I Terminal ~~second~~ year Examination - 2018-19
physics

① (iii)
② ~~weber or Nm~~ Volt-meter (Vm) OR Nm^2/C
③ magnetic dipoles only
(Non-existance of monopole)
④ electric field
⑤ Red, orange Blue, Gold
⑥ $R/2$
(7) (iii)

⑧ (a) Statement / $\phi = q/\varepsilon_0$

(b) $\phi = \frac{q_{inside}}{\varepsilon_0}$

$= \frac{q_1 + q_2 + q_4}{\varepsilon_0}$

$= \frac{(5 + -3 + 5) \times 10^{-9}}{8.85 \times 10^{-12}}$

$= 0.79 \times 10^{3}$ Vm

⑨ Ni - Std. resistance coil
Current density - Vector
Semi conductor - Ge
Resistivity - Ωm

(10) (a) $\oint \vec{E} \cdot \vec{dl} = \mu_0 \Sigma I$

(b) $I_{enclosed} = I + -I = 0$

$\therefore \int \vec{E} \cdot \vec{dl} = 0$

(11) (a) Nature and Concⁿ of electrolyte
surface area of rod
distance between rod

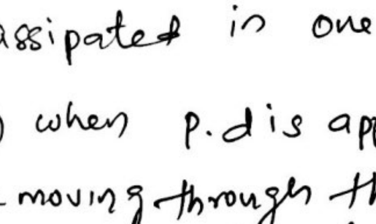
(b) (iii) $\frac{E}{r}$

(12) (a) para
(b) Two properties

(13) (a) $\vec{F} = q(\vec{v} \times \vec{B})$
(b) True. (only direction of $\vec{p}$ changes)

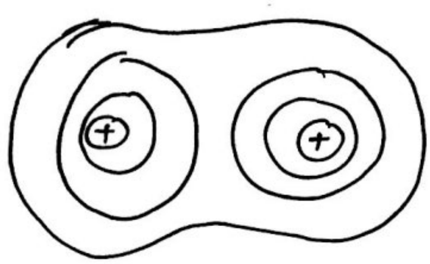
(14) (a) It is the heat energy dissipated in one second

(b) when p.d is applied, charges are moving through the conductor under the action of electric field, kinetic energy also increases. The charge particles moves with a steady drift velocity due to collision. During collisions, the energy will be shared with atoms and they vibrate vigourously. Thus conductor heats up.

(15)


For No tension,
$mg = F_m$
$mg = I l B$
$B = \frac{mg}{Il} = \frac{60 \times 10^{-3} \times 9.8}{5 \times 0.45} = 0.261\,T$

(16) (a)



(b) $W = 0$

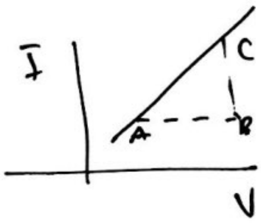
potential inside is the same every where.

(17) (a) $U = -MB\cos\theta$

(b) $\theta = 0$

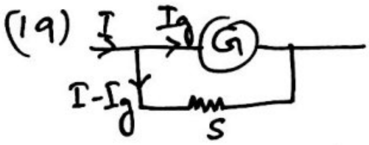
(18)(a)(ii) $j = \sigma E$

(b)



$$R = \frac{AB}{BC} = \frac{0.6-0.4}{0.3-0.2} = \frac{0.2}{0.1} = 2\Omega$$

(19)



By connecting a low resistance in parallel to Galvanometer, we can convert Galvanometer to Ammeter

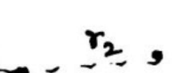
$$I_g R_G = (I - I_g)S$$

$$\boxed{S = \frac{I_g R_G}{I - I_g}}$$

(20)(a) $\vec{F}_{12} = \frac{1}{4\pi\varepsilon_0}\frac{q_1 q_2}{r_{12}^2}\hat{r}_{12}$

$\vec{F}_{21} = \frac{1}{4\pi\varepsilon_0}\frac{q_1 q_2}{r_{21}^2}\hat{r}_{21}$

(b) For equilibrium



$$\frac{q_1}{r_1^2} = \frac{q_2}{r_2^2}$$

$$\frac{q_1}{x^2} = \frac{q_2}{(r-x)^2}$$

$$8\times10^{-9}(40-x)^2 = 2\times10^{-9}\times x^2$$

$$4(40-x)^2 = x^2$$

$$2(40-x) = x$$

$$80 - 2x = x$$

$$3x = 80$$

$x = 80/3 = 26.67$ cm from q_1

(21)(a) Derivation $C = \frac{\varepsilon_0 A}{d}$ $\quad E = \frac{\sigma - \sigma_p}{\varepsilon_0} = \frac{\sigma}{\varepsilon_0 \varepsilon_r}$

(b) ~~increases~~ decreases $\left[\cancel{C = \frac{\varepsilon_0 K A}{d}}\right]$

(22)(a) dip, declination, B_H

(b) $\tan\theta = \frac{B_V}{B_H} = 1 \Rightarrow \theta = 45^\circ$

(23)(a) Derivation $E = \frac{\sigma}{2\varepsilon_0}$

(b) $E_A = 0$

$$E_B = \frac{\sigma_1}{2\varepsilon_0} - \frac{\sigma_2}{2\varepsilon_0} = \frac{\sigma}{2\varepsilon_0} - \frac{-\sigma}{2\varepsilon_0} = \frac{\sigma}{\varepsilon_0} = \frac{17\times10^{-22}}{8.85\times10^{-12}} = 1.92\times10^{-10}\ V/m$$

24)(a) proof of Wheatstone's principle

(b) $R_3 = \frac{R_1}{R_2}\times R_4 = \frac{3}{2}\times 6 = 9\Omega$

(25)(a) Derivation, $\tau = MB\sin\theta = NIAB\sin\theta$

(b) $F = 0$

(c) parallel (plane of coil)

26) (a) Derivation, $V = \frac{1}{4\pi\epsilon_0}\frac{q}{r}$

b) $V = 50x^2 + 36y^2$

$E_x = -\frac{\Delta V}{\Delta x} = -50 \times 2x$
$= -100x$
$= -100 \times -1$
$= 100\ V/m$

$E_y = \frac{-\Delta V}{\Delta y} = -36 \times 2y$
$= -72 \times 3$
$= -216\ V/m$

$E_z = 0$

---

(27) (a) circuit diagram

(b) $I = \frac{E}{R_1 + R_2} = \frac{6}{10+R}$.

for wire, $V = IR_1$
$= \frac{6}{10+R} \times 10 = \frac{60}{10+R}$

potential gradient, $\phi = \frac{V}{l}$
$= \frac{60}{(10+R) \times 500}$

p.d across $l_1 = 250$ is,

$V_1 = \phi l_1$
$= \frac{60}{(10+R)500} \times 250$
$= \frac{30}{10+R}$

Since 1V is balanced at 250

$1 = \frac{30}{10+R}$
$10 + R = 30$
$R = 20\Omega$

(28) (a) Series combination

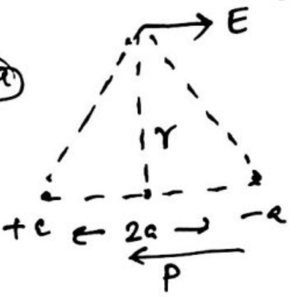
(b) $\frac{1}{C} = \frac{1}{C_1} + \frac{1}{C_2} + \frac{1}{C_3}$

(c) $C = \frac{\epsilon_0 A}{d} = 8 \times 10^{-12} F$

$d' = d/2$
$K = 6$

$C' = \frac{\epsilon_0 A \times K}{d'}$
$= \frac{\epsilon_0 A}{d/2} K$
$= 2K \times C$
$= 2 \times 6 \times 8\ pF$
$= 96\ pF$

(29) (a)



(b) Derivation $E_{eq} = \frac{1}{4\pi\epsilon_0}\frac{p}{r^3}$.

(c) $180°$

LALAN V.M
HSST PHYSICS
GOVT. GIRLS HSS (4095)
ALAPPUZHA - 688011
9496520070