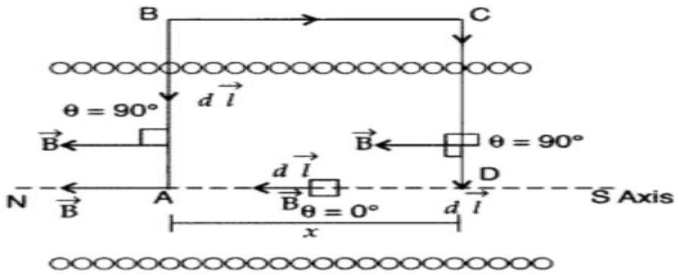
10.

(i) Shunt Resistance, $S = \frac{R_A i_g}{i - i_g} = \frac{0.6 \times 1}{4} = 0.15\ \Omega$

(ii) Total Resistance, $\frac{1}{R_{total}} = \frac{1}{0.6} + \frac{1}{0.15} = \frac{25}{3}$

$R_{total} = \frac{3}{25}\ \Omega = \mathbf{0.12\ \Omega}$

11. Magnetic field due to Solenoid Let length of solenoid = L
Total number of turns in solenoid = N
No. of turns per unit length = NL = n
ABCD is an Ampere's loop
AB, DC are very large
BC is in a region of B→ = 0
AD is a long axis
Length of AD = x
Current in one turn = I_0



Applying Ampere's circuital loop

$$\oint \vec{B} \cdot d\vec{l} = \mu_0 I$$

L.H.S.

$$= \int_A^B \vec{B} \cdot d\vec{l} + \int_B^C \vec{B} \cdot d\vec{l} + \int_C^D \vec{B} \cdot d\vec{l} + \int_D^A \vec{B} \cdot d\vec{l}$$

$$= 0 + 0 + 0 + \int_D^A \vec{B} \cdot d\vec{l}$$

$(\because \theta = 90°)$ $(\because \vec{B} = 0)$ $(\because \theta = 90°)$ $(\because \theta = 0°)$

$$= \int_D^A \vec{B} \cdot d\vec{l} = B \int_D^A dl \cos\theta \quad \ldots[\because \cos\theta = 1$$

$$= B \int_D^A dl = B[l]_0^x = Bx$$

No. of turns in x length = nx,
Current in turns nx, $I = nx\, I_0$
According to Ampere's circuital law
$Bx = \mu_0 I \Rightarrow Bx = \mu_0\, nx\, I_0$
$\therefore B = \mu_0 n I_0$

12.

Given : $l_1 = l_2 = l$

$A_1 : A_2 = 1 : 2$ or $\frac{A_1}{A_2} = \frac{1}{2}$

As $R = \rho \frac{l}{A}$, as $\rho_1 = \rho_2$

We have $\frac{R_1}{R_2} = \frac{2}{1}$

(*i*) In series current is same so from

$v_d = \frac{I}{neA}$ So, $I_1 = I_2$, $\frac{A_1}{A_2} = \frac{1}{2}$

We get $\frac{v_{d_1}}{v_{d_2}} = \frac{2}{1}$ $\therefore$ $v_{d_1} : v_{d_2} = \mathbf{2 : 1}$

(*ii*) In parallel current gets divided in inverse ratio of resistances

$\therefore$ $\frac{I_1}{I_2} = \frac{R_2}{R_1} = \frac{1}{2}$

As $v_{d_1} = \frac{I_1}{enA_1}$, $v_{d_2} = \frac{I_2}{enA_2}$

We have $\frac{v_{d_1}}{v_{d_2}} = \frac{I_1}{I_2} \times \frac{A_2}{A_1} = \frac{1}{2} \times \frac{2}{1} = \frac{1}{1}$

$\therefore$ $v_{d_1} : v_{d_2} = \mathbf{1 : 1}$

13.

Applying Kirchhoff's law by moving along ACDE, we get,