

MATA SAVITRI DEVI SANJEEVANI PUBLIC SCHOOL

CLASS- XII

ELECTROSTATICS

SUBJECT: PHYSICS

BY RUPESH GUPTA SIR

ELECTRIC CHARGE AND COULOMB'S LAW

ASSIGNMENT NO: -1

NAME OF STUDENT: -

ROLL NO: -

- Q1. What is the value of charge on a body which carries 20 excess electrons?
- Q2. Is a charge of 5.8×10^{-18} C possible?
- Q3. How much positive and negative charge is there in a cup of water contain 500 cc of water.
- Q4. If a body gives out 10^9 electrons every second, how much time is required to get a total charge of 1 C from it?
- Q5. A charge q is placed at the centre of the line joining two equal charge Q . show that the system of three charges will be in equilibrium if $q = -Q/4$.
- Q6. Two electrons and a positive charge q are held along a straight line. At what position and for what value of q will the system be in equilibrium? Check whether it is stable, unstable or neutral equilibrium.
- Q7. Which is bigger – a coulomb charge on an electron? How many electronic charges form one coulomb of charge? [Ans. Coulomb, 6.25×10^{18}]
- Q8. If a body gives out 10^9 electrons every second, how much time is required to get a total charge of 1C from it? [Ans. 198.18 year or 200 years]
- Q9. Calculate the charge on ${}_{26}\text{Fe}^{56}$ nucleus. Given charge on a proton = 1.6×10^{-19} C. [Ans. $+4.16 \times 10^{-18}$ C]
- Q10. Determine the total charge on 75.0 Kg of electrons. [Ans. -1.33×10^{13} C]
- Q11. The electrostatic force of repulsion between two positively charged ions carrying equal charges is 3.7×10^{-9} N, when they are separated by a distance of 5 \AA . How many electrons are missing from each ion? [n =2]
- Q12. A free pith-ball A of 8 g carries a positive charge of 5×10^{-8} C. What must be the nature and magnitude of charge that should be given to a second pith-ball B fixed 5 cm below the former ball so that the upper ball is stationary? [4.36 $\times 10^{-7}$ C, positive]
- Q13. A particle of mass m and carrying a charge $-q_1$ is moving around a charge $+q_2$ along a circular path of radius r . prove that the period of revolution of charge $-q_1$ about $+q_2$ is given by $T = \sqrt{16\pi^3 \epsilon_0 m r^3 / q_1 q_2}$
- Q14. Two particles each have a mass of 5g and charge 1.0×10^{-7} C, stay in limiting equilibrium on a horizontal table with a separation of 10 cm between them. The coefficient of friction between each particle and the table is the same. Find coefficient of friction. [0.18]
- Q15. Two similarly equally charged identical metal spheres A and B repel each other with a force of 2.0×10^{-5} N. A third identical uncharged sphere C is touched to A, then placed at the mid-point between A and B. Calculate the net electrostatic force on C. [2.0 $\times 10^{-5}$ N, along BC]

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Q16. Two identical charges, Q each, are kept at a distance r from each other. A third charge q is placed on the line joining the above two charge such that all three charge are in equilibrium. What is the magnitude, sign and position of the charge q ? [q = Q/4]

Q17. Two point charges of charge values Q and q are placed at distances x and $x/2$ respectively from a third charge of charge value $4q$, all charge being in the same straight line. Calculate the magnitude and nature of charge Q , such that the net force experienced by the charge q is zero. [Q= 4q]

Q18. Two small spheres each having mass m kg and charge q coulomb is suspended from a point by insulating threads each l meter long but of negligible mass. If θ is the angle, each thread make with the vertical when equilibrium has attained, show that $q^2 = (4 mgl^2 \sin^2 \theta \tan \theta) 4 \pi \epsilon_0$

Q19. What is the nature of electrostatic force between two point electric charges q_1 and q_2 if
(a) $q_1 + q_2 > 0$ (b) $q_1 + q_2 < 0$

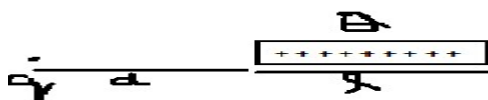
Q20. What is the nature of electrostatic force between two point electric charges q_1 and q_2 if
(a) $q_1 q_2 > 0$ (b) $q_1 q_2 < 0$

Q21. Two equal balls having equal positive charge q coulomb are suspended by two insulating strings of equal length. What would be the effect on the force when a plastic sheet is inserted between the two?

Q22. Two metal spheres A and B having charges $-3\mu\text{C}$ and $-0.45\mu\text{C}$. How many electrons should be transferred so that finally both have same charges?

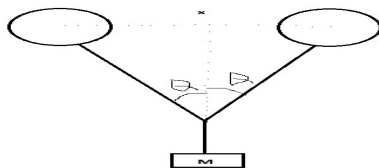
Q23. Three identical charged spheres carrying same charge are placed in such a way that each touches each. Find the net force on one due to other two

Q24. Calculate the force between a point charge (q) and a rod of length l having a charge (Q) placed at a distance d as shown in figure.



Q25. Two identical charged spheres are tied up with two string of equal length and suspended to a common point of suspension. Now the system is immersed in liquid of density ' σ ' the angle between them remain unchanged. What will be the dielectric constant of medium of density of charged sphere is ' ρ '?

Q26. Two identical helium filled balloon floats in air as shown in figure. Both the balloon carry same charge. Find the charge on each balloon. Find volume of each balloon.



Q27. A charge ' q ' is revolving around the massive charge ' Q ' in a circular orbit of radius ' r '. find period of revolution.

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Hint,

Q1. Sp -1 Pr 1/9	Q2. Sp – 2 Pr 1/9	Q3. Ex -3 pr 1/17	Q4. Ex 4 pr 1/17	Q5.EX7 Pr 1/18
Q6.ex 10 pr 1/20	Q7. Ex-1 sl 1.7	Q8. Ex -3 sl 1.7	Q9. P-4 sl 1.7	Q10. P-5 sl 1.7
Q11. Ex- 5 sl 1.11	Q12. Ex -6 sl 1.11	Q13. Ex-7 sl 1.11	Q14. Ex-8 sl 1.12	Q15. Ex 11 SL 1.12
Q16. Ex- 12 SL 1.13	Q17.Ex-15 SL 1.14	Q18. Ex-18 SL 1.15	Q19. Q.2 Xm- 15	Q20. Q1. Xm – 15
Q21. Q3. Xm -15				