$$=> \left(1.089\times10^{77}\right)\frac{\left(4.14\times10^{-23}\right)\times T}{\left(3.32\times10^{-27}\right)}$$

$$=> \frac{\left(1.089\times10^{77}\right)\times\left(3.32\times10^{-27}\right)}{\left(4.14\times10^{-23}\right)} = T$$

$$=> \boxed{T = 873.3 K}$$

$OR \quad T = 873.3 - 273$

$$\boxed{T = 600.3\ ^{o}C}$$

Q.2(iv) See in Theory

Q.2(v) DATA:

$V_v = 400\, volt$

$R_v = 40000\Omega$

$$=> I_v = \frac{V_v}{R_v} = \frac{400}{40000} = 0.01\ Ampere$$

$R_x = ?$

Rage of new voltmeter =

V = 750 volt

SOLUTION:

According to equation of Series – Resistor in case of modified voltmeter,

$$R_x = \frac{V}{I_v} - R_v$$

$$=> R_x = \frac{750}{0.01} - 40000$$

$$=> R_x = 75000 - 40000$$

$$=> R_x = 35000\Omega$$

It means, by connecting an additional Series-Resistor of 35000Ω the range of voltmeter can be increased upto 750 volt.

Q.2(vi) DATA:

Wave length of X-Rays used = $\lambda_1 = 3.64\text{x}10^{-10}$ meter

Fractional change in wavelength = $\frac{\Delta\lambda}{\lambda_1} = ?$

$\theta = 120^o$

Given that:

$h = 6.63\text{x}10^{-34}$ JxS

$m_o = 9.1\text{x}10^{-31}$ Kg

$C = 3\text{x}10^{8}$ m/s

SOLUTION:

According to compton's shift in wavelength of X-Ray's Photon,

$$\Delta\lambda = \frac{h}{m_o c}(1 - Cos\theta)$$

Divided by "λ_1" on both sides,

$$=> \frac{\Delta\lambda}{\lambda_1} = \frac{h}{m_o c\lambda_1}(1 - Cos\theta)$$

Fractional change in wavelength =

$$= \frac{\left(6.63\times10^{-34}\right)\times\left(1 - Cos120^o\right)}{\left(9.1\times10^{-31}\right)\times\left(3\times10^{8}\right)\times\left(3.64\times10^{-10}\right)}$$

$$= \frac{\left(6.63\times10^{-34}\right)\times\left[1-\left(-0.5\right)\right]}{\left(9.937\times10^{-32}\right)}$$

$$= \frac{\left(6.63\times10^{-34}\right)\times\left(1.5\right)}{\left(9.937\times10^{-32}\right)}$$

$$=> \boxed{\frac{\Delta\lambda}{\lambda_1} = 0.010}$$

$$OR \quad \boxed{\frac{\Delta\lambda}{\lambda_1} = 1\%}$$

Q.2(vii) DATA:

$T_{1/2} = 140\ Days$

$=> T_{1/2} = 140\times24 = 3360\ Hour$

$\lambda_{(\%\ per\ Hour)} = ?$

SOLUTION:

According to equation of Half-Life of Radio-Element,

$$T_{1/2} = \frac{0.693}{\lambda}$$

$$=> \quad \lambda = \frac{0.693}{T_{1/2}}$$

$$=> \lambda = \frac{0.693}{3360}$$

$$=> \boxed{\lambda = 2.0625\times10^{-4}\ Per\ Hour}$$

OR