PHYSICS 2017

SOLUTION OF NUMERICALS

SOLVED BY:

SIR MUHAMMAD SALEEM

(More than 35 Years of Experience in Teaching Physics & Maths) upto X, XI, XII & B.Sc. CLASSES

CONTACT FOR GROUP TUITION: THE MATHEMATICIAN

0331-0360691, 0321-2488378, 0333-2220710

Q.2(i) DATA:

$m = 1.67 \times 10^{-27} Kg$

$e = 1.6 \times 10^{-19} columb$

$\Delta V = 14.32 \times 10^{-9} Volt$

Distance between two plates = d = ?

SOLUTION:

According to equation of P.D. between two oppositely charged plates,

$$\Delta V = E \times d$$

$$\Rightarrow \quad \frac{\Delta V}{E} = d$$

$$\Rightarrow \quad d = \frac{\Delta V}{E} \text{---} (i)$$

To find the value of "E":

In case of balanced charged particle between two oppositely charged plates,

$$F_{(Elec)} = W_{(Particle)}$$

$$\Rightarrow \quad Ee = mg$$

$$\Rightarrow \quad E = \frac{mg}{e}$$

$$\Rightarrow \quad E = \frac{\left(1.67 \times 10^{-27}\right) \times (9.8)}{\left(1.6 \times 10^{-19}\right)}$$

$$\Rightarrow \quad \boxed{E = 1.023 \times 10^{-7} Volt/meter}$$

Now, Substituting the value of "E" in eqn(i)

$$\because eqn\,(i) \Rightarrow d = \frac{\Delta V}{E}$$

$$\Rightarrow \quad d = \frac{14.32 \times 10^{-9}}{1.023 \times 10^{-7}}$$

$$\Rightarrow \quad \boxed{d = 0.13998\ meter}$$

$$OR \quad \boxed{d = 13.998\ cm}$$

Q.2(ii) See in Theory

Q.2(iii) DATA:

$T(^{\circ}C) = ?$

$\upsilon_{(r.m.s.)} = 3300 m/s$

Mass of Hydrogen molecule =

$m = 3.32 \times 10^{-27} Kg$

Given that:

Boltzman's constant = K =

$1.38 \times 10^{-23} J/K$

SOLUTION:

As,

$$\upsilon_{(r.m.s.)} = \sqrt{\frac{3KT}{m}}$$

By squaring on both sides,

$$\upsilon^2_{(r.m.s.)} = \frac{3KT}{m}$$

$$\Rightarrow (3300)^2 = \frac{3 \times \left(1.38 \times 10^{-23}\right) \times T}{\left(3.32 \times 10^{-27}\right)}$$