GIRLS' HIGH SCHOOL AND COLLEGE

2020 - 2021

CLASS -12 A & B

PHYSICS

WORKSHEET-02

Chapter - ELECTRIC CHARGES & FIELDS

Topic - COULUMB'S LAW & ELECTRIC FIELD

INSTRUCTION : Parents kindly instruct your ward to visit the relevant websites
https://www.wikipedia.org/
www.khanacdemy.org
https://www.physicsclassroom.com/
https://www.electrical4u.com/
or refer Nootan ISC 12 Physics by Kumar& Mittal (Nageen Prakashan) or Physics-12 by D.K.Tyagi (Balaji Publications) to answer the following questions on the topics – Coulomb's Law, Electric Field, Principle of Superposition, Electric lines of force and Numericals based on above topics.

The students should go through the topics first for at least 2 to 3 days and then attempt the following questions:

1) For a system of two charges $q_1 = 8.0\mu C$ and $q_2 = 0.8\ \mu C$, state which charge will exert a greater force on the other?
2) Consider a system of three charges $+q_1, -q_2$, and $+ q_3$ placed at the vertices of the triangle with sides r_1, r_2, r_3 such that q_1 faces r_1, q_2 faces r_2 and q_3 faces r_3. Show with the help of a neat diagram all the forces acting between the charges with their proper directions.

3) Define Electric field. Give its mathematical expression, unit and dimensional formula.

4) Using the definition of electric field find an expression for electric field due to a point charge at a distance 'r' from it.

5) Is principle of superposition applicable in case of electric field at a point due to multiple charges? If yes how?

6) What is a surface charge distribution and define surface charge density? Give its unit and dimensional formula.

7) Give the expression for electric field due to a volume charge density.

8) Show diagrammatically the difference in the electric field lines for two similar charges and two opposite charges at a small separation between them.

9) Explain why two field lines do not intersect?

10) Two point's charges $q_A = 3\mu C$ and $q_B = -3\ \mu C$ are located 20cm apart in vacuum.

   a) What is the electric field at the mid point O of the line AB joining the two charges

   b) If a negative test charge of magnitude 1.5×10^{-9} C is placed at this point, what is the force experienced by the test charges?

11) An electron is separated from a proton by a distance of 0.53Å. Calculate the electric field at the location of the electron.

12) A point charge of 5×10^{-6} C experiences a force of 2×10^{-3} N when kept in uniform electric field *E*. Find E.

13) A charged oil drop weighing 1.6×10^{-15} N is found to remain suspended in uniform electric field intensity 2×10^{3} NC^{-1}. Find the charge on the drop.

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