1. Calculate the electrostatic force of attraction between a proton and an electron in a hydrogen atom given radius of the electron orbit is 0.05 nm. (remember that the single proton is at the centre and the single electron is revolving around it in a circular orbit. Charge on proton is 1.6×10^{-19} C and that on the electron is equal but negative) Take $1nm=10^{-9}m$ Think of whether the force is attractive or repulsive. Ans. 9.215×10^{-8} N
2. Two point charges 10μC and 20μC are placed 0.05 m apart in free space. Find the force between them. What will be the force if the distance between them is doubled? Take $1\mu C=10^{-6}C$ Ans. 720 N, 180 N.
3. Charges 10μC and 50μC are placed 4 m apart. Calculate the force exerted on a charge 15μC placed midway between them. (Do not forget that both the charges exert force on 15μC charge and you are supposed to give the resultant force. Also force is a vector quantity) Ans. 1.35 N (Think of the direction)
4. Two point charges 8nC and 16nC are placed at the corners B and C of the base of an equilateral triangle of side 0.03 m. Calculate the resultant electric field at the vertex of the triangle. (Do not forget to use parallelogram law of vector addition $R=\sqrt{p^2+q^2+2pq\cos\theta}$ to add the two fields created by the two charges) Ans. 21.16×10^4 N/C (Think of the direction)
5. An electric dipole consists of a positive and negative charge each of magnitude 5μC separated by a distance of 5 mm. Calculate the dipole moment. Ans. 25×10^{-9} Cm
6. Two equal and opposite charges of magnitude 20μC are separated by a distance of 2 cm. Calculate the electric field on the equatorial line at a distance of 120 cm from the centre of the dipole. Ans. 2.08 N/C (What do you think is the direction of this field? In the direction of the dipole moment or opposite?)
7. Two charges -4q and –q are fixed at a distance d apart. Find the location of the third charge in between these two where it can be in equilibrium. Does the magnitude and sense of the third charge matter in deciding the answer? Do not forget that for equilibrium the net force on it must be zero. Ans. 2d/3 from -4q
8. Find the flux of the electric field through a sphere of radius R due to a charge 10^{-7} C at the centre and another equal charge at a point distance 2R from the centre. Ans. $1.1\times10^4\,Nm^2/C$ (what do you think is the contribution to the flux by the charge outside the sphere? What will be your answer if another charge is placed at a distance of 3R from the centre?)
9. Charges 10 μC and 20 μC are placed separated by a certain distance. Which charge will repel the other with a greater force? (answer deliberately not given)
10. A body has more protons than electrons. What is the nature of the charge on the body?