ELECTRIC CHARGES AND FIELDS

(1). Electric force between two charges is given by F
zinc R'

And F ='i where E —i?r—, is the electric field due to charge 41 $_2$
4rEt:.o11`

(2) Electric potential energy for system of two charges Is U == $\frac{qq_2}{4117._o}$ 1 – r_2 |

For r_2 = 00, U $\frac{(11q2}{4TEE_o r_1}$

0p Electrostatic potential is a = AU / q

{4]. Electric field an the axis of a dipole of moment p 2.arQ at a distance R from the centre is

E = 2Rn / zl-nc{R^2 – a^2}^{2} .IfR »athen E= / 41(c R^3

{5}. Electric field an the equatorial line of the dipole at a distance R from the centre is

= / 4YEE (R^2 + ^{3} .ifik »atlhen E = / 4• R.2

(6). Torque t experienced by+ a short dipole kept In uniform external electric field E Is
i=OxE=pEsinCli)

{711. Perpendicular deflection of a charge in a uniform electric field E after travelling a straight distance

x is y clEx^2 / 2ply' where m is mass of the charge and vo is initial speed of perpendicular entry in the electric field.

(8). Electric flux 41 E = ES cos Area ...actor 5 is perpendicular to the surface area.

{911. Gauss law ; ft dS R. Here E Is the electric field due to all the charges inside as well as outside the Gaussian surface, while Q is the net charge enclosed inside Gaussian surface.

{10). Electric field due to in Nnitely long charged wine of linear charge density X et a perpendicular

distance R Is E = / 27gE$_0$R

{11]. Electric field due to sing!l layer of surface charge density is / 28$_0$ · Field clue to oppositely

charged conducting plates is cr / g$_0$ irk between the gap but zero outhide.

(12). Field dye to a uniformly charged thin Spherical shell of radio R is E = 4 / 0 "2 fdr out5ide point

and zero Inside (r is distance from the centre of shell)

{13). Field due to a charge uniformly. distributed In a spherical volume Is $E - \frac{d}{dr}\ \frac{a}{4\ ne_a R.^3}\ r2 = \frac{pr}{31\%}$

for i nside points and $E = \frac{}{4trzr^2}$ for outsithe point_

Here $p = \frac{3Q}{47R3}$ Is volume charge density and Q Is total chaige it the sphere.