PHYSICS

BOOKS - R G PUBLICATION

ELECTRIC CHARGES AND FIELDS

Exercise

1. Can a body have a charge of 1.8×10^{-19} C?

Give reason.

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2. State Gauss's Law of electrostatics.

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3. What is qunatisation of chage?

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4. What is the SI unit of permittivity?

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5. In an electric filed a unit positive charge is displaced from one point to another point along a straingt line of length 2cm and the work done is 2mJ. If it is displaced along a parabilic path between the same points of length 5 cm, What will be the work done?

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6. The product of permeability of free space and permittivity is -

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7. Which experiment established the fact that electric charge is quanctized?

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8. Using Gauss's theorem find the filed due to a charged thin spherical shell at a point outside the shell.

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9. Find an expression for electric filed at any position on an axial line of an electric dipole.

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10. What is an electric dipole? Find an expression for the torque acting on an electric dipole placed in an external unifrom electric filed.

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11. If electric field E = 0 in a region do you think potential at the region should also be zero? Justify you answer.

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12. State Coulomb's law of electrostatics. Express it in vector form.

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13. Apply Gauss's theorem to calculate electric field due to an infinite plane sheet of charge.

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14. If $\overline{E} = \left(3\hat{i} + 6\hat{j} + 4\hat{k}\right)\frac{N}{C}$,calculate the elctric flux through a surface area $20cm^2$ in Y-X plane .

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15. Calculate the magnitute of electrostatic force between a proton and an electron separated by a distance 0.5.A Give that magnitude of charge of proton and electron to be 1.6×10^{-19}C each

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16. State two basic properties of electric charges.

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17. Three electric point charges q_0, q_1 and q_2 are at distances $\vec{t}\, r_0$, $\vec{r}_1$ and $\vec{r}_2$ respectively with respect to same origin. What is the force on charge q_0 in the filed of charges q_1 and q_2 ?

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18. The volume charge density within a volume is $\rho(r)$. What is the force on a small test charge q_0 placed outside the volume having position vector $\overrightarrow{rr_0}$ with respect to the same origin considered to specify the position vector of the charge distribution within the volume.

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19. Give the statement of Coulomb's law for the force between two point charges. Write this law in vector notation for two point charges of same magnitude and opposite sign separated by a distacne r in vacuum.

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20. Two point charges $0.01\mu C$ and $-0.01\mu C$ are place 10 cm apart in vacuum. Calculated the magnitude of electric field intensity at the

middle point of the line joining the charges and mention its direction.

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21. Apply Gauss's law to derive the expression for electric field intensity due to an infinitely long straight uniformly charges wire. What is the direction of the field intensity if it is positively charged?

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22. Find an expression for electric filed at any position on an axial line of an electric dipole.

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23. What is the net electric flux through a closed surface surrounding an electric dipole? Derive the expressions for electric field intesity both inside and outside a uniformly charged spherical cell. What is the total enclosed by a closed surface if the electric flux entering and

leaving the surface are $20000\frac{N}{C}m^2$ and $30000\frac{N}{C}m^2$ respectively.

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24. Fill in the blanks

Electrostatic deals with the study of_____

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25. Fill in the blanks

A body can be charged negatively by _____

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26. Fill in the blanks

The dipole moment vector P of an electric dipole is defined by P = _____

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27. Fill in the blanks

The total charge of the electric dipole is ___

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28. What is electric charge?

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29. Write the name of a simple apparatus to detect charge on a body.

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30. Write two common examples of electric discharge.

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31. What is Gaussian surface?

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32. What are the two types of charges?

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33. What are the point charges?

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34. What is the S.I. unit of charge?

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35. Write the value of basic unit of charges, e?

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36. What is the value of $\in_0$ in S.I. unit?

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37. What is electrci field?

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38. What is a solid angle?

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39. What is the unit of electric flux?

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40. Deduce the expression of total flux Φ through a surface S.

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41. What is centre of the dipole?

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42. Define point dipole.

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43. Write the unit for surface charge density.

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44. State Gauss's law.

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45. Give an example to understand how the electroscope works.

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46. Will there be any effect on potential at a point if the medium arround this point is changed.

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47. Show that the electric flux through a closed surface S is $q/\in_0$

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48. Show that in an uniform electric filed E, a dipole experience a tongue r, which given by $\tau = P \times E$

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49. How can you make a simple electroscope? Describe.

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50. "Charges are additive".Describe.

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51. "Charges are conserved".Describe.

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52. What is principle of super position?

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53. What is Coulomb's law?

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54. What is elecrtic flux?

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55. What is an electric dipole?

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56. Write the physical significance of dipole.

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57. Deduce the expression $\tau = P \times E$

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58. What is volume charge density? What is its unit?

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59. Deduce the expression of field at P due to a uniformly charged thin spherical shell when the point,P is inside the shell.

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60. Show that the ratio of electric force and gravitational force between a proton and an electron is $\frac{ke^2}{Gm_cm_p} = \sim 2.4 \times 10^{39}$

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61. Write a short note on "Superposition Principle"

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62. Show that the flux $\delta\Phi$ of electric field E through a small area element δ S is given by $\delta\Phi = E\,\delta S$ when $\delta S = |\delta S|\hat{n}$

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63. How many electron must be remove from a piece of metal to give it a +ve charge of $1 \times 10^7 C$.

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64. Show that the ratio of electric force and gravitational force between a proton and an electron is $\frac{ke^2}{Gm_cm_p} = \sim 2.4 \times 10^{39}$

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65. Write the properties of electric lines of force and define neutral point.

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66. Calculate the electric dipole moment of an electron and proton 5nm apart.

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67. An electron is released from rest in a uniform electric field of magnitude $5 \times 10^{-4} \frac{N}{C}$. Calculate the acceleration of the electron.

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68. Calculate the electric potential for a point charge.

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69. Distinguish between conductors and insulators .Give examples.

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70. Write the procedure of experiment of charging two metal spherical bodies by induction.

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71. How can you charge a metal sphere positively?

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72. State two basic properties of electric charges.

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73. Apply Gauss's law to derive the expression for electric field intensity due to an infinitely long straight uniformly charges wire. What is the direction of the field intensity if it is positively charged?

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74. Write the unit of Electric field

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75. Give the SI unit of electric flux.

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76. Write the unit of Vector areas element

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77. What is quantization of charge?

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78. If the electric filed is given by $6\hat{i} + 3\hat{j} + 3\hat{k}$ calculate the electric flux through a surface area 20 units lying in y-z plane.

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79. Deduce the expression of field at P due to a uniformly charged thin spherical shell when the point,P is inside the shell.

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80. "The total charge of the isolated system is always conserved". How?

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81. How Coulomb's law agrees with the Newton's third law?

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82. Deduce the equation of electric field E, due to a system of charges $q_1, q_2 \ldots\ldots, q_n (q_1, q_2 \ldots q_n)$.

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83. Write the physical significance of electric field?

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84. Who did first introduced the concept of electric field?

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85. What are the general properties of electric field lines?

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86. Deduce the expression of field of an electric dipole for points on the equatorial plane.

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87. Write the physical significance of electric field?

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88. Who did first introduced the concept of electric field?

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89. What are the general properties of electric field lines?

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90. Find an expression for electric filed at any position on an axial line of an electric dipole.

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91. State Gauss's law.

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92. Prove that for two charges A and B that $F_{AB} = -F_{BA}$ from vectro force of Coulombs law.

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93. Find the relation between intensity and the potential at a point in an electric field.

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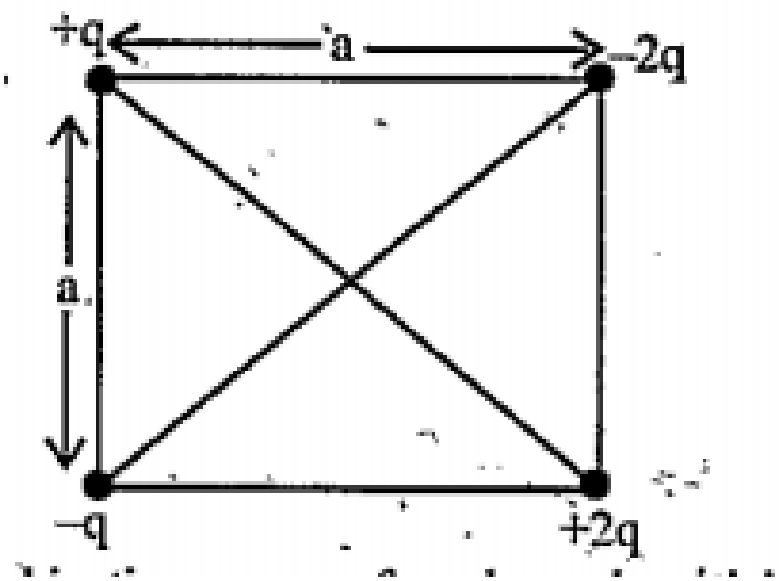
94. What are the magnitude and direction of the electric field at the centre of square in figure if $q = 1 \times 10^4 C$ and a = 5cm.



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95. The kinetic energy of a charged particle decreases by 10J as it moves from a point at potential 100V to a point of potential 200V. Find the charged on the particle.

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