PHYSICS

BOOKS - UNIVERSAL BOOK DEPOT 1960 PHYSICS (HINGLISH)

ELECTROSTATICS

Ordinary Thinking Objective Questions (Charge and Coulomb.s Law)

1. The law, governing the force between electric charges is known as

A. Ampere's law

B. Ohm's law

C. Faraday's law

D. Coulomb's law

Answer: D

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2. When the distance between two charged particles is halved, the force between them will become

A. One-fourth

B. Half

C. Double

D. Four times

Answer: D

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3. There are two charges +1 microcoulombs and +5 microcoulombs. The ratio of the forces acting on them will be

A. $1:5$

B. $1:1$

C. $5:1$

D. $1:25$

Answer: B

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4. A charge Q_1 exerts some force on a second charge Q_2. If a 3rd charge Q_3 is brought near, the force of Q_1 exerted on Q_2 :-

A. Decerases

B. Increases

C. Remains unchanged

D. Increases if q_3 is of the same sign as q_1 and decreases if q_3 is of opposite sign

Answer: C

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5. F_g and F_e represent gravitational and electrostatic force respectively between electrons situated at a distance 10 cm. The ratio of F_g / F_e is of the order of

A. 10^{42}

B. 10

C. 1

D. 10^{-43}

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6. The ratio of the force between two small spheres (with constant charges) F_1 in air and F_2 in a medium of dielectric constant k is respectively..

A. $1:K$

B. $K:1$

C. $1:K^2$

D. $K^2:1$

Answer: B

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7. A soap bubble is given a negative charge, then its radius

A. Decreases

B. Increases

C. Remains unchanged

D. Nothing can be predicted as information is insufficient

Answer: B

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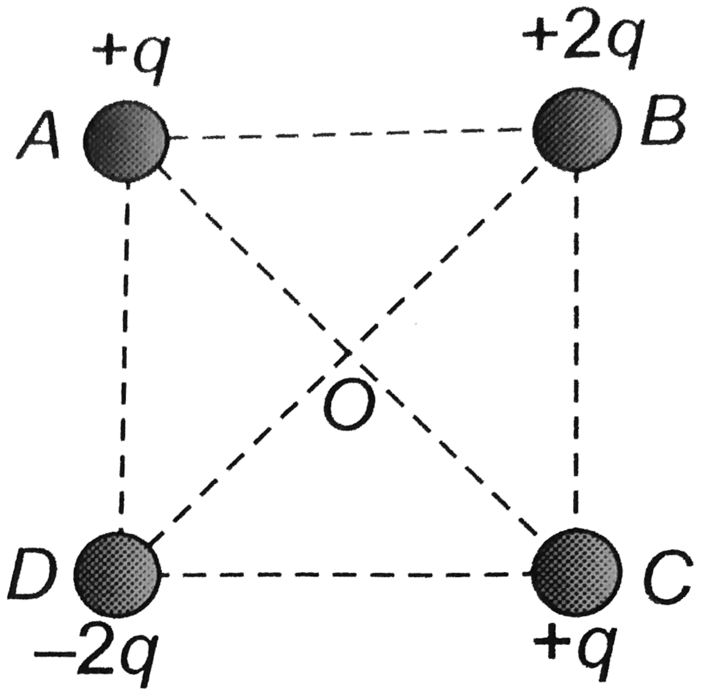
8. Four charges are arranged at the corners of a square $ABCD$, as shown in the adjoining figure, The force on a positive charge kept at the centre O is



A. Zero

B. Along the diagonal AC

C. Along the diagonal BD

D. Perpendicular to side AB

Answer: C

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9. In the absence of other conductors, the surface charge density

A. Is proportional to the charge on the conductor and its surface area

B. Inversely proportional to the charge and directly proportional to the surface area

C. Directly proportional to the charge and inversely proportional to the surface area

D. Inversely proportional to the charge and the surface area

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10. A body can be negatively charged by

A. Giving excess of electrons to it

B. Removing some electrons from it

C. Giving some protons to it

D. Removing some neutrons from it

Answer: A

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11. The minimum charge on an object is

A. 1 coulomb

B. 1 stat coulomb

C. 1.6×10^{-19} coulomb

D. 3.2×10^{-19} coulomb

Answer: C

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12. A total charge Q is broken in two parts Q_1 and Q_2 and they are placed at a distance R from each other. The maximum force of repulsion between them will occur, when

A. $Q_2=\frac{Q}{R}, Q_1=Q-\frac{Q}{R}$

B. $Q_2\frac{Q}{4}, Q_1=Q-\frac{2Q}{3}$

C. $Q_3=\frac{Q}{4}, Q_q=\frac{3Q}{4}$

D. $Q_1=\frac{Q}{2}, Q_2=\frac{Q}{2}$

Answer: D

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13. Three charges $4q$, Q and q are in a straight line in the position of $0. l/2$ and l respectively. The resultant force on q will be zero, if $Q =$

A. $-q$

B. $-2q$

C. $-\frac{q}{2}$

D. $4q$

Answer: A

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14. An isolated solid metallic sphere is given +Q charge. The charge will be distributed on the sphere

A. Uniformly but only on surface

B. Only on surface but non-uniformly

C. Uniformly inside the volume

D. Non-uniformly inside the volume

Answer: A

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15. Two small balls having equal positive charge Q,C each are suspended by two insulating strings of equal length L meter form a hook fixed to a stand . The whole set up is taken to a satellite in space where there is no gravity. Calculate the angle between the two strings and the tension in each string.

A. $180^\circ, \frac{1}{4\pi\varepsilon_0}\frac{Q^2}{(2L)^2}$

B. $90^\circ, \frac{1}{4\pi\varepsilon_0}\frac{Q^2}{L^2}$

C. $180^\circ, \frac{1}{4\pi\varepsilon_0}\frac{Q^2}{2L^2}$

D. $180^\circ, \frac{1}{4\pi\varepsilon_0}\frac{Q^2}{L^2}$

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16. It two charges of 1 coulomb each are placed 1 km apart,then the force between them will be

A. 9×10^3 Newton

B. 9×10^{-3} Newton

C. 1.1×10^{-4} Newton

D. 10^4 Newton

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17. $+2C$ and $+6C$ two charges are repelling each other with a force of $12N$. If each charges is given $-2C$ of charge is given $-2C$ of charge, then the value of the force will be

A. 4N (Attractive)

B. 4N (Repulsive)

C. 8N (Repulsive)

D. Zero

Answer: D

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18. Dielectric constant of pure water is 81. Its permittivity will be

A. 7.12×10^{-10} MKS units

B. 8.86×10^{-12} MKS units

C. 1.02×10^{13} MKS units

D. Cannot be calculated

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19. There are two metallic spheres of same radii but one is solid and the other is hollow, then

A. Solid sphere can be given more charge

B. Hollow sphere can be given more charge

C. They can be charged equally (maximum)

D. None of the above

Answer: C

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20. In a general, metallic ropes are suspended on the carries which take inflammable material. The reason is

A. There speed is controlled

B. To keep the centre of gravity of the carrier nearer to the earth

C. To keep the body of the carrier in contact with the earth

D. Nothing should be placed under the carrier

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21. Three equal charges are placed on the three corners of a square. If the force between q_1 and q_2 is F_{12} and that between q_1 and q_3 is F_{13}, then the ratio of magnitudes (F_{12} / F_{13}) is

A. $1/2$

B. 2

C. $1/\sqrt{2}$

D. $\sqrt{2}$

Answer: B

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22. ABC is a right angled triangle in which AB = 3 cm and BC = 4cm. And $\angle ABC = \pi/2$. The three charges +15, + 12 and -20 e.s.u. are placed respectively on A, B and C . The force acting on B is

A. 125 dynes

B. 35 dynes

C. 25 dynes

D. Zero

Answer: C

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23. What is the effect of temperature on dielectric constant ?

A. Increases

B. Decreases

C. Remains unchanged

D. Charges erratically

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24. Two charges q_1 and q_2 are placed in vacuum at a distance d and the force acting between them is F . If a medium of dielectric constant 4 is introduced around them, the force now will be

A. $4F$

B. $2F$

C. $\frac{F}{2}$

D. $\frac{F}{4}$

Answer: D

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25. Force of attraction between two point charges Q and $-Q$ separated by d meter is F_e. When these charges are placed on two identical spheres of radius $R = 0.3d$ whose centres are d meter apart , the force of attraction between them is

A. Greater than F_e

B. Equal to F_e

C. Less than F_e

D. Less than F_e

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26. When 10^{14} electrons are removed from a neutral metal sphere , the charge on it becomes

A. $16\mu C$

B. $-16\mu C$

C. $32\mu C$

D. $-32\mu C$

Answer: A

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27. A force F acts between sodium and chlorine ions of salt (sodium chloride) when put 1 cm apart in air. The permittivity of air and dielectric constant of water are ε_0 and k respectively. When a piece of salt is put in water, electrical force acting between sodium and chlorine ions 1cm apart is

A. $\frac{F}{K}$

B. $\frac{FK}{\varepsilon_0}$

C. $\frac{F}{K\varepsilon_0}$

D. $\frac{F\varepsilon_0}{K}$

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28. A conductor has 14.4×10^{-19} coulombs positive charge. The conductor has : (Charge on electron $= 1.6 \times 10^{-19}$ coulombs

A. 9 electrons in excess

B. 27 electrons in short

C. 27 electrons in excess

D. 9 electrons in short

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29. The value of electric permittivity of free space is

A. $9 \times 10^9 NC^2 / m^2$

B. $8.85 \times 10^{-12} Nm^2 / C^2 \sec$

C. $8.85 \times 10^{-12} C^2 / Nm^2$

D. $9 \times 10^9 C^2 / Nm^2$

Answer: C

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30. Two similar spheres having $+Q$ and $-Q$ charge are kept at a certain distance. F force acts between the two. If in the middle of two spheres, another similar sphere having $+Q$ charge is kept, then it experiences a force in magnitude and direction as

A. Zero having no direction

B. 8F towards +q charge

C. 8F towards -Q charge

D. 4F towards +q charge

Answer: C

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31. A charge Q is divided into two parts of q and Q -q . If the coulomb repulsion between them when they are separated is to be maximum, the ratio of $\frac{Q}{q}$ should be

A. 2

B. $\frac{1}{2}$

C. 4

D. $\frac{1}{4}$

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32. Calculate the number of electrons consituting one coulomb of charge.

A. 5.46×10^{29}

B. 6.25×10^{18}

C. $1.6 \times 10^{+19}$

D. 9×10^{11}

Answer: B

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33. When air is replaced by a dielectric medium of constant K, the maximum force separated by a distance

A. Decreases K times

B. Remains unchanged

C. Increases K times

D. Increases k^{-1} times

Answer: A

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34. A glass rod rubbed with silk is used to charge a gold leaf electroscope and the leaves are observed to diverge. The electroscope thus charged is exposed to X-rays for a short period. Then

A. The divergence of leaves will not be affected

B. The leaves will diverge further

C. The leaves will collapse

D. The leaves will melt

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35. One metallic sphere A is given positive charge whereas another identical metallic sphere B of exactly same mass as of A is given equal amount of negative charge. Then

A. Mass of and mass of still remain equal

B. Mass of increases

C. Mass of decreases

D. Mass of increases

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36. The force between two charges 0.06 m apart is 5 N . If each charge is moved towards the other by 0.01 m, then the force between them will become

A. $7.20N$

B. $11.25N$

C. $22.50N$

D. $45.00N$

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37. Two charge spheres separated at a distance d exert a force F on each other. If they are immersed in a liquid of dielectric constant K=2, then the force (if all conditions are same) is

A. $\frac{F}{2}$

B. F

C. $2F$

D. $4F$

Answer: A

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38. Two point charges $+3\mu C$ and $+8\mu C$ repel each other with a force of $40N$. If a charge of $-5\mu C$ is added to each of them, then the force between them will become

A. $-10N$

B. $+10N$

C. $+20N$

D. $-20N$

Answer: A

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39. When 10^{19} electrons are removed from a neutral metal plate through some process, then the charge on it becomes

A. $-1.6C$

B. $+1.6C$

C. $10-C$

D. $10+C$

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40. Electric charges of $1\mu C, -1\mu C$ and $2\mu C$ are placed in air at the corners A, B and C respectively of an equilateral triangle ABC having length of each side $10cm$. The resultant force on the charge at C is

A. 0.9 N

B. 1.8 N

C. 2.7 N

D. 3.6 N

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41. Charge on an α-particle is

A. $4.8 \times 10^{-19} C$

B. $1.6 \times 10^{-19} C$

C. $3.2 \times 10^{-19} C$

D. $6.4 \times 10^{-19} C$

Answer: C

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42. Two small conducting spheres of equal radius have charges $+10\mu C$ and $-20\mu C$ respectively and placed at a distance R from each other. They experience force F_1. If they are brought in contact and separated to the same distance, they experience force F_2. The ratio of F_1 to F_2 is

A. $1:8$

B. $-8:1$

C. $1:2$

D. $-2:1$

Answer: B

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43. Two charges each equal to $2\mu C$ are 0.5 m apart. If both of them exist inside vacuum, then the force between them is

A. 1.89 N

B. 2.44 N

C. 0.144 N

D. 3.144 N

Answer: C

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44. Two charges are at a distance d apart. If a copper plate (conducting medium) of thickness $d/2$ is placed between them , the effictive force will be

A. 2F

B. $f/2$

C. 0

D. $\sqrt{2}F$

Answer: C

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45. Two electrons are separated by a distance of 1Å.

What is the Coulomb force between them?

A. $2.3 \times 10^{-8} N$

B. $4.6 \times 10^{-8} N$

C. $1.5 \times 10^{-8} N$

D. None of these

Answer: A

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46. Two copper balls, each weighing $10g$ are kept in air $10cm$ apart. If one electron from every 10^6 atoms in trandferred from one ball to the other, the coulomb force between them is (atomic weight of copper is 63.5)

A. $2.0 \times 10^{10} N$

B. $2.0 \times 10^4 N$

C. $2.0 \times 10^8 N$

D. $2.0 \times 10^6 N$

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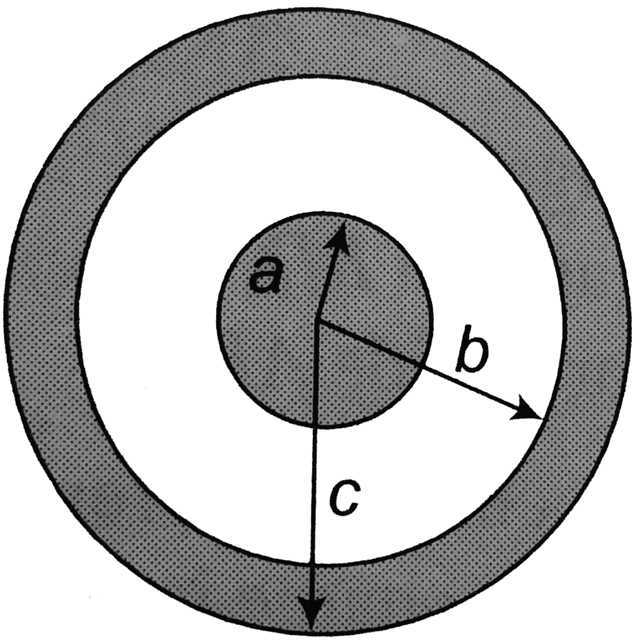
47. A solid conducting sphere of radius a has a net positive charge $2Q$. A conducting spherical shell of inner radius b and outer radius c is concentric with the solid sphere and has a net charge $-Q$. The surface charge density on the inner and outer surfaces of the spherical shell will be



A. $-\frac{2Q}{4\pi b^2}, \frac{Q}{4\pi c^2}$

B. $-\frac{Q}{4\pi b^2}, \frac{Q}{4\pi c^2}$

C. $0, \frac{Q}{4\pi c^2}$

D. None of the above

Answer: A

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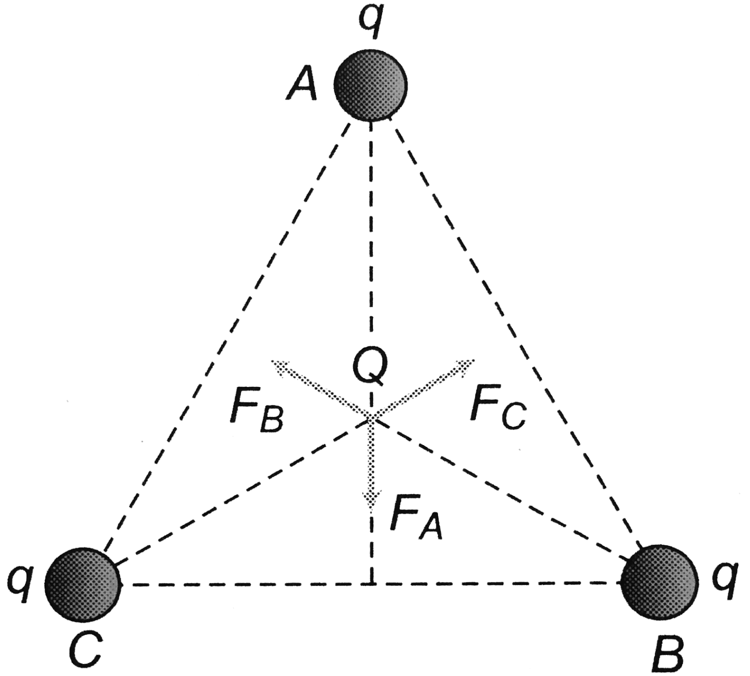
48. Three charges each of magnitude q are placed at the corners of an equilateral triangle, the electrostatic force on the charge place at the centre is (each side of triangle is L)



A. Zero

B. $\dfrac{1}{4\pi\varepsilon_0}\dfrac{q^2}{L^2}$

C. $\dfrac{1}{4\pi\varepsilon_0}\dfrac{3q^2}{L^2}$

D. $\dfrac{1}{12\pi\varepsilon_0}\dfrac{q^2}{L^2}$

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49. Two charges placed in air repel each other by a force of $10^{-4}N$. When oil is introduced between the charges, then the force becomes $2.5 \times 10^{-5}N$ The dielectric constant of oil is

A. 2.5

B. 0.25

C. 2.0

D. 4.0

Answer: D

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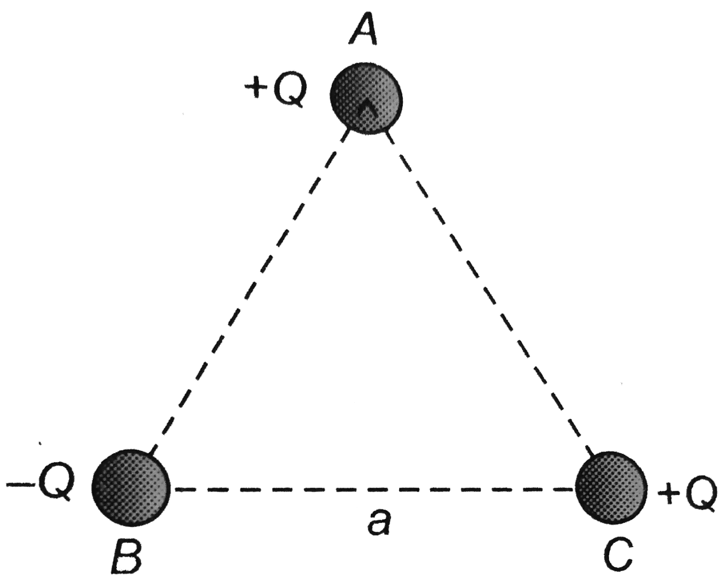
50. Three charges are placed at the vertices of an equilateral trianlge of side a as shown in the following figure. The force experienced by the charge placed at the vertex A in a direction normal to BC is



A. $Q^2 / (4\pi\varepsilon_0 a^2)$

B. $-Q^2 / (4\pi\varepsilon_0 a^2)$

C. Zero

D. $Q^2 / (2\pi\varepsilon_0 a^2)$

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51. Two particle of equal mass m and charge q are placed at a distance of 16 cm. They do not experience any force. The value of $\frac{q}{m}$ is

A. l

B. $\sqrt{\frac{\pi\varepsilon_0}{G}}$

C. $\sqrt{\dfrac{G}{4\pi\varepsilon_0}}$

D. $\sqrt{4\pi\varepsilon_0 G}$

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52. When a glass rod is rubbed with silk, it

A. Gains electrons from silk

B. Gives electrons to silk

C. Gains protons from silk

D. Gives protons to silk

Answer: B

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53. An electron is moving round the nucleus of a hydrogen atom in a circular orbit of radius r. The coulomb force $\overrightarrow{F}$ between the two is (where $k = \frac{1}{4\pi\varepsilon_0}$)

A. $-K\frac{e^2}{r^3}\hat{r}$

B. $K\frac{e^2}{r^3}\overrightarrow{r}$

C. $-K\frac{e^2}{r^3}\overrightarrow{r}$

D. $K\frac{e^2}{r^2}\hat{r}$

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54. A body has -80 micro coulomb of charge. Number of additional electrons in it will be

A. 8×10^{-5}

B. 80×10^{-17}

C. 5×10^{14}

D. 1.28×10^{-17}

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55. Two point charges placed at a certain distance r in air exert a force F on each other. Then the distance r at which these charges will exert the same force in a medium of dielectric constnat K is given by

A. r

B. r/k

C. $r/\sqrt{k}$

D. $r\sqrt{k}$

Answer: C

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56. The dielectric constant of a metal is

A. Zero

B. Infinite

C. I

D. Greater then 1

Answer: B

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57. A charge of Q coulomb is placed on a solid piece of metal of irregular shape. The charge will distribute itself

A. Uniformly in the metal object

B. Uniformly on the surface of the object

C. Such that the potential energy of the system is minimised

D. Such that the total heat loss is minimised

Answer: C

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58. Five balls numbered 1,2,3,4,and 5 are suspended using separated threads. The balls (1,2),(2,4) and (4,1) show electrostatic attraction while balls (2,3) and (4,5) show repulsion. Therefore, ball 1 must be

A. Positively charged

B. Negatively charged

C. Neutral

D. Made of metal

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59. Equal charges q are placed at the four corners $A, B, C, D$of a square of length a. The magnitude of the force on the charge at B will be

A. $\frac{3q^2}{4\pi\varepsilon_0 a^2}$

B. $\frac{4q^2}{4\pi\varepsilon_0 a^2}$

C. $\left(\left(\frac{1}{2}+\sqrt{2}\right)\right)\frac{q^2}{4\pi\varepsilon_0 a^2}$

D. $\left(2+\frac{1}{\sqrt{2}}\right)\frac{q^2}{4\pi\varepsilon_0 a^2}$

Answer: C

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60. Two identical conductors of copper and aluminium are placed in an identical electric fields. The magnitude of induced charge in the aluminium will be

A. Zero

B. Greater than in copper

C. Equal to that in copper

D. Less than in copper

Answer: C

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61. Two spherical conductors B and C having equal radii and carrying equal charges on them repel each other with a force F when kept apart at some distance. A third spherical conductor having same radius as that B but uncharged is brought in contact with B, then brought in contact with C and finally removed away from both. The new force of repulsion between B and C is

A. F/4

B. 3F/4

C. F/8

D. 3F/8

Answer: D

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62. When a body is earth connected, electrons from the earth flow into the body. This means the body is

....

A. Unchanged

B. Charged positively

C. Charged negatively

D. An insulator

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63. The charges on two spheres are $+7\mu C$ and $-5\mu C$ respectively. They experience a force F. If each of them is given an additional charge of $-2\mu C$, the new force of attraction will be

A. F

B. F/2

C. $F/\sqrt{3}$

D. $2F$

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64. The ratio of electrostatic and gravitational force acting between electron and proton separated by a distance $5 \times 10^{-11} m$, will be (charge on electron $= 1.6 \times 10^{-19} C$, mass of electron $= 9.1 \times 10^{-31} kg$

, mass of proton

$= 1.6 \times 10^{-27} kg, G = 6.7 \times 10^{-11} N - m^2 / kg^2)$

A. 2.36×10^{39}

B. 2.36×10^{40}

C. 2.34×10^{41}

D. 2.34×10^{42}

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65. Two point charges $3 \times 10^{-6} C$ and $8 \times 10^{-6} C$ repel each other by a force of 6×10^{-3} N. If each of them is given an additional charge – 6×10^6 C, the force between them will be

A. 2.4×10^{-3} N (attractive)

B. 2.4×10^{-9}N (attractive)

C. 1.5×10^{-3}N (repulsive)

D. 1.5×10^{-3} N (attractive)

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66. Two equally charged, indentical metal spheres A and B repel each other with a force F. The spheres are kept fixed with a distance r between them. A third identical, but uncharged sphere C is brought in contact with A and The magnitude of the net electric force on C is

A. F

B. $3F/4$

C. $F/2$

D. $F/4$

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67. Two charges of equal magnitudes and at a distance r exert a force F on each other. If the charges are halved and distance between them is doubled, then the new force acting on each charge is

A. F/8

B. F/4

C. 4F

D. F/16

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68. An infinite number of charges, each of charge $1\mu C$ are placed on the x-axis with co-ordinates

$x = 1, 2, 4, 8. \dots \infty$ If a charge of $1C$ is kept at the origin, then what is the net force action on $1C$ charge

A. 9000 N

B. 12000 N

C. 24000 N

D. 36000 N

Answer: B

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69. The number of electrons in 1.6 C charge will be

A. 10^{19}

B. 10^{20}

C. 1.1×10^{19}

D. 1.1×10^{2}

Answer: A

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70. Four metal conductors having different shapes

1. A sphere 2. Cyclindrical

3.Pear 4.Lightning conductor

Are mounted on insulating stands and charged. The one which is best suited to retain the charges for a longer time is

A. 1

B. 2

C. 3

D. 4

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Ordinary Thinking Objective Questions (Electric Field and Potential)

1. A charge q is placed at the centre of the line joining two equal charges Q. The system of the three charges will be in equilibrium if q is equal to:

A. $-\frac{Q}{2}$

B. $-\frac{Q}{4}$

C. $+\frac{Q}{4}$

D. $+\frac{Q}{2}$

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2. Inside a hollow charged spherical conductor, the potential

A. Is constant

B. Varies directly as the distance from the centre

C. Varies inversely as the distance from the centre

D. Varies inversely as the square of the distance from the centre

Answer: A

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3. Two small spheres, each carrying a charge q are placed r m apart and they interact with force F. If one of the sphere is taken around the other once in a circular path, the work done will be equal to

A. Force between them $\times$ r

B. Force between them $\times 2\pi r$

C. Force between them $/ 2\pi r$

D. Zero

Answer: D

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4. An electric charge in uniform motion produces

A. An electric field only

B. A magnetic field only

C. Both electric and magnetic field

D. Neither electric nor magnetic field

Answer: C

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5. Two charged spheres of radii 10 cm and 15 cm are connected by a thin wire. Current will flow through them if they have the same

1. charge on each

2. energy

3. potential

Which of the statements given above is/are correct ?

A. only 1

B. only 2

C. Only 3

D. Both 1 and 2

Answer: D

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6. The electric field inside a spherical shell of uniform surface charge density is

A. Zero

B. Constant, less than zero

C. Directly proportional to the distance from the centre

D. None of the above

Answer: A

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7. The electric potential V at any point x,y,z (all in metre) in space is given by $V = 4x^2$ volt. The electric field at the point $(1m, 0, 2m)$ is ....$\frac{V}{m}$.

A. 8 along negative X- axis

B. 8 along positive X - axis

C. 16 along negative X - axis

D. 16 along positive Z - axis

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8. A hollow metal sphere of radius $5cm$ is charged so that the potential on its surface is $10V$. The potential at the centre of the sphere is

A. 0 V

B. 10 V

C. Same as at point 5 cm away from the surface

D. Same as at point 25 cm away from the surface

Answer: B

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9. If a unit positive charge is taken from one point to another over an equipotential surface ,then

A. Work is done on the charge

B. Work is done by the charge

C. Work done is constant

D. No work is done

Answer: D

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10. Electric lines of force about negative point charge are

A. Circular, anticlockwise

B. Circular, clockwise

C. Radial, inward

D. Radial, outward

Answer: C

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11. Charges of $+\frac{10}{3}\times 10^{-9}C$ are placed at each of the four corners of a square of side $8cm$. The potential at the intersection of the diagonals is

A. $150\sqrt{2}$ volt

B. $1500\sqrt{2}$ volt

C. $900\sqrt{2}$ volt

D. 900 volt

Answer: B

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12. A uniform electric field having a magnitude E_0 and direction along the positive X-axis exists. If the potential V is zero at $x = 0$, then its value at $X = +x$ will be

A. $V_{(x)} = +xE_0$

B. $V_x = -xE_0$

C. $V_x = +x^2E_0$

D. $V_x = -x^2E_0$

Answer: B

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13. Three charges $2q, \ -q, \ \text{and} \ -q$ are located at the vertices of an equilateral triangle. At the center of the triangle,

A. The field is zero but potential is non-zero

B. The field is non-zero but potential is zero

C. Both field and potential are zero

D. Both field and potential are non-zero

Answer: B

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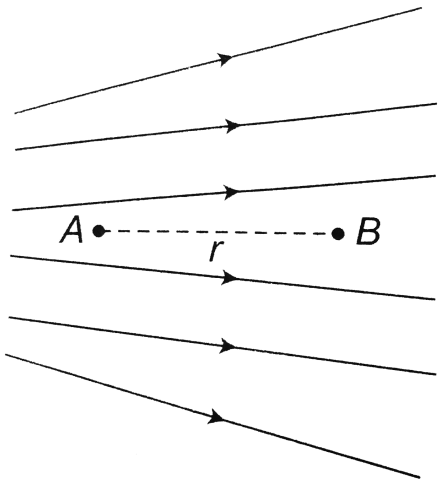
14. Figure shows the electric lines of force emerging from a charged body. If the electric field at$A$ and B are E_A and E_B respectively and if the displacement between A and B is r then



A. $E_A > E_B$

B. $E_A < E_B$

C. $V_A = V_B$

D. $V_A = \frac{V_B}{r^2}$

Answer: A

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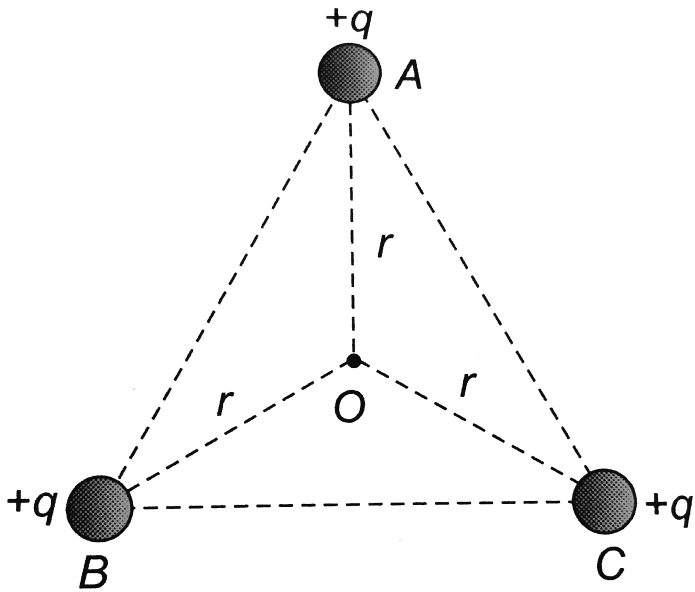
15. ABC is an equilateral triangle. Charges $+q$ are placed at each corner. The electric intensity at O will be



A. $\dfrac{1}{4\pi\varepsilon_0}\dfrac{q}{r^2}$

B. $\dfrac{1}{4\pi\varepsilon_0}\dfrac{q}{r}$

C. Zero

D. $\dfrac{1}{4\pi\varepsilon_0}\dfrac{3q}{r^2}$

Answer: C

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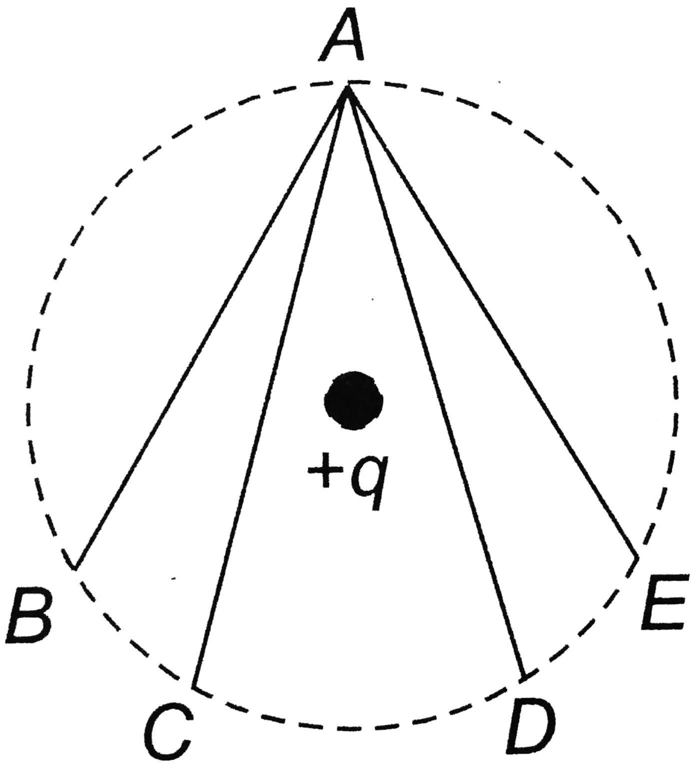
16. In the electric field of a point chargde q, a cetrain charge is carried from point A to B, C, D and E. Then the ork done



A. Is least along the path AB

B. Is least along the path AD`

C. Is zero along all the paths AB, AC, AD and AE

D. Is least along AE

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17. The magnitude of electric field intensity E is such that, an electron placed in it would experience an electrical force equal to its weight is given by

A. mge

B. $\frac{mg}{e}$

C. $\frac{e}{mg}$

D. $\frac{e^2}{m^2}g$

Answer: B

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18. A conductor with a positive charge

A. Is always at +ve potential

B. Is always at zero potential

C. Is always at negative potential

D. May be at +ve, zero or -ve potential

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19. An electron and a proton are in uniform electic field. The ratio of their acceleration will be

A. Zero

B. Unity

C. The ratio of the masses of proton and electron

D. The ratio of the masses of electron and proton

Answer: C

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20. Two parallel plates have equal and opposite charge. When the space between them is evacuated, the electric field between the plates is 2×10^5 V/m. When the space is filled with dielectric, the electric field becemes 1×10^5 V/m. The dielectric constant of the dielectric material is

A. $1/2$

B. 1

C. 2

D. 3

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21. The insulation property of air breaks down at $E = 3 \times 10^6 \text{volt} / meter$. The maximum charge that can be given to a sphere of diameter $5m$ is approximately (in coulombs)

A. 2×10^{-2}

B. 2×10^{-3}

C. 2×10^{-4}

D. 2×10^{-5}

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22. The distance between the two charges $25\mu C$ and $36\mu C$ is $11cm$. At what point on the line joining the two, the intensity will be zero

A. At a distance of 5cm from $25\mu C$

B. At a distance of 5cm from $36\mu C$

C. At a distance of 10cm from $25\mu C$

D. At a distance of 11cm from $36\mu C$

Answer: A

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23. Two spheres A and B of radius 4 cm and 6 cm are given charges of $80\mu C$ and $40\mu C$, respectively. If they are connected by a fine wire, then the amount of charge flowing from one to the other is

A. $20\mu C$ from A to B

B. $10\mu C$ from A to B

C. $32\mu C$ from B to A

D. $32\mu C$ from A to B

Answer: D

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24. A charge particle is free to move in an electric field. It will travel

A. Always along a line of force

B. Along a line of force, if its initial velocity is zero

C. Along a line of force, if it has some initial velocity in the direction of an acute angle with the line of force

D. None of the above

Answer: D

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25. If E is the electric field intensity of an electrostatic field, then the electrostatic energy density is proportional to

A. E

B. E^2

C. $1/E^2$

D. E^3

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26. A metallic sphere has a charge of $10\mu C$. A unit negative charge is brought from A to B both $100cm$ away from the sphere but A being east of it while B being on west. The net work done is

A. Zero

B. $2/10$ joule

C. $-2/10$ joule

D. $-1/10$ joule

Answer: A

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27. Two charges $+4e$ and $+e$ are at a distance x apart. At what distance,a charge q must be placed from charge $+e$ so that is in equilibrium

A. $x/2$

B. $2x/3$

C. $x/3$

D. $x/6$

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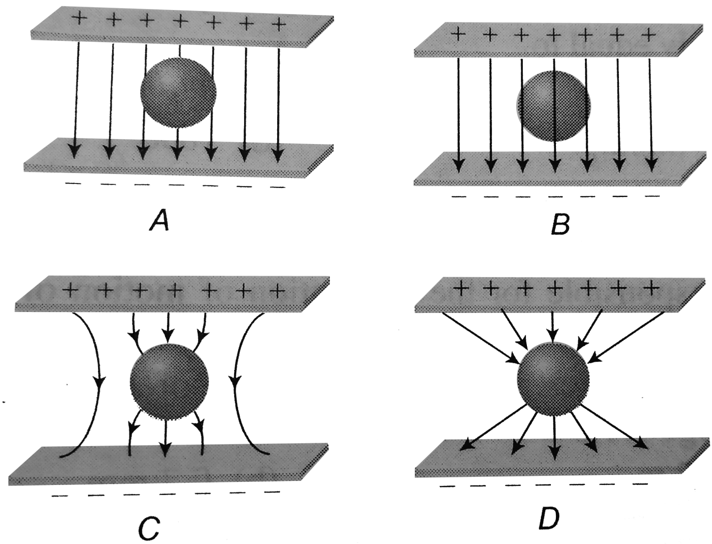
28. An uncharged sphere of metal is placed in between two charged plates as shown. The lines of force look like



A. A

B. B

C. C

D. D

Answer: C

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29. The intensity of electric field required to balance a proton of mass $1.7 \times 10^{-27} kg$ and chrage $1.6 \times 10^{-19} C$ is nearly

A. $1 \times 10^{-7} V/m$

B. $1 \times 10^{-5} V/m$

C. $1 \times 10^{7} V/m$

D. $1 \times 10^{5} V/m$

Watch Video Solution

30. On ortating a point charge having a charge q around a chrage Q in a circla of radius r. The work done will be

A. $q \times 2\pi r$

B. $\dfrac{q \times 2\pi Q}{r}$

C. Zero

D. $\dfrac{Q}{2\varepsilon_0 r}$

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31. Two point charges Q and $-3Q$ are placed at some distance apart. If the electric field at the location of Q is E then at the locality of $-3Q$, it is

A. $-E$

B. $E/3$

C. $-3E$

D. $-E/3$

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32. The number of electrons to be put on a spherical conductor of radius $0.1m$ to produce an electric field of $0.036N/C$ just above its surface is

A. 2.7×10^5

B. 2.6×10^5

C. 2.5×10^5

D. 2.4×10^5

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33. Two plates are $2cm$ apart, a potential difference of 10 volt is applied between them, the electric field between the plates is

A. $20N/C$

B. $500N/C$

C. $5N/C$

D. $250N/C$

Answer: B

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34. The intensity of the electric field required to keep a water drop of radius $10^{-5} cm$ just suspended in air when charged with one electron is approximately

A. 260 volt / cm

B. 260 newton / coulomb

C. 130 volt / cm

D. 130 newton / coulomb

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35. Conduction electrons are almost uniformly distributed within a conducting plate. When placed in an electric field $\vec{E}$, the electric field within the plate

A. Is zero

B. Depends upon E

C. Depends upon $\vec{E}$

D. Depends upon the atomic number of the conducting element

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36. Three particles, each having a charge of $10\mu C$ are placed at the coners of an equilateral triangle of side $10cm$. The electrostatic potential energy of the system is (Given $\frac{1}{4\pi\varepsilon_0} = 9 \times 10^9 N - m^2 / C^2\Big)$

A. Zero

B. Infinite

C. 27 J

D. 100 J

Answer: C

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37. The electric field near a conducting surface having a uniform surface charge density σ is given by

A. $\frac{\sigma}{\varepsilon_0}$ and is parallel to the surface

B. $\frac{2\sigma}{\varepsilon_0}$ and is parallel to the surface

C. $\frac{\sigma}{\varepsilon_0}$ and is normal to the surface

D. $\frac{2\sigma}{\varepsilon_0}$ and is normal to the surface

Answer: C

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38. There is an electric field E in x-direction. If the work done on moving a charge of $0.2C$ through a distance of 2w m along a line making a angle 60° with x-axis is 4 J, then what is the value of E?

A. $\sqrt{3}N/C$

B. $4N/C$

C. $5N/C$

D. None of these

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39. Four equal charges Q are placed at the four corners of a square of each side is 'a'. Work done in removing a charge $-Q$ from its centre to infinity is

A. 0

B. $\dfrac{\sqrt{2}Q^2}{4\pi\varepsilon_0 a}$

C. $\dfrac{\sqrt{2}Q^2}{\pi\varepsilon_0 a}$

D. $\dfrac{Q^2}{2\pi\varepsilon_0 a}$

Answer: C

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40. A particle A has chrage $+q$ and a particle B has charge $+4q$ with each of them having the same mass m. When allowed to fall from rest through the same electric potential difference, the ratio of their speed $\frac{v_A}{v_B}$ will become

A. $2:1$

B. $1:2$

C. $1:4$

D. $4:1$

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41. Deutron and $allpha$- particle are put 1Å apart in air. Magnitude of intensity of electric field due to deutron at $\alpha -$ particle is

A. Zero

B. 2.88×10^{11} newton / coulomb

C. 1.44×10^{11} newton / coulomb

D. 5.76×10^{11} newton / coulomb

Watch Video Solution

42. Angle between equipotential surface and lines of force is

A. Zero

B. 180°

C. 90°

D. 45°

Answer: C

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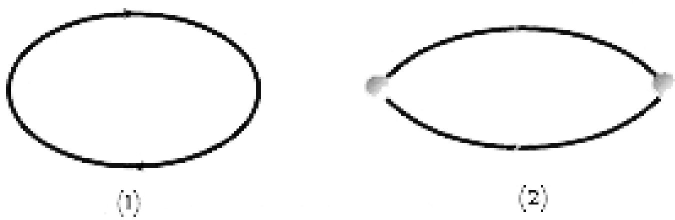
43. Below figures (1) and (2) represent lines of force. Which is correct statement



A. Figure (1) represents magnetic lines of force

B. Figure (2) represents magnetic lines of force

C. Figure (1) represents electric lines of force

D. Both figure (1) and figure (2) represent magnetic lines of force

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44. The unit of electric field is not equivalent to

A. N/C

B. J/C

C. V/m

D. $J/C - m$

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45. A flat circular fixed disc has charge +Q uniformly distributed on the disc. A charge +q is thrown with kinetic energy K, towards the disc along its axis. The charge q :

A. Hit the disc at the centre

B. Return back along its path after touching the disc

C. Return back along its path without touching the disc

D. Any of the above three situations is possible depending on the magnitude of E

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46. At a certain distance from a point charge, the electric field is 500 V/m and the potential is 3000 V. What is the distance ?

A. 6m

B. 12m

C. 36m

D. 144m

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47. The magnitude of electric field $\vec{E}$ in the annular region of a charged cylindrical capacitor.

A. Is same throughout

B. Is higher near the outer cylinder than near the inner cylinder

C. Varies as $1/r$, where r is the distance from the axis

D. Varies as $1/r^2$, where r is the distance from the axis

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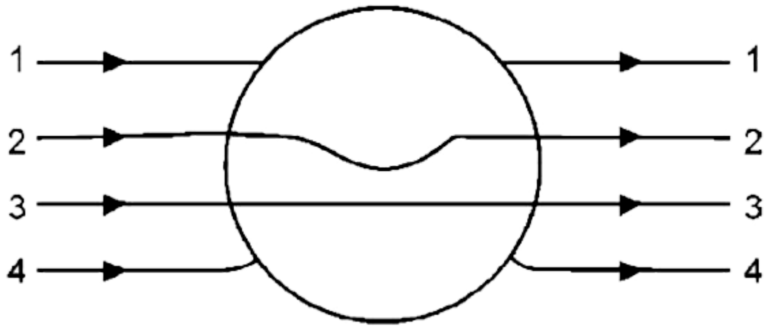
48. A metallic solid sphere is placed in a uniform electric fied. The lines of force follow the path(s) shown in Figure as



A. 1

B. 2

C. 3

D. 4

Answer: D

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49. The distance between a proton and electron both having a charge 1.6×10^{-19} coulomb, of a hydrogen atom is 10^{-10} metre . The value of intensity of electric field produced on electron due to proton will be

A. $2.304 \times 10^{-10} N/C$

B. $14.4 V/m$

C. $16 V/m$

D. $1.44 \times 10^{11} N/C$

Answer: D

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50. What is the magnitude of a point charge due to which the electric field $30cm$ away the magnitude 2?

$[1/4\pi\varepsilon_0 = 9 \times 10^9 Nm^2/C^2]$

A. 2×10^{-11} coulomb

B. 3×10^{-11} coulomb

C. 5×10^{-11} coulomb

D. 9×10^{-11} coulomb

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51. two charge $+q$ and $-q$ are situated at a certain distance. At the point exactly midway between them

A. Electric field and potential both are zero

B. Electric field is zero but potential is not zero

C. Electric field is not zero but potential is zero

D. Neither electric field nor potential is zero

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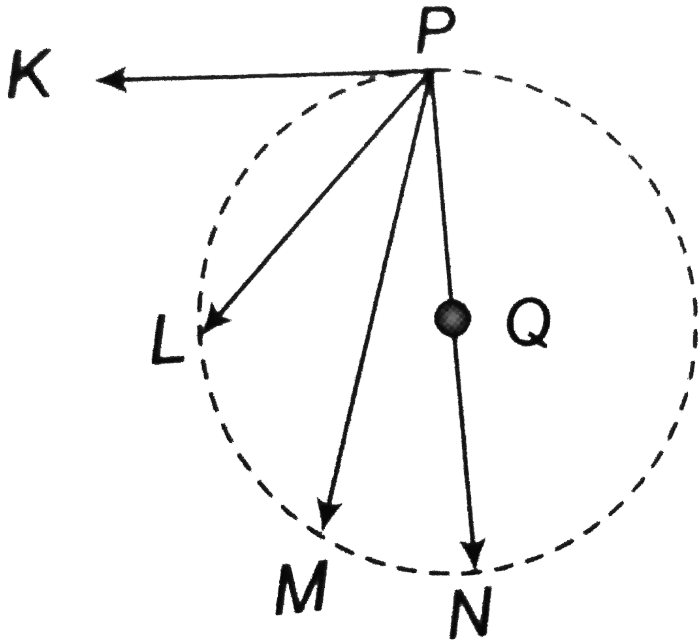
52. In the firgure the charge Q is at the centre of the circle. Work done is maximum when another charge is taken from point P to



A. K

B. L

C. M

D. N

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53. A mass $m = 20g$ has a charge $q = 3.0mC$. It moves with a velocity of 20 m/s and enters a region of electric field of 80 N/C in the same direction as the velocity of the mass. The velocity of the mass after 3 s in this region is

A. 80 m/s

B. 56 m/s

C. 44 m/s

D. 40 m/s

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54. Four idenbtial charges $+50\mu C$ each are placed, one at each corner of a square of side $2m$. How much external energy is required to bring another charge of $+50\mu C$ from infinity to the centre of the square

(Given $\frac{1}{4\pi\varepsilon_0} = 9 \times 10^9 \frac{Nm^2}{C^2}$)

A. 64 J

B. 41 J

C. 16 J

D. 10 J

Answer: A

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55. In Millike's oil drop experiment an oil drop carrying a charge Q is held stationary by a potential difference $2400V$ between the plates. To keep a drop of half the radius stationary the potential difference had to be made $600V$. What is the charge on the second drop ?

A. $\frac{Q}{4}$

B. $\frac{Q}{2}$

C. Q

D. $\frac{3Q}{2}$

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56. A charge of $5C$ experiences a force of $5000N$ when it is kept in a uniform electric field. What is the potential difference between two points separted by a distance of $1cm$?

A. 10V

B. 250V

C. 1000V

D. 2500V

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57. Two insulated charged conducting spheres of radii $20cm$ and $15cm$ respectively and having an equal charge of $10C$ are connected by a copper wire and then they are separated. Then

A. Both the spheres will have the same charge of 10C

B. Surface charge density on the 20cm sphere will be greater than that on the 15 cm sphere

C. Surface charge density on the 15 cm sphere will be greater than that on the 20 cm sphere

D. Surface charge density on the two spheres will be equal

Answer: C

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58. Equal charges q are placed at the vertices A and B of an equilatral triangle ABC of side a. The magnitude of electric field at the point C is

A. $\frac{q}{4\pi\varepsilon_0 a^2}$

B. $\frac{\sqrt{2}q}{4\pi\varepsilon_0 a^2}$

C. $\frac{\sqrt{3}q}{4\pi\varepsilon_0 a^2}$

D. $\frac{q}{2\pi\varepsilon_0 a^2}$

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59. Two charges of equal magnitude q are placed in air at a distance 2a apart and third charge $-2q$ is placed at mid-point . The potential energy of the system is (ε_0 = permittivity of free space)

A. $\dfrac{q^2}{8\pi\varepsilon_0 a}$

B. $\dfrac{6q^2}{8\pi\varepsilon_0 a}$

C. $-\dfrac{7q^2}{8\pi\varepsilon_0 a}$

D. $\dfrac{9q^2}{8\pi\varepsilon_0 a}$

Answer: C

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60. Two point charges $100\mu C$ and $5\mu C$ are placed at points A and B respectively with $AB = 40cm$. The work done by external froce in displacing the charge

$5\mu C$ from B to C, where $BC = 30cm$, angle $ABC = \frac{\pi}{2}$ and $\frac{1}{4\pi\varepsilon_0} = 9 \times 10^9 Nm^2 / C^2$

A. 9 J

B. $\frac{81}{20} J$

C. $\frac{9}{25} J$

D. $-\frac{9}{4} J$

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61. The unit of intensity of electric field is

A. Newton / Coulomb

B. Joule / Coulomb

C. Volt - metre

D. Newton / metre

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62. Equal charges are given to two spheres of different radii. The potential will

A. Be more on the smaller sphere

B. Be more on the bigger sphere

C. Be equal on both the spheres

D. Depend on the nature of the materials of the spheres

Answer: A

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63. A chrage of $5C$ is given a displacement of $0.5m$. The work done in the process is $10J$. The potetnial difference between the two points will be

A. 2V

B. 0.25 V

C. 1 V

D. 25 V

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64. The electric potential V is givne as a function of distance x (metre) by $V=(5x^2+10x-9)$ volt. Value of electric field at $x=1$is

A. 20 V/m

B. 6 V/m

C. 11 V/m

D. -23 V/m

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65. Two metal pieces having a potential difference of $800V$ are $0.02m$ apart horizontally. A particle of mass $1.96 \times 10^{-15} kg$ is suspended in equilibrium between the plates. If the e is the elementary charge, then charge on the particle is

A. e

B. 3e

C. 6e

D. 8e

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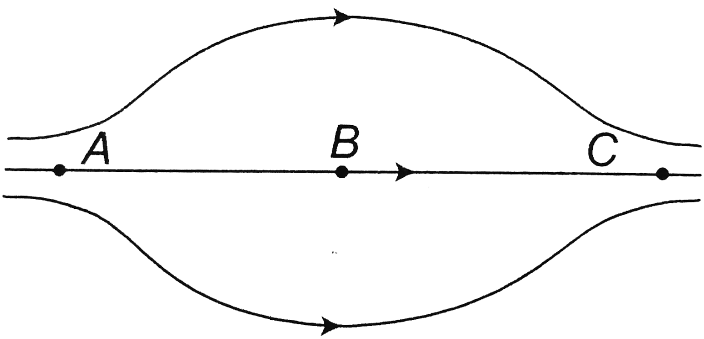
66. The figure shows some of the electric field lines corresponding to an electric field. The figure suggests



A. $E_A > E_B > E_C$

B. $E_A = E_B = E_C$

C. $E_A = E_C > E_B$

D. $E_A = E_C < E_B$

Answer: C

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67. Two spheres of radius a and b respectively are charged and joined by a wire. The ratio of electric field of the spheres is

A. a/b

B. b/a

C. a^2/b^2

D. b^2/a^2

Answer: B

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68. A particle of mass m and charge q is placed at rest in a uniform electric field E and then released, the kinetic energy attained by the particle after moving a distance y will be

A. qEy^2

B. qE^2y

C. qEy

D. q^2Ey

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69. A hollow insulated conducting sphere is given a positive charge of $10\mu C$. What will be the electric field at the centre of the sphere it is radius is 2 metres ?

A. Zero

B. $5\mu Cm^{-2}$

C. $20\mu Cm^{-2}$

D. $8\mu Cm^{-2}$

Answer: A

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70. An electron of mass m_e initially at rest moves through a certain distance in a uniform electric field in time t_1. A proton of mass m_p also initially at rest takes time t_2 to move through an equal distance in this uniform electric field.Neglecting the effect of gravity, the ratio of t_2 / t_1 is nearly equal to

A. 1

B. $(m_p / m_e)^{1/2}$

C. $(m_e / m_p)^{1/2}$

D. 1836

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71. A cube of side b has a charge q at each of its vertices , Determine the potential and electric field due to this charge array at the centre of the cube.

A. q/b^2

B. $q/2b^2$

C. $32q/b^2$

D. Zero

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72. A charged water drop whose radius is $0.1\mu m$ is in equilibrium in an electric field. If charge on it is equal to charge of an electron, then intensity of electric field will be $\left(g = 10ms^{-1}\right)$

A. $1.61N/C$

B. $26.2N/C$

C. $262N/C$

D. $1610N/C$

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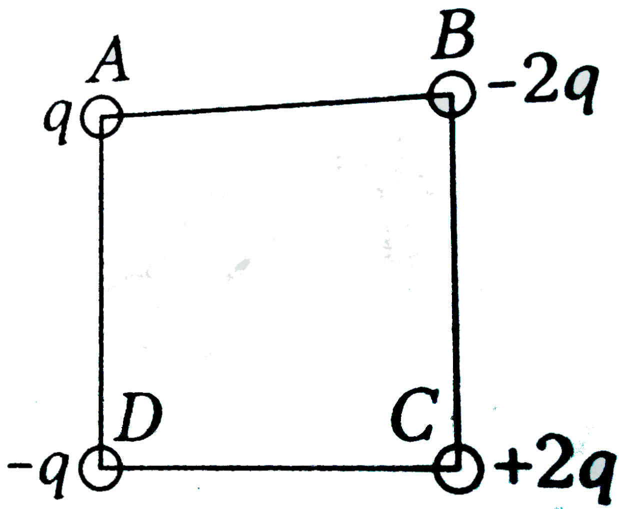
73. Four charge are placed at the corners of a square of side 10 cm as shown in figure having. If q is $1\mu C$, then what will be electric field intensity at the centre of the square?



A. $1.02 \times 10^7 N/C$ upwards

B. $2.04 \times 10^7 N / C$ downwards

C. $2.04 \times 10^7 N / C$ upwards

D. $1.02 \times 10^7 N / C$ downwards

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74. A sphere of radius $1cm$ has potential of $8000V$, then energy density near its surface will be

A. $64 \times 10^5 J / m^3$

B. $8 \times 10^3 J / m^3$

C. $32 J / m^3$

D. $2.83J/m^3$

Answer: D

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75. Point charges $+4q, -q$ are kept on the x-axis at points $x=0, x=a$ and $X=2a$ respectively, then

A. Only q is in stable equilibrium

B. None of the charges are in equilibrium

C. All the charges are in unstable equilibrium

D. All the charges are in stable equilibrium

76. Two point charges of $20\mu C$ and $80\mu C$ are 10 cm apart where will the electric field strength be zero on the line joining the charges from $20\mu C$ charge

A. 0.1 m

B. 0.04 m

C. 0.033 m

D. 0.33 m

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77. How much kinetic energy will be gained by an $\alpha -$ particle in going from a point at $70V$ to another point at $50V$

A. 40 eV

B. 40 keV

C. 40 MeV

D. 0 eV

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78. If a charged spherical conductor of radius $10cm$ has potential V at a point distant $5cm$ from its centre, then the potential at a point distant $15cm$ from the centre will be

A. $\frac{1}{3}V$

B. $\frac{2}{3}V$

C. $\frac{3}{2}V$

D. 3V

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79. Two unlike charges of magnitude q are separated by a distance $2d$. The potential at a point midway between them is

A. Zero

B. $\frac{1}{4\pi\varepsilon_0}$

C. $\frac{1}{4\pi\varepsilon_0} \cdot \frac{q}{d}$

D. $\frac{1}{4\pi\varepsilon_0} \cdot \frac{2q}{d^2}$

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80. What is the potential energy of the equal positive point charges of $1\mu C$ each held $1m$ apart in air ?

A. $9 \times 10^{-3} J$

B. $9 \times 10^{-3} eV$

C. $2eV / m$

D. Zero

Answer: B

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81. An ail drop having charge $2e$ is kept stationary between two parallel horizontal plates $2.0cm$ apart when a potential difference of 12000 volts is applied between them. If the density of oil is $900kg/m^3$, the radius of the drop will be

A. $2.0 \times 10^{-6}m$

B. $1.7 \times 10^{-6}m$

C. $1.4 \times 10^{-6}m$

D. $1.1 \times 10^{-6}m$

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82. The ratio of moment of an electron and an α-particle which are accelerated from rest by a potential difference of $100V$ is

A. 1

B. $\sqrt{\frac{2m_e}{m_\alpha}}$

C. $\sqrt{\frac{m_e}{m_\alpha}}$

D. $\sqrt{\frac{m_e}{2m_\alpha}}$

Watch Video Solution

83. A proton is accelerated through $50,000V$. Its energy will increase by

A. 5000 eV

B. $8 \times 10^{-15} J$

C. $5000 J$

D. $50,000 J$

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84. When a proton is accelerated through $1V$, then its kinetic energy will be

A. 1840 eV

B. 13.6 eV

C. 1 eV

D. 0.54 eV

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85. An electron enters between two horizontal plates separated by $2mm$ and having a potential difference of $1000V$. The force on electron is

A. $8 \times 10^{-12} N$

B. $8 \times 10^{-14} N$

C. $8 \times 10^{9} N$

D. $8 \times 10^{14} N$

Answer: B

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86. two metal spheres of radii R_1 and R_2 are charged to the same potential. The ratio of charges on the spheres is

A. $\sqrt{R_1} : \sqrt{R_2}$

B. $R_1 : R_2$

C. $R_1^2 : R_2^2$

D. $R_1^3 : R_2^3$

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87. Electric charges of $+10\mu C$, $+5\mu C$, $-3\mu C$ and $+8\mu C$ are placed at the corners of a square of side $\sqrt{2}$ m, the potential at the centre of the square is

A. 1.8 V

B. 1.8×10^6V

C. 1.8×10^5 V

D. $1.8 \times 10^4 V$

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88. The electric field due to a charge at a distance of 3 m from it is $500 NC^{-1}$. The magnitude of the charge is

$$\left[\frac{1}{4\pi\varepsilon_0} = 9 \times 10^9 N - m^2 / C^2\right]$$

A. 2.5 micro-coulomb

B. 2.0 micro-coulomb

C. 1.0 micro-coulomb

D. 0.5 micro-coulomb

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89. Two charges of $4\mu C$ each are placed at the corners A and B of an equilaternal triangle of side length $0.2m$ in air. The electric potential at C is $\left[\frac{1}{4\pi\varepsilon_0}=9\times10^9\frac{N-m^2}{C^2}\right]$

A. 9×10^4V

B. 18×10^4V

C. $36 \times 10^{4} V$

D. $36 \times 10^{-4} V$

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90. find the electric field strength due to a point charge of $5 \mu C$ at a distance of 80 cm from the charge.

A. $8 \times 10^{4} N / C$

B. $7 \times 10^{4} N / C$

C. $5 \times 10^{4} N / C$

D. $4 \times 10^{4} N / C$

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91. Ten electrons are qually spaced and fixed around a circle of radius R. Relative to $V=0$ at infinity, the electrostatic potential V and the electric field E at the centre C are

A. $V \neq 0$ and $\overrightarrow{E} \neq 0$

B. $V \neq 0$ and $\overrightarrow{E} = 0$

C. V=0 and $\overrightarrow{E} = 0$

D. V=0 and $\overrightarrow{E} \neq 0$

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92. Two positive point charges of $12\mu C$ and $8\mu C$ are $10cm$ apart. The work done in bringing then $4cm$ closer is

A. 5.8 J

B. 5.8 eV

C. 13 J

D. 13 eV

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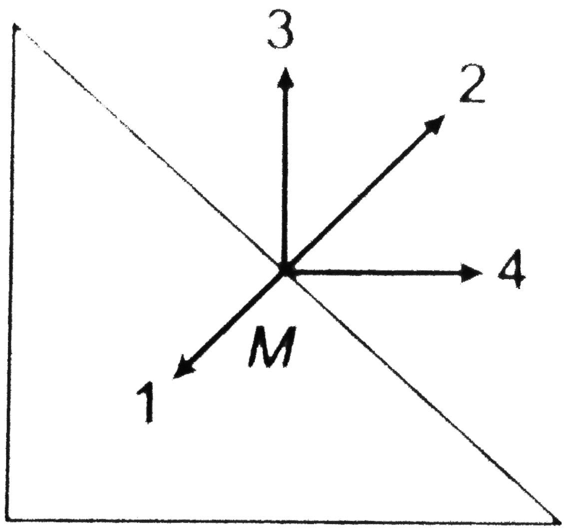
93. Three identical points charges, as shown are placed at the vertices of an isosceles right angled triangle. Which of the nembered vectors coincides in direction with the electric field at the mid-point M the hypotenuse



A. 1

B. 2

C. 3

D. 4

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94. The displacement of a chrage Q in the electric field $E = e_1\hat{i} + e_2\hat{j} + e_3\hat{k}$ is $\overrightarrow{r} = a\hat{i} + b\hat{j}$. The work done is

A. $Q(ae_1 + be_2)$

B. $Q\sqrt{(ae_1)^2 + (be_2)^2}$

C. $Q(e_1 + e_2)\sqrt{a^2 + b^2}$

D. $Q\left(\sqrt{e_1^2 + e_2^2}\right)(a + b)$

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95. The potential at a point, due to a positive charge of $100\mu C$ at a distance of $9m$, is

A. $10^4 V$

B. $10^5 V$

C. $10^6 V$

D. $10^7 V$

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96. A non-conducting solid sphere of radius R is uniformly charged. The magnitude of the electric filed due to the sphere at a distance r from its centre

A. $E \propto R^{-2}$

B. $E \propto R^{-1}$

C. $E \propto \frac{1}{R^3}$

D. $E \propto R^2$

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97. Two charges $+5\mu C$ and $+10\mu C$ are placed $20cm$ apart. The net electric field at the mid-point between the two charges is

A. 4.5×10^6 N/C directed towards $+5\mu C$

B. 4.5×10^6 N/C directed towards $+10\mu C$

C. 13.5×10^6 N/C directed towards $+5\mu C$

D. 13.5×10^6 N/C directed towards $+10\mu C$

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98. Which of the following is deflected by electric field ?

A. X-rays

B. γ-rays

C. Neutrons

D. α- particles

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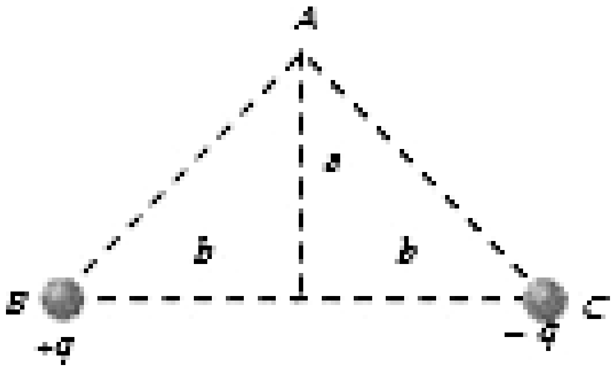
99. As shown in the figure, charges and are placed at the vertices and of an isosceles triangle. The potential at the vertex A is



A. $\frac{1}{4\pi\varepsilon_0}\cdot\frac{2q}{\sqrt{a^2+b^2}}$

B. Zero

C. $\frac{1}{4\pi\varepsilon_0}\cdot\frac{q}{\sqrt{a^2+b^2}}$

D. $\frac{1}{4\pi\varepsilon_0}\cdot\frac{(-q)}{\sqrt{a^2+b^2}}$

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100. Consider the points lying on a straight line joining two fixed opposite charges. Between the charges there is

A. No point where electric field is zero

B. Only one point where electric field is zero

C. No point where potential is zero

D. Only one point where potential is zero

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101. A charged particle of mass $5 \times 10^{-5} kg$ is held stationary in space by placing it in an electric field of strength $10^{7} NC^{-1}$ directed vertically downwards. The charge on the particle is

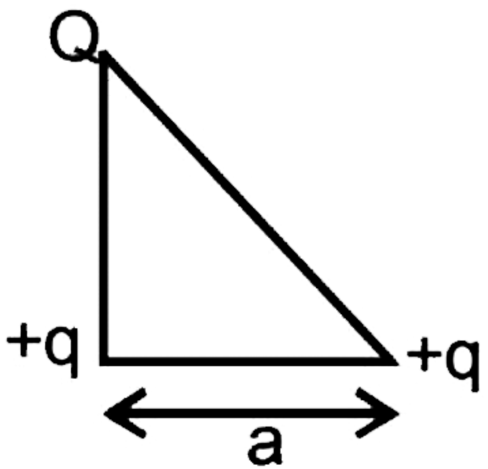
A. $-20 \times 10^{-5} \mu C$

B. $-5 \times 10^{-5} \mu C$

C. $5 \times 10^{-5} \mu C$

D. $20 \times 10^{-5} \mu C$

102. Three charges Q, $+q$ and $+q$ are placed at the vertices of a right-angled isosceles triangle as shown. The net electrostatic energy of the configuration is zero if Q is equal to



A. $\frac{-q}{1+\sqrt{2}}$

B. $\frac{-2q}{2+\sqrt{2}}$

C. $-2q$

D. $+q$

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103. Two electric charges $12\mu C$ and $-6\mu C$ are placed $20cm$ apart in air. There will be a point P on the line joining these charges and outside the region between them, at which the electric potential is zero. The distance of P from $6\mu C$ chrage is

A. 0.10 m

B. 0.15 m

C. 0.20 m

D. 0.25 m

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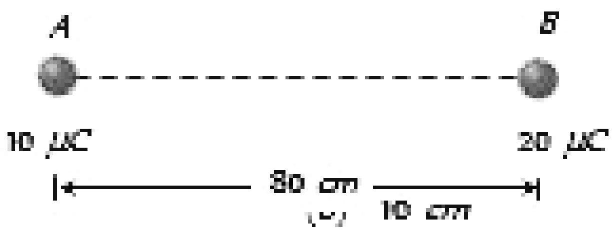
104. In the given figure distance of the point from A where the electric field is zero is



A. 20 cm

B. 10 cm

C. 33 cm

D. None of these

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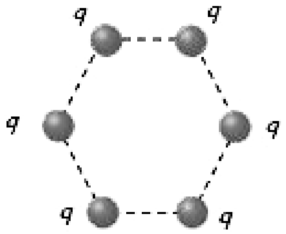
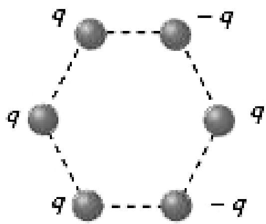
105. Figures below show regular hexagons, with charges at the vertices. In which of the following cases the electric field at the centre is not zero



(1)



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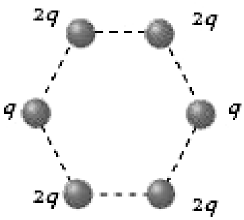

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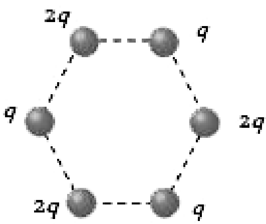

(4)

A. 1

B. 2

C. 3

D. 4

Answer: B

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106. An electron is moving towards x-axis. An electric field is along y-direction then path of electron is

A. Circular

B. Elliptical

C. Parabola

D. None of these

Answer: C

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107. An electron enters in an electric field with its velocity in the direction of the electric lines of force. Then

A. The path of the electron will be a circle

B. The path of the electron will be a parabola

C. The velocity of the electron will decrease

D. The velocity of the electron will increase

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108. An electron of mass m and charge e is accelerated from rest through a potential difference V in vacuum. The final speed of the electron will be

A. $V\sqrt{e/m}$

B. $\sqrt{eV/m}$

C. $\sqrt{2eV/m}$

D. $2eV/m$

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109. The radius of a soap bubble whose potential is 16V is doubled. The new potential of the bubble is

A. 2V

B. 4V

C. 8V

D. 16V

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110. The dimensions of $\frac{1}{2}\varepsilon_0 E^2 (\varepsilon_0 =$ permittivity of free space, $E =$ electric field) is

A. MLT^{-1}

B. ML^2T^{-2}

C. $ML^{-1}L^{-2}$

D. ML^2T^{-1}

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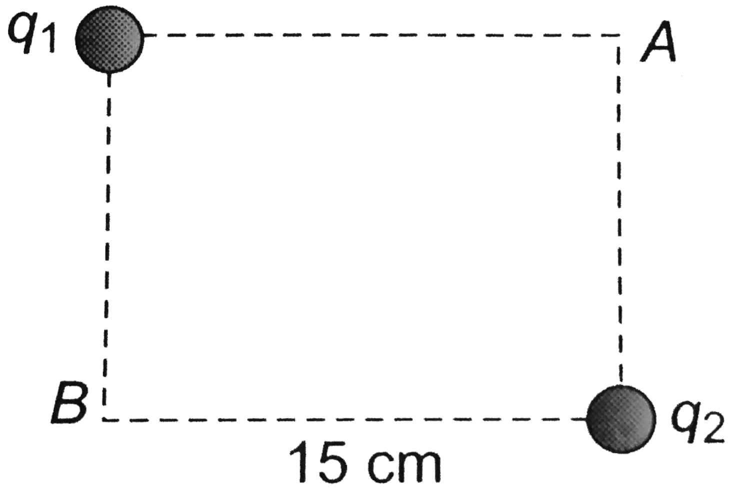
111. In the rectangle, shown below, the two corners have charges $q_1 = -5\mu C$ and $q_2 = +2.0\mu C$. The work done in moving a charge $+3.0\mu C$ from $B \to A$

is (take $1/44\pi\varepsilon_0 = 10^{10} N - m^2/C^2$)



A. 2.8 J

B. 3.5 J

C. 4.5 J

D. 5.5 J

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112. A cube of a metal is given a positive charge Q. For the above system, which of the following statements is true ?

A. Electric potential at the surface of the cube is zero

B. Electric potential within the cube is zero

C. Electric field is normal to the surface of the cube

D. Electric field varies within the cube

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113. If q is the charge per unit area on the surface of a conductor, then the electric field intensity at a point on the surface is

A. $\left(\frac{q}{\varepsilon_0}\right)$ normal to surface

B. $\left(\frac{q}{2\varepsilon_0}\right)$ normal to surface

C. $\left(\frac{q}{\varepsilon_0}\right)$ tangential to surface

D. $\left(\frac{q}{2\varepsilon_0}\right)$ tangential to surface

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114. A hollow conducting sphere of radius R has a charge $(+Q)$ on its surface. What is the electric potential within the

sphere at a distance $r = \frac{R}{3}$ from its centre ?

A. Zero

B. $\frac{1}{4\pi\varepsilon_0} = \frac{Q}{r}$

C. $\frac{1}{4\pi\varepsilon_0}\frac{Q}{R}$

D. $\frac{1}{4\pi\varepsilon_0}\frac{Q}{r^2}$

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115. A spherical conductor of radius $2m$ is charged to a potential of $120V$. It is now placed inside another hollow spherical conductor of radius $6m$. Calculate the potential to which the bigger sphere would be raised

A. 20 V

B. 60 V

C. 80 V

D. 40 V

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116. A charge $(-q)$ and another charge (Q) are kept at two points A and B respectively. Keeping the charge $(+Q)$ fixed at B, the charge $(-q)$ at A is moved to another point C such that ABC forms an equilateral triangle of side l. The net work done in moving teh charge $(-q)$ is

A. $\frac{1}{4\pi\varepsilon_0}\frac{Qq}{l}$

B. $\frac{1}{4\pi\varepsilon_0}\frac{Qq}{l^2}$

C. $\frac{1}{4\pi\varepsilon_0}Qql$

D. Zero

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117. A particle of mass 'm' and charge 'q' is accelerated through a potential difference of V volt, its energy will be

A. qV

B. mqV

C. $\left(\frac{q}{m}\right)V$

D. $\frac{q}{mV}$

Answer: A

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118. Two spheres A and B of radius 'a' and 'b' respectively are at same electric potential. The ratio of the surface charge densities of A and B is

A. $\frac{a}{b}$

B. $\frac{b}{a}$

C. $\frac{a^2}{b^2}$

D. $\frac{b^2}{a^2}$

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119. Potential at a point x-distance from the centre inside the conducting sphere of radius R and charged with charge Q is

A. $\frac{Q}{R}$

B. $\frac{Q}{x}$

C. $\frac{Q}{x^2}$

D. xQ

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120. Electric field intensity at a point in between two parallel sheets with like charges of same surface charge densities (σ) is

A. $\frac{\sigma}{2\varepsilon_0}$

B. $\frac{\sigma}{\varepsilon_0}$

C. Zero

D. $\frac{2\sigma}{\varepsilon_0}$

Answer: C

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121. In an hydrogen atom, the electron revolves around the nucles in an orbit of radius $0.53 \times 10^{-10} m.$ Then the electrical potential produced by the nucleus at the position of the electron is

A. $-13.6V$

B. $-27.2V$

C. $27.3V$

D. 13.6 V

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122. Consider two point charges of equal magnitude and opposite sign separated by a certain distance. The neutral point due to them

A. Does not exist

B. Will be in mid way between them

C. Lies on the perpendicular bisector of the line joining the two

D. Will be closer to the negative charge

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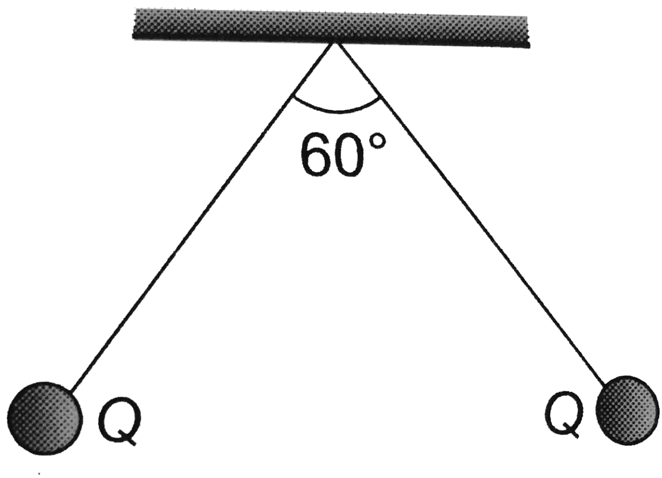
123. Two small spherical balls each carrying a charge $Q = 10\mu C$(10 micro=coulomb) are suspended by two insulating threads of equal lengths $1cm$ each, from a point fixed in the ceiling. It is found that in equilibrium threads are sepreated by an angle 60° between them, as shown in figure. What is the tension in the threads

(Given $\frac{1}{4\pi\varepsilon_0} = 9 \times 10^9 Nm/C^2$)



A. 18 N

B. 1.8 N

C. 0.18 N

D. None of these

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124. A ball of mass $1g$ and charge $10^{-8}C$ moves from a point A. Where potential is 600 volt to the point B where potential is zero. Velocity of the ball at the point B is $20cm/s$. The velocity of the ball at the point A will be

A. 22.8 cm/s

B. 228 cm/s

C. 16.8 m/s

D. 168 m/s

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125. An electron is accelerated in an electric field of $40Vcm^{-1}$. If e/m of electron is $1.76 \times 10^{11}Ckg^{-1}$, then its acceleration is

A. $8.8 \times 10^{14}m/\sec$

B. $6.2 \times 10^{13}m/\sec$

C. $5.4 \times 10^{12}m/\sec$

D. Zero

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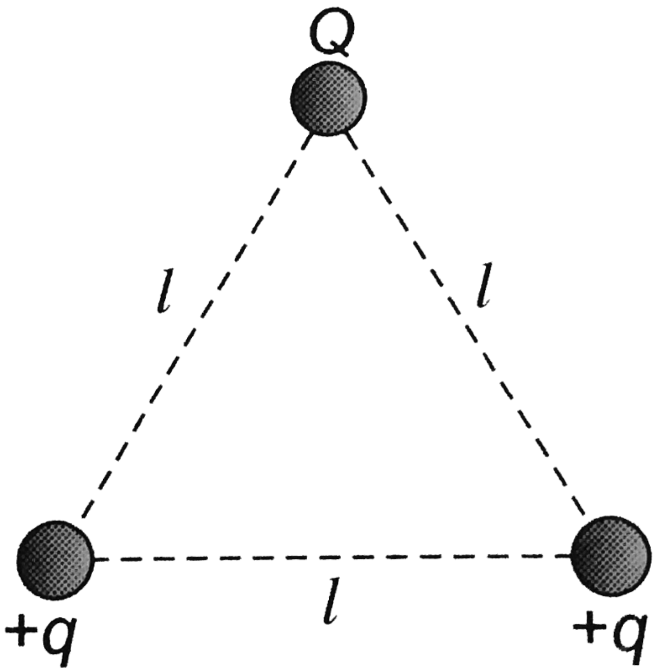
126. Three charges Q, $(+q)$ and $(+q)$ are placed at the vertices of an equilateral triangle of side l as shown in the figure. It the net electrostatic energy of the system is zero, then Q is equal to



A. $\left(-\frac{q}{2}\right)$

B. $(- q)$

C. $(+ q)$

D. Zero

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127. A positively charge particle moving along x-axis with a certain velocity enters a uniform electric field directed along positively y-axis. Its

A. Vertical velocity changes but horizontal velocity remains constant

B. Horizontal velocity changes but vertical velocity remains constant

C. Both vertical and horizontal velocities change

D. Neither vertical nor horizontal velocity changes

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128. Electric potential at any point is $V = -5x + 3y + \sqrt{15}z$, then the magnitude of the electric field is

A. $3\sqrt{2}$

B. $4\sqrt{2}$

C. $5\sqrt{2}$

D. 7

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129. The work done in bringing a 20 coulomb charge from point A to point B for disatnce $0.2m$ is $2J$. The potential difference between the two points will be (in volt)

A. 0.2

B. 8

C. 0.1

D. 0.4

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130. A hollow sphere of charge does not produce an electric field at any-

A. Point beyond 2 metres

B. Point beyony 10 metres

C. Interior point

D. Outer point

Answer: C

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131. If $4 \times 10^{20} eV$ energy is required to move a charge of 0.25 coulomb between two points. Then what will be the potential difference between them ?

A. 178 V

B. 256 V

C. 356 V

D. None of these

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132. Kinetic energy of an electron accelerated in a potential difference of $100V$ is

A. $1.6 \times 10^{-17} J$

B. $1.6 \times 10^{21} J$

C. $1.6 \times 10^{-29} J$

D. $1.6 \times 10^{-34} J$

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133. A drop of 10^{-6} kg water carries $10^{-6}C$ charge. What electric field should be applied to balance its weight (assume $g = 10ms^{-2}$)

A. 10 V/m upward

B. 10 V/m downward

C. 0.1 V/m downward

D. 0.1 V/m upward

Answer: C

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134. A charged particle of mass 0.003 g is held stationary in space by placing it in a downward direction of electric field of $6 \times 10^4 NC^{-1}$. Then, the magnitude of charge is

A. $5 \times 10^{-4} C$

B. $5 \times 10^{-10} C$

C. $-18 \times 10^{-6} C$

D. $-5 \times 10^{-9} C$

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135. Two point charges $+9e$ and $+e$ are kept $16cm$. Apart from each other. Where should a third charge q be placed between them so that the system is in equlibrium state:

A. 24 cm from +9e

B. 12 cm from +9e

C. 24 cm from +e

D. 12 cm from +e

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136. If 3 charges are placed at the vertices of equilateral triangle of charge 'q' each. What is the net potential energy, if the side of equilateral Δ is lcm ?

A. $\dfrac{1}{4\pi\varepsilon_0}\dfrac{q^2}{l}$

B. $\dfrac{1}{4\pi\varepsilon_0}\dfrac{2q^2}{l}$

C. $\dfrac{1}{4\pi\varepsilon_0}\dfrac{3q^2}{l}$

D. $\dfrac{1}{4\pi\varepsilon_0}\dfrac{4q^2}{l}$

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137. The distance between charges $5.0 \times 10^{-11} C$ and $-2.7 \times 10^{-11} C$ is $0.2m$. The distance at which a third charge should be placed in order that it will not experience any force along the line joining the two charges is

A. 0.44 m

B. 0.65 m

C. 0.556 m

D. 0.350 m

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138. If identical charges $(-q)$ are placed at each corner of a cube of side b, then electric potential energy of charge $(+q)$ which is palced at centre of the cube will be

A. $\frac{8\sqrt{2}q^2}{4\pi\varepsilon_0 b}$

B. $\frac{-8\sqrt{2}q^2}{\pi\varepsilon_0 b}$

C. $\frac{-4\sqrt{2}q^2}{\pi\varepsilon_0 b}$

D. $\frac{-4q^2}{\sqrt{3}\pi\varepsilon_0 b}$

Answer: D

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139. An electron having charge $'e'$ and mass $'m'$ is moving a uniform electric field E. Its acceleration will be

A. $\frac{e^2}{m}$

B. $\frac{E^2 e}{m}$

C. $\frac{eE}{m}$

D. $\frac{mE}{e}$

Answer: C

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140. Cathode rays travelling from east to west enter into region of electric field directed towards north to south in the plane of paper. The deflection of cathode rays is towards

A. East

B. South

C. West

D. North

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141. An $\alpha -$ particle is accelerated through a potential difference of $200V$. The increase in its kinetic energy is

A. 100 eV

B. 200 eV

C. 400 eV

D. 800 eV

Answer: C

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142. A simple pendulum of period T has a metal bob which is negatively charged. If it is allowed to oscillate above a positively charged metal plate, its period will

A. Remains equal to T

B. Less than T

C. Greater then T

D. Infinite

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143. A charged particle of mass m and charge q is released from rest in an uniform electric field $\vec{E}$. Neglecting the effect of gravity, the kinetic energy of the charged particle after 't' second is

A. $\dfrac{Eq^2m}{2t^2}$

B. $\dfrac{2E^2t^2}{mq}$

C. $\dfrac{E^2q^2t^2}{2m}$

D. $\dfrac{Eqm}{t}$

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144. A proton is about 1840 times heavier than an electron. When it is accelerated by a potential difference of $1kV$. Its kinetic energy will be

A. 1840 keV

B. $1/1840$ keV

C. 1 keV

D. 920 keV

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145. A conducting sphere of radius R=20 cm is given a charge $Q = 16\mu C$. What it $\overrightarrow{E}$ at centre

A. $3.6 \times 10^6 N/C$

B. $1.8 \times 10^6 N/C$

C. Zero

D. $0.9 \times 10^6 N/C$

Answer: C

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146. A thin spherical conducting shell of radius R has a charge q. Another charge Q is placed at the centre of the shell. The electrostatic potential at a point P a distance $\frac{R}{2}$ from the centre of the shell is

A. $\frac{(q+Q)}{4\pi\varepsilon_0}\frac{2}{R}$

B. $\frac{2Q}{4\pi\varepsilon_0 R}$

C. $\frac{2Q}{4\pi\varepsilon_0 R}-\frac{2q}{4\pi\varepsilon_0 R}$

D. $\frac{2Q}{4\pi\varepsilon_0 R}+\frac{q}{4\pi\varepsilon_0 R}$

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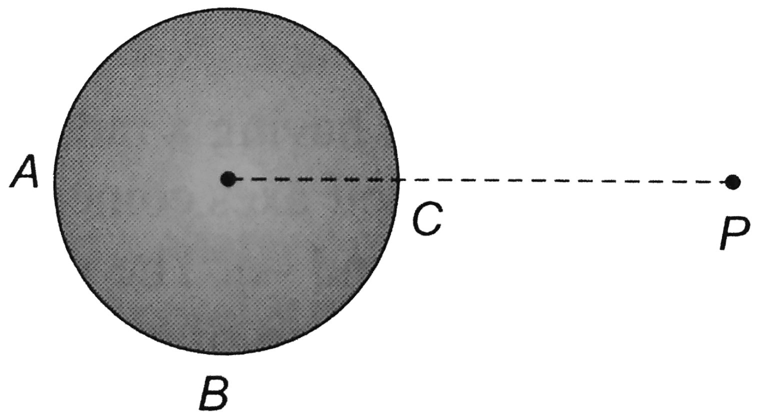
147. A hollow conducting sphere is placed in an electric field produced by a point charge placed at P as shown in figure.

Let V_A, V_B, V_C be the potentials at points A, B and C respectively. Then



A. $V_C > V_B$

B. $V_B > V_C$

C. $V_A > V_B$

D. $V_A = V_C$

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148. A point charge is kept at the centre of a metallic insulated spherical shell. Then

A. Electric field out side the sphere is zero

B. Electric field inside the sphere is zero

C. Net induced charge on the sphere is zero

D. Electric potential inside the sphere is zero

Answer: C

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149. An electron moving with the speed 5×10^6 per sec is shot parallel to the electric field of intensity $1 \times 10^3 N/C$. Field is responsible for the retardation of motion of electron. Now evaluate the distance travelled by the electron before coming to rest for an instant (mass of $e = 9 \times 10^{-31} Kg$ charge $= 1.6 \times 10^{-19} C$)

A. 7 m

B. 0.7 mm

C. 7 cm

D. 0.7cm

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150. An electron enters in high potential region V_2 from lower potential region V_1 then its velocity

A. Will increase

B. Will change in direction but not in magnitude

C. No change in direction of field

D. No change in direction perpendicular to field

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151. The electric potential at the surface of an atmoic nucleus $(Z = 50)$ of radius $9.0 \times 10^{-13} cm$ is

A. 80 volts

B. 8×10^6 volts

C. 9 volts

D. 9×10^5 volts

Answer: B

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152. A pellet carrying a charge of 0.5 coulomb is accelerated through a potential of 2000 volts. It attains some kinetic energy equal to

A. 1000 ergs

B. 1000 joules

C. 1000 kWh

D. 500 ergs

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153. A particle has a mass 400 times than that of the elctron and charge is double than that of aelectron. It is accelerated by $5V$ of potential difference. Initially the particle was at rest, then its final kinetic energy will be

A. 5 eV

B. 10 eV

C. 100 eV

D. 2000 eV

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154. An electron (charge $= 1.6 \times 10^{-19}$ coulomb) is accelerated through a potential of $1, 00, 000$ volts.

The energy required by the electron is

A. 1.6×10^{-24} joule

B. 1.6×10^{-14} erg

C. 0.53×10^{-14} joule

D. 1.6×10^{-14} joule

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155. The charge given to a hollow sphere of radius $10cm$ is 3.2×10^{-19} coulomb. At a distance of $4cm$ from its centre, the electric potetnial will be

A. 28.8×10^{-9} volts

B. 288 volts

C. 2.88 volts

D. Zero

Answer: A

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156. Work done in moving a positive charge on an equipotential surafce is

A. Finite, positive but not zero

B. Finite, negative but not zero

C. Zero

D. Infinite

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157. A charge 10 esu is placed at a distance of 2 cm from a charge 40 esu and 4 cm from another charge -20 esu. The potential energy of the charge 10 esu is : (in ergs)

A. 87.5

B. 112.5

C. 150

D. 250

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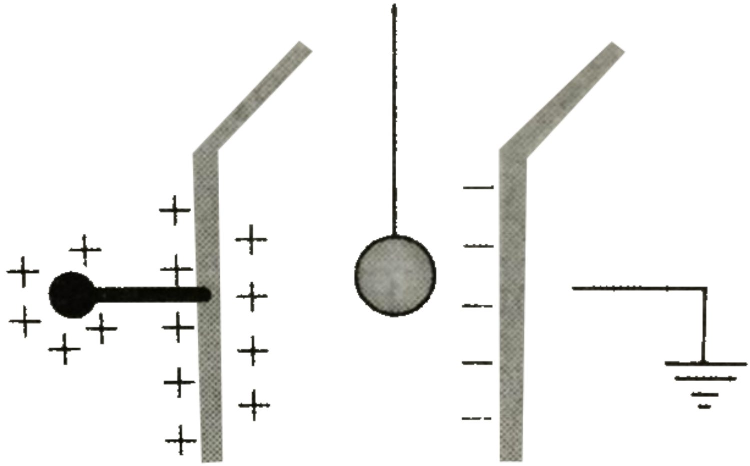
158. A table tennis ball covered with a conducting paint is suspended by a silk thread so that it hangs between tow metal plates. One plate is earthed, when the other plate is connected to a high voltage generator, what will happen to the ball.



A. Is attracted towards high voltage plate and stays there

B. Hangs without moving

C. Swing backward and forward hitting each plate in turn

D. Is attracted to earthed plate and stays there

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159. A sphere of $4cm$ radius is suspended within a hollow sphere of $6cm$ radius. The inner sphere is charged to potential 3 e.s.u. and the outer sphere is earthed. The charge on the inner sphere is

A. 54 e.s.u.

B. $\frac{1}{4}$ e.s.u.

C. 30 e.s.u.

D. 36 e.s.u.

Answer: D

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160. State which of the following is correct

A. Joule = coulomb $\times$ volt

B. Joule = coulomb/volt

C. Joule = volt $\times$ ampere

D. Joule = volt/ampere

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161. If a positive charge is shifted from a low - potential region to a high- potential region, the electric potential energy

A. Decrease

B. Increases

C. Remain unchanged

D. Become zero

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162. When a negative charge is taken at a height from earth's surface, then its potential energy

A. Decreases

B. Increases

C. Remains unchanged

D. Will become infinity

Answer: B

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163. When a charge of 3 coulombs is placed in a uniform electric field, it experiences a force of 3000 netwon. Within this field, potential difference between two points separated by a distance of $1cm$ is

A. 10 volts

B. 90 volts

C. 1000 volts

D. 3000 volts

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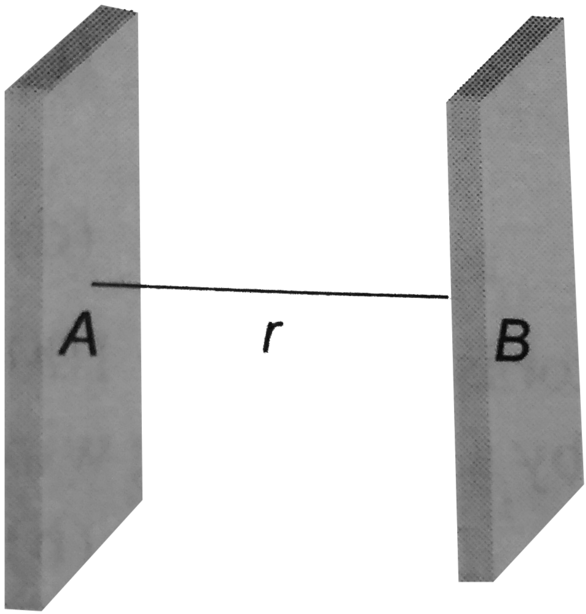
164. There are two equipotential surafce as shown in figure. The distance between them is r. The charged of $-q$ coulomb is taken from the surface A to B, the resultant work done will be



A. $W = \frac{1}{4\pi\varepsilon_0}\frac{q}{r}$

B. $W = \frac{1}{4\pi\varepsilon_0} \frac{q}{r^2}$

C. $W = -\frac{1}{4\pi\varepsilon_0} \frac{q}{r^2}$

D. W=zero

Answer: D

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165. In bringing an electron towards another electron, the electrostatic potential energy of the system

A. Decreases

B. Increases

C. Remain unchanged

D. Become zero

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166. A hollow metal sphere of radius $5cm$ is charged such that the potential on its surface is $10V$. The potential at a distance of $2cm$ from the centre of the sphere

A. Zero

B. 10 V

C. 4 V

D. $10/3V$

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167. The work done in carrying a charge of $5\mu C$ form a point A to a point B in an electric field is $10mJ$. The potential difference $(V_B - V_A)$ is then

A. $+2kV$

B. $-2kV$

C. $+200V$

D. $-200V$

Answer: A

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168. Value of potential at a point due to a point charge is

A. Inversely proportional to square of the distance

B. Directly proportional to square of the distance

C. Inversely proportional to the distance

D. Directly proportional to the distance

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169. The electric potential of earth is taken to be zero because earth is a good

A. Insulator

B. Conductor

C. Semiconductor

D. Dielectric

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170. There is 10 units of charge at the centre of a circle of radius $10m$. The work done in moving 1 unit of charge around the circle once is

A. Zero

B. 10 units

C. 100 units

D. 1 unit

Watch Video Solution

171. Two parallel plates separated by a disatnce of $5mm$ are kept at a potential difference of $5.0V$. A particle of mass $10^{15}kg$ and change $10^{-11}C$ centre in it with a velocity $10^7 m/s$. The acceleration of the particle will be

A. $10^8 m/s^2$

B. $5 \times 10^5 m/s^2$

C. $10^5 m/s^2$

D. $2 \times 10^3 m/s^2$

Answer: A

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172. Three point charges are placed at the corner of an equilateral triangle. Assuming only electrostatic forces are acting.

A. The system can never be in equilibrium

B. The system will be in equilibrium if the charges rotate about the centre of the triangle

C. The system will be in equilibrium if the charges have different magnitudes and different signs

D. The system will be in equilibrium if the charges have the same magnitudes but different signs

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173. A conducting sphere of radius R is charged to a potential of V volts. Then the electric field at a distance $r(> R)$ from the centre of the sphere would be

A. $\frac{\rho R}{3\varepsilon_0}$

B. $\frac{\rho r}{\varepsilon_0}$

C. $\frac{\rho r}{3\varepsilon_0}$

D. $\frac{3\rho R}{\varepsilon_0}$

Answer: C

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174. Two plates are at potentials $-10V$ and $+30V$. If the separation between the plates be $2cm$. The electric filed between them is

A. $2000V/m$

B. $1000V/m$

C. $500V/m$

D. $3000\frac{V}{m}$

Answer: A

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175. The electric potential inside a conducting sphere

A. Increases from centre to surface

B. Decreases from centre to surface

C. Remains constant from centre to surface

D. Is zero at every point inside

Answer: C

Watch Video Solution

176. The wrong statement about electric lines of force is

A. These originate from positive charge and end on negative charge

B. They do not intersect each other at a point

C. They have the same form for a point charge and a sphere

D. They have physical existence

Answer: D

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177. A charge produce an electric field of 1 N/C at a point distant 0.1 m from it. The magnitude of charge is

A. $1.11 \times 10^{-12} C$

B. $9.11 \times 10^{-12} C$

C. 7.11×10^{-6} C

D. None of these

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178. A charged particle is suspended in equilibrium in a uniform vertical electric field of intensity 20000 V/m. If mass of the particle is 9.6×10^{-16} kg the charge on it and excess number of electrons on the particle are respectivly $(g = 10m / s^2)$

A. $4.8 \times 10^{-19} C, 3$

B. $5.8 \times 10^{-19} C, 4$

C. $3.8 \times 10^{-19} C, 2$

D. $2.8 \times 10^{-19} C, 1$

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179. The potential at a distance $R/2$ from the centre of a conducting sphere of radius R will be

A. 0

B. $\dfrac{Q}{8\pi\varepsilon_0 R}$

C. $\frac{Q}{4\pi\varepsilon_0 R}$

D. $\frac{Q}{2\pi\varepsilon_0 R}$

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180. Four charges $+Q, -Q, +Q, -Q$ are placed at the corners of a square taken in order. At the centre of the square

A. E=0,V=0

B. $E = 0, V \neq 0$

C. $E \neq 0, V = 0$

D. $E = 0, V \neq 0$

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181. The radius of nucleus of sliver (atomic number $= 47$) is $3.4 \times 10^{-14} m$. The electric potential on the surface of uncleus is $\left(e = 1.6 \times 10^{-19} C\right)$

A. $1.99 \times 10^{-19} C$ volt

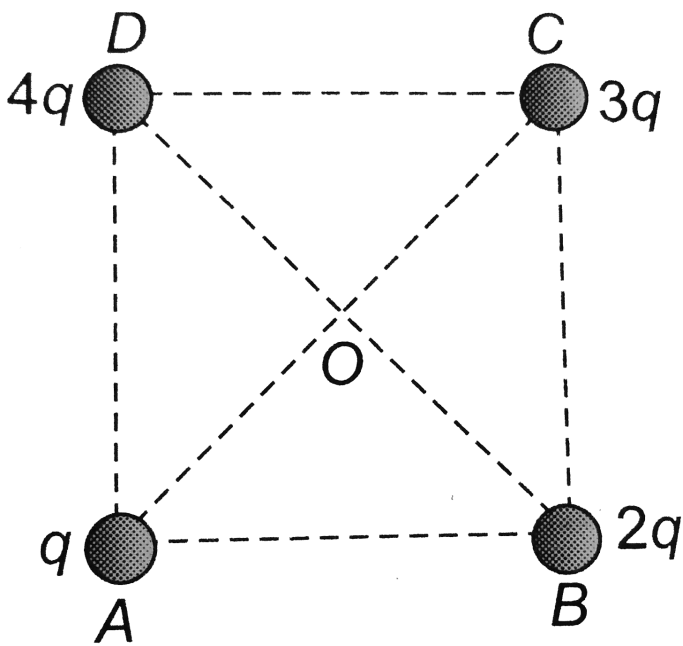
B. $2.9 \times 10^{6} C$ volt

C. $4.99 \times 10^{6} C$ volt

D. $0.99 \times 10^{6} C$ volt

Watch Video Solution

182. Charges q, $2q$, $3q$ and $4q$ are placed at the corners A, B, C and D of a square as shown in the following figure. The directon of electric field at the centre of the square is along



A. AB

B. CB

C. BD

D. AC

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183. Point charge $q_1 = 2\mu C$ and $q_2 = -1\mu C$ are kept at points $x = 0$ and $x = 6$ respectively. Electrical potential will be zero at points

A. x=2 and x=9

B. x=1 and x=5

C. x=4 and x=12

D. x=-2 and x=2

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184. Equipotential surfaces associated with an electric field which is increasing in magnitude along the x-direction are

A. Planes parallel to yz-plane

B. Planes parallel to xy-plane

C. Planes parallel to xz-plane

D. Coaxial cylinders of increasing radii around the x-axis

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185. A bullet of mass $2gm$ is having a charge of $2\mu c$. Through what potential difference must it be accelerated, starting from rest, to acquire a speed of $10m/s$

A. 5 kV

B. 50 kV

C. 5 V

D. 50 V

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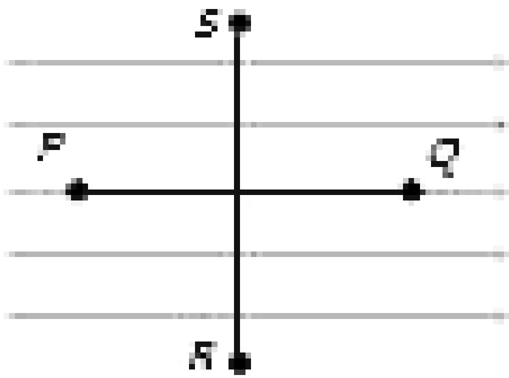
186. The points resembling equal potentials are



A. P and Q

B. S and Q

C. S and R

D. P and R

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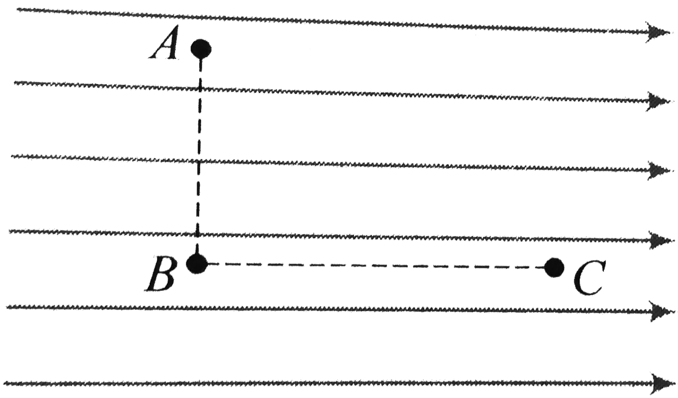
187. Figure shown three points A, B and C in a region of unifrom electric field $\vec{E}$. The line AB is perpendicular and BC is parallel to the field lines. Then which of the following holds good. Where V_A, V_B and V_C represenet the electric potential at points A, B and C respectively



A. $V_A = V_B = V_C$

B. $V_A = V_B > V_C$

C. $V_A = V_B < V_C$

D. $V_A > V_B = V_C$

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188. In a certain charge distribution, all points having zero potetnial can be joined by a circles S. Points inside S have positive potential and points outside S have negative potential. A positive charg, which is free to move, is placed inside S

A. It will remain in equilibrium

B. It can move inside S, but it cannot cross S

C. It must cross S at some time

D. It may move, but will ultimately return to its starting

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189. Infinite charges of magnitude q each are lying at $x = 1, 2, 4, 8.... meter$ on X-axis. The value of intensity of electric field at point $x = 0$ due to these charges will be

A. $12 \times 10qN/C$

B. Zero

C. $6 \times 10qN/C$

D. $4 \times 10qN/C$

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190. A square of side a charge Q at its centre and charge q at one of the corners. The work required to be done in moving the charge q from the corner to the diagonally opposite corner is

A. Zero

B. $\frac{Qq}{4\pi \in_0 a}$

C. $\frac{Qq\sqrt{2}}{4\pi \in_0 a}$

D. $\frac{Qq}{2\pi \in_0 a}$

Answer: A

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191. A pendulum bob of mass $30.7 \times 10^{-6} kg$ and carrying a chargee $2 \times 10^{-8} C$ is at rest in a horizontal uniform electric field of $20000 V/m$. The tension in the thread of the pendulum is $(g = 9.8 m/s^2)$

A. $3 \times 10^{-4} N$

B. $4 \times 10^{-4} N$

C. $5 \times 10^{-4} N$

D. $6 \times 10^{-4} N$

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192. An infinite line charge produce a field of $7.182 \times 10^{8} NC^{-1}$ at a distance of 2 cm. The linear charge density is

A. $7.27 \times 10^{-4} C/m$

B. $7.98 \times 10^{-(4)} C/m$

C. $7.11 \times 10^{-4} C/m$

D. $7.04 \times 10^{-4} C/m$

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193. An electron experiences a force equal to its weight, when placed in an electric field. The intensity of the field will be

A. $1.7 \times 10^{-11} N/C$

B. $5.0 \times 10^{-11} N/C$

C. $5.5 \times 10^{-11} N/C$

D. $56 N/C$

Answer: C

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194. The electric field strength in air at NTP is $3 \times 10^6 V / m$. The maximum charge that can be given to a spherical conductor of radius 3m is

A. $3 \times 10^{-4} C$

B. $3 \times 10^{-5} C$

C. $3 \times 10^{-2} C$

D. $3 \times 10^{-1} C$

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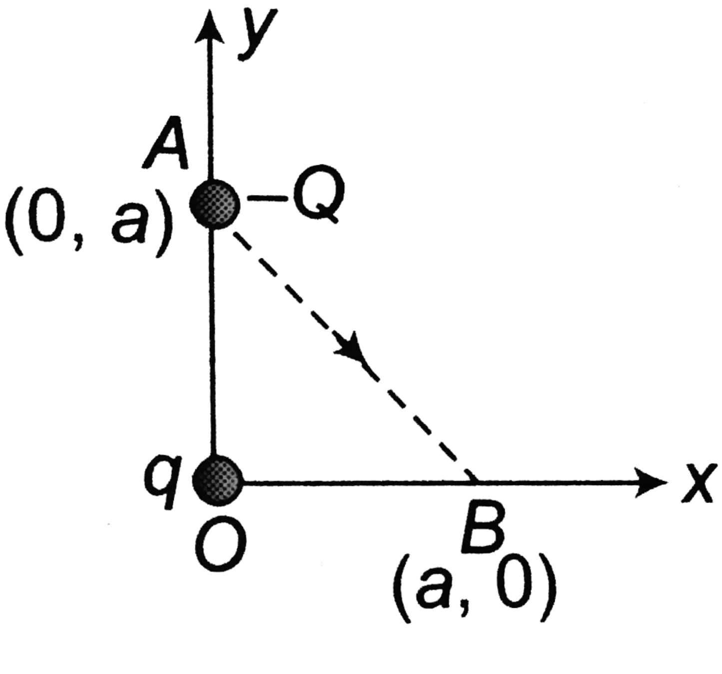
195. As per this diagram a point charge $+q$ is placed at the origin O. Work done in taking another point charge $-Q$ from the point $A(0, a)$ to another point $B(a, 0)$ along the staight path AB is:



A. Zero

B. $\left(\dfrac{-qQ}{4\pi \in_0} \dfrac{1}{a^2}\right)\sqrt{2}a$

C. $\left(\frac{qQ}{4\pi \in_0}\frac{1}{a^2}\right)\frac{a}{\sqrt{2}}$

D. $\left(\frac{qQ}{4\pi \in_0}\frac{1}{a^2}\right)\sqrt{2}a$

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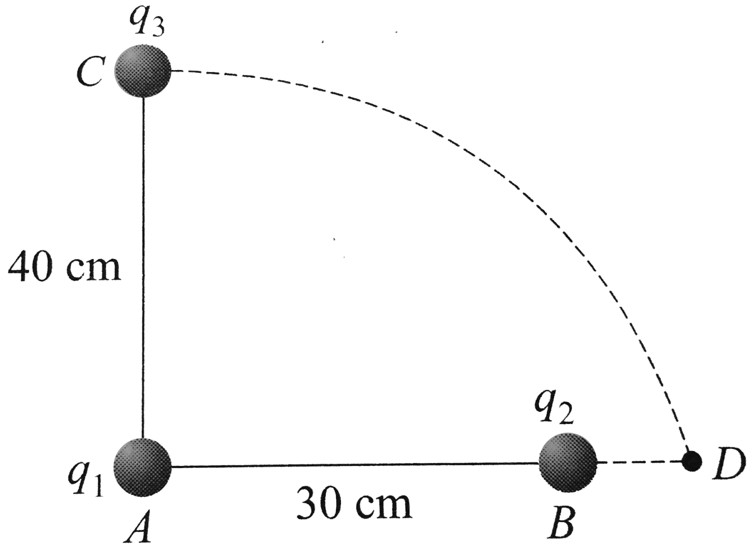
196. Two charges q_1 and q_2 are placed $30cm$ apart, as shown in the figure. A third charge q_3 is moved along the arc of a circle of radius $40cm$ from C to D. The change in the potential energy o fthe system is

$\frac{q_3}{4\pi\varepsilon_0}k$., where k is



A. $8q_2$

B. $8q_1$

C. $6q_2$

D. $6q_1$

Answer: A

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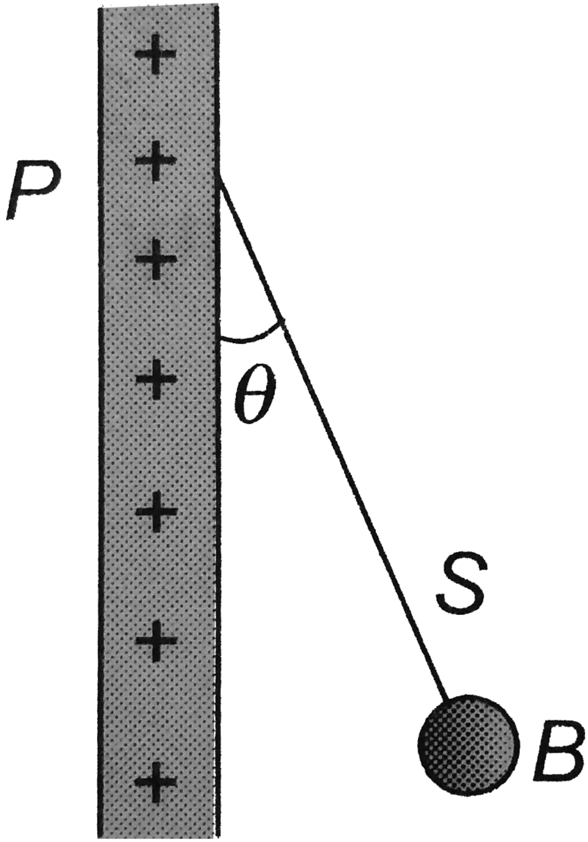
197. A charged ball B hangs from a silk thread S, which makes an angle θ with a large charged conducting sheet P, as shown in the figure. The surface charge density σ of the sheet is proportional to



A. $\sin\theta$

B. $\tan\theta$

C. $\cos\theta$

D. $\cot \theta$

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198. Two point charges $+8q$ and $-2q$ are located at $x=0$ and $x=L$ respectively. The location of a point on the x axis at which the net electric field due to these two point charges is zero is

A. 8 L

B. 4 L

C. 2 L

D. $\frac{L}{4}$

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199. Two thin wire rings each having a radius R are placed at a distance d apart with their axes coiciding. The charges on the two rings are $+q$ and $-q$. The potential difference between the centres of the two rings is

A. Zero

B. $\frac{Q}{4\pi \in_0}\left[\frac{1}{R}-\frac{1}{\sqrt{R^2+d^2}}\right]$

C. $QR/4\pi \in_0 d^2$

D. $\frac{Q}{2\pi \in_0}\left[\frac{1}{R} - \frac{1}{\sqrt{R^2 + d^2}}\right]$

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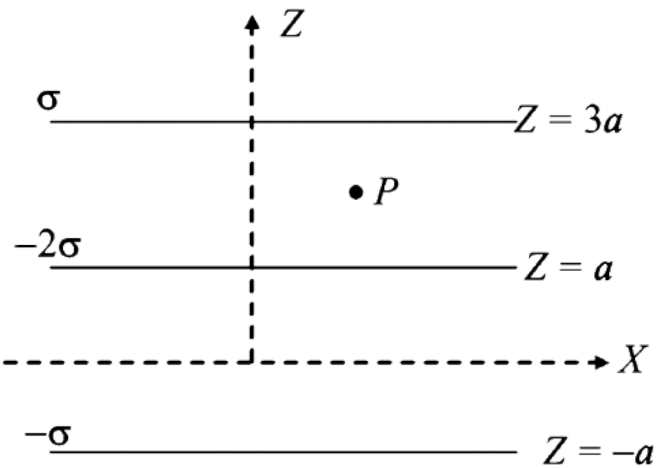
200. Three infinitely long charge sheets are placed as shown in figure. The electric field at point P is



A. $\frac{2\sigma}{\in_0}\hat{k}$

B. $-\dfrac{2\sigma}{\in_0}\hat{k}$

C. $\dfrac{4\sigma}{\in_0}\hat{k}$

D. $-\dfrac{4\sigma}{\in_0}\hat{k}$

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201. Two infinitely long parallel conducting plates having surface charge densities $+\sigma$ and $-\sigma$ respectively, are seperated by a small distance. The medium between the plates is vacuum. If ε_0 is the dielectric permittivity of vacumm, then the electric field in the region between the plates is

A. 0 volts/meter

B. $\frac{\sigma}{2 \in_0}$ volts/ meter

C. $\frac{\sigma}{\in_0} vo < s / meter$

D. $\frac{2\sigma}{\in_0}$ volts/meter

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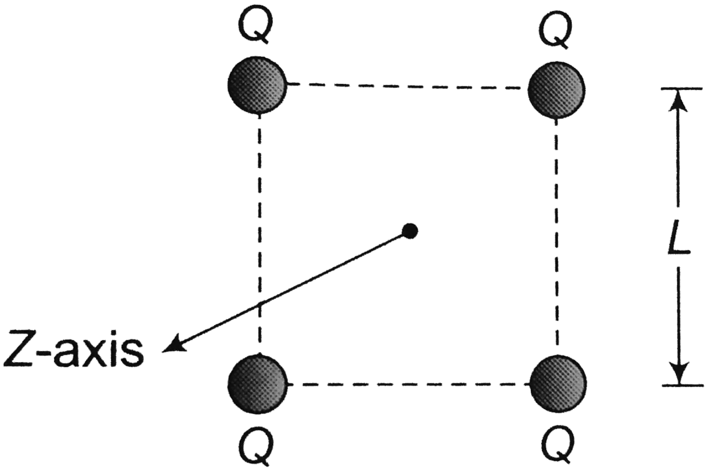
202. Four point $+ve$ charges of same magnitude(Q) are placed at four corners of a rigid square frame as shown in figure. The plane of the frame is perpendicular to z-axis. If a $-ve$ point charge is placed at a distance z away from the above frame

$(z < < L)$ then



A. – ve charge oscillates along the axis

B. It moves away from the frame

C. It moves slowly towards the frame and stays in the plane of the frame

D. It passes through the frame only once.

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203. At a point $20cm$ from the centre of a uniformly charged dielectric sphere of radius $10cm$, the electric field is $100V/m$. The electric field at $3cm$ from the centre of the sphere will be

A. 150 V/m

B. 125 V/m

C. 120 V/m

D. Zero

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204. Charges 4Q, q and Q and placed along x-axis at positions $x = 0, x = 1/2$ and $x = 1$, respectively. Find the value of q so that force on charge Q is zero

A. Q

B. Q/2

C. $-Q/2$

D. $-Q$

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205. If an electron moves from rest from a point at which potential is 50 volt to another point at which potential is 70 volt, then its kinetic energy in the final state will be

A. $3.2 \times 10j$

B. $3.2 \times 10j$

C. $32 \times 10j$

D. $320 \times 10j$

Answer: B

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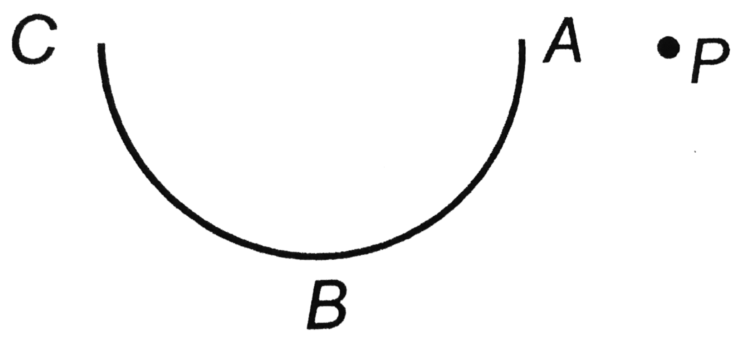
206. In the following diagram the work done in moving a point charge from point P to point A, B and C is respectively as W_A, W_B and W_C, then



A. $W = W = W$

B. $W = W = W = 0$

C. $W > W > W$

D. $W < W < W$

Answer: A

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207. A conducting sphere of radius R is given a charge Q. The electric potential and the electric field at the centre of the sphere respectively are

A. Zero

B. $\frac{1}{4\pi \in_0} \cdot \frac{Q}{R}$

C. $\frac{1}{4\pi \in_0} \cdot \frac{2Q}{R}$

D. $\frac{1}{4\pi \in_0} \cdot \frac{Q}{2R}$

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Ordinary Thinking Objective Questions (Electric Dipole)

1. An electric dipole when placed in a uniform electric field E will have minimum potential energy, if the positive direction of dipole moment makes the following angle with E

A. π

B. $\pi/2$

C. Zero

D. $3\pi/2$

Answer: C

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2. A given charge is situated at a certain distance from an electric dipole in the end-on position experiences a force F If the distance of the charge is doubled, the force acting on the charge will be

A. $2F$

B. $F/2$

C. $F/4$

D. $F\frac{/}{8}$

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3. The electric potential at a point on the axis of an electric dipole depends on the distance r of the point from the dipole as

A. $\propto \frac{1}{r}$

B. $\propto \frac{1}{r^2}$

C. $\propto r$

D. $\propto \frac{1}{r^3}$

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4. An electric dipole of moment p is palced in the positive of stable equilibrium in uniform electric field of intensity E. It is rotated through an angle θ from the initial position. The potential energy of electric dipole in the final position is

A. $pE\cos\theta$

B. $pE\sin\theta$

C. $pE(1-\cos\theta)$

D. $-pE\cos\theta$

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5. An electric dipole is kept in non-unifrom electric field. It experiences

A. A force and a torque

B. A force but not a torque

C. A torque but not a force

D. Neither a force nor a torque

Answer: A

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6. An electric dipole consisting of two opposite charges of $2 \times 10^{-6} C$ each separated by a distance of $3cm$ is placed in an electirc field of $2 \times 10^5 N/C$. The maximum torque on the dipole is will be

A. $12 \times 10^{-1} Nm$

B. $12 \times 10^{-3} Nm$

C. $24 \times 10^{-1} Nm$

D. $24 \times 10^{-3} Nm$

Answer: B

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7. An electric dipole of moment $\overrightarrow{p}$ is placed normal to the lines of force of electric intensity $\overrightarrow{E}$, then the work done in deflecting it through an angle of 180° is

A. pE

B. $+2pE$

C. $-2pE$

D. Zero

Answer: B

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8. An electric dipole having charges $+q$ and $-q$ at a separation r. At distance $d > > r$ along the axis of the dipole , the field is proportional to

A. $\frac{q}{d^2}$

B. $\frac{qr}{d^2}$

C. $\frac{q}{d^3}$

D. $\frac{qr}{d^3}$

Answer: D

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9. An electron and a proton are at a distance of . The moment of this dipole will be $(C \times m)$

A. 1.6×10^{19}

B. 1.6×10^{-29}

C. 3.2×10^{19}

D. 3.2×10^{29}

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10. The electric field due to a dipole at a distance on its axis is

A. Directly proportional to r^3

B. Inversely proportional to r^3

C. Directly proportional to r^2

D. Inversely proportional to r^2

Answer: B

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11. Two charges $+3.2 \times 10^{-19}$ and $-3.2 \times 10^{-19}C$ placed at $2.4A$ apart from an electric dipole. It is placed in a uniform electric field of intensity $4 \times 10^5 \text{volt}/m$. The electric dipole moment is

A. 15.36×10^{-29} coulmb $\times$ m

B. 15.36×10^{-19} coulmb $\times$ m

C. 7.68×10^{-29} coulmb $\times$ m

D. 7.68×10^{-19} coulmb $\times$ m

Answer: C

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12. An electric dipole is placed along x-axis at the origin O. A point P is at a distance of 20 cm from this origin such that OP make an angle $\frac{\pi}{3}$ with the x-axis .

If electric field at P makes an angle θ with x-axis , then the value of θ is

A. $\frac{\pi}{3}$

B. $\frac{\pi}{3} + \tan^{-1}\left(\frac{\sqrt{3}}{2}\right)$

C. $\frac{2\pi}{3}$

D. $\tan^{-1}\left(\frac{\sqrt{3}}{2}\right)$

Answer: B

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13. Electric charges $q, q, -2q$ are placed at the corners of an equilateral triangle ABC of side l. The magnitude of electric dipole moment of the system is

A. ql

B. 2ql

C. $\sqrt{3}ql$

D. $4ql$

Answer: C

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14. The torque τ acting on an electric dipole of dipole momtn $\overrightarrow{p}$ in an electric field $\overrightarrow{E}$ is

A. $\overrightarrow{P} . \overrightarrow{E}$

B. $\overrightarrow{P} \times \overrightarrow{E}$

C. Zero

D. $\overrightarrow{E} \times \overrightarrow{P}$

Answer: B

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15. The electric field at a point on equatorial of a dipole and direction of the dipole moment

A. Will be parallel

B. Will be in opposite direction

C. Will be perpendicular

D. Are not related

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16. Two opposite and equal charges 4×10^{-8} coulomb when placed $2 \times 10^{-2} cm$ away, from a dipole. If dipole is placed in an external electric field 4×10^{8} newton//coulomb, the value of maximum torque and the work done in rotating it through 180° will be

A. $64 \times 10^{-4} Nm$ and $64 \times 10^{-4} J$

B. $32 \times 10^{-4} Nm$ and $32 \times 10^{-4} J$

C. $64 \times 10^{-4} Nm$ and $32 \times 10^{-4} J$

D. $32 \times 10^{-4} Nm$ and $64 \times 10^{-4} J$

Answer: D

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17. If E_a be the electric field strength of a short dipole at a point on its axial line and E_e that on the equatorial line at the same distance, then

A. $E_e = 2E_a$

B. $E_a = 2E_a$

C. $E_a = E_e$

D. None of the above

Answer: B

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18. An electric dipole is placed in an electric field generated by a point charge

A. The net electric force on the dipole must be zero

B. The net electric force on the dipole may be zero

C. The torque on the dipole due to the field must be zero

D. The torque on the dipole due to the field may be zero

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19. A point Q lies on the perpendicular bisector of an electrical dipole of dipole moment p, If the distance of Q from the dipole is r (much larger than the size of the dipole), then electric field at Q is proportional to

A. p^{-1} and r^{-2}

B. p and r^{-2}

C. p^2 and r^{-3}

D. p and r^{-3}

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20. If the magnitude of intensity of electric field at a distance x on axial line and at a distance y on equatorial line on a given dipole are equal, then $x : y$ is

A. $1:1$

B. $1:\sqrt{2}$

C. $1:2$

D. $3\sqrt{2}:1$

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21. An electric dipole in a uniform electric field experiences (When it is placed at an angle θ with the field)

A. Force and torque both

B. Force but no torque

C. Torque but no force

D. No force and no torque

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22. The electric intensity due to a dipole of length $10cm$ and having a charge of $500\mu C$, at a point on the axis at a distance $20cm$ from one of the charges in air is

A. $6.25 \times 10^7 N/C$

B. $9.28 \times 10^7 N / C$

C. $13.1 \times 11^{11} N / C$

D. 20.5×10^7 N/C

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23. Electric potential at any point in equatorial plane of a dipole is ....

A. Zero

B. $\frac{P}{4\pi \in_0 r^2}$

C. $\frac{P}{4\pi n_0 r^3}$

D. $\frac{2P}{4\pi \in_0 r^3}$

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24. The distance between H^+ and CI^- ions in HCI molecule is 1.28Å. What will be the potential due to this dipole at a distance of 12Å on the axis of dipole ?

A. 0.13 V

B. 1.3 V

C. 13 V

D. 130 V

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25. The potential at a point due to an electric dipole will be maximum and minimum when the angles between the axis of the dipole and the line joining the point to the dipole are respectively

A. 90° and 180°

B. 0° and 90°

C. 90° and 0°

D. 0° and 180°

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26. The value of electric potential at any point due to any electric dipole is

A. $k.\frac{\overrightarrow{p}\times\overrightarrow{r}}{r^2}$

B. $k.\frac{\overrightarrow{p}\times\overrightarrow{r}}{r^3}$

C. $k.\frac{\overrightarrow{p}.\overrightarrow{r}}{r^2}$

D. $k.\frac{\overrightarrow{p}.\overrightarrow{r}}{r^3}$

Answer: D

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27. An electric dipole has the magnitude of its charge as q and its dipole moment is p. It is placed in a uniform electric field E. If its dipole moment is along the direction of the field, the force on it and its potential energy are respectively

A. 2q . E and minimum

B. q . E and p . E

C. Zero and minimum

D. q . E and maximum

Answer: C

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28. Intensity of an electric field (E) depends on distance r due to a dipole, is related as

A. $E \propto \frac{1}{r^4}$

B. $E \propto \frac{1}{r^3}$

C. $E \propto \frac{1}{r^2}$

D. $E \propto \frac{1}{r}$

Answer: B

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29. The ratio of electric fields on the axis and at equator of an electric dipole will be

A. $1:1$

B. $2:1$

C. $4:1$

D. None of these

Answer: B

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30. For a dipole $q = 2 \times 10^{-6} C$ and $d = 0.01 m$.

Calculate the maximum torque for this dipole if

$E = 5 \times 10^5 N/C$

A. $1 \times 10^{-3} Nm^{-1}$

B. $10 \times 10^{-3} Nm^{-1}$

C. $10 \times 10^{-3} Nm$

D. $1 \times 10^2 Nm^2$

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31. A molecule with a dipole moment p is placed in an electric field of strength E. Initially the dipole is aligned parallel to the field. If the dipole is to be rotated to be anti-parallel to the field, the work required to be done by an external agency is

A. $-2pE$

B. $-pE$

C. pE

D. 2pE

Answer: D

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32. An electric dipole of moment $\overrightarrow{p}$ placed in a uniform electric field $\overrightarrow{E}$ has minimum potential energy when the angle between $\overrightarrow{p}$ and $\overrightarrow{E}$ is

A. Zero

B. $\frac{\pi}{2}$

C. π

D. $\frac{3\pi}{2}$

Answer: A

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33. The region surrounding a stationary electric dipole has

A. Magnetic field only

B. Electric field only

C. Both electric and magnetic fields

D.) No electric and magnetic fields

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34. Two electric dipoles of moment P and $64P$ are placed in opposite direction on a line at a distance of

$25cm$. The electric field will be zero at point between the dipoles whose distance from the dipole of moment P is

A. 5 cm

B. $\frac{25}{9}$ cm

C. 10 cm

D. $\frac{4}{13}$ cm

Answer: A

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35. When an electric dipole P $\vec{v}$ is placed in a uniform electric field $\vec{E}$ then at what angle between $\vec{P}$ and $\vec{E}$ the value of torque will be maxima

A. 90°

B. 0°

C. 180°

D. 45°

Answer: A

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36. Two charges $+3.2 \times 10^{-19} C$ and $-3.2 \times 10^{-9} C$ kept 2.4Å apart forms a dipole. If it is kept in uniform electric field of intensity $4 \times 10^{5} vol/m$ then what will be its electrical energy in equilibrium ?

A. $+3 \times 10^{-23} J$

B. $-3 \times 10^{-23} J$

C. $-6 \times 10^{-23} J$

D. $-2 \times 10^{-23} J$

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37. What is the anle between the electric dipole moment and the elcetric field strength due to it on the equatorial line

A. 0°

B. 90°

C. 180°

D. None of these

Answer: C

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38. The electric field due to an electric dipole at a distance r from its centre in axial position is E. If the dipole is rotated through an angle of 90° about its perpendicular axis, the electric field at the same point will be

A. E=0,V=0

B. E/4

C. E/2

D. 2E

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Ordinary Thinking Objective Questions (Electric Flux and Gauss.s Law)

1. A cylinder of radius R and length L is placed in a uniform electric field E parallel to the axis. The total flux for the surface of the cylinder is given by

A. $2\pi R^2 E$

B. $\pi R^2 / E$

C. $\left(\pi R^2 - \pi R\right) / E$

D. Zero

Answer: D

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2. Electric field at a point varies as r^0 for

A. An electric dipole

B. A point charge

C. A plane infinite sheet of charge

D. A line charge of infinite length

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3. An electric charge q is placed at the centre of a cube of side l. The electric flux through one of its faces will be

A. $\frac{q}{6 \in_0}$

B. $\frac{q}{\in_0 a^2}$

C. $\frac{q}{4\pi \in_0 a^2}$

D. $\frac{q}{\in_0}$

Answer: A

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4. Total electric flux coming out of a unit positive charge put in air is

A. $\in_0$

B. $\in_0^{-1}$

C. $(4\pi n_0)^{-1}$

D. $4\pi \in_0$

Answer: B

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5. For a given surface the Gauss's law is stated as $\oint \vec{E} . d\vec{A} = 0$. From this we can conclude that

A. E is necessarily zero on the surface

B. E is perpendicular to the surface at every point

C. The total flux through the surface is zero

D. The flux is only going out of the surface

Answer: C

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6. A cube of side l is p laced in a uniform field E, where $E = E\hat{i}$. The net electric flux through the cube is

A. Zero

B. $l^2 E$

C. $4l^2E$

D. $6l^2E$

Answer: A

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7. Eight dipoles of charges of magnitude e are placed inside a cube. The total electric flux coming out of the cube will be

A. $\frac{8e}{\in_0}$

B. $\frac{16e}{\in_0}$

C. $\frac{e}{\in_0}$

D. Zero

Answer: D

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8. A charge +q is placed at the mid point of a cube of side L. The electric flux emerging from cube is

A. $\frac{q}{\in_0}$

B. Zero

C. $\frac{6qL^2}{\in_0}$

D. $\frac{q}{6L^2 \in_0}$

Answer: A

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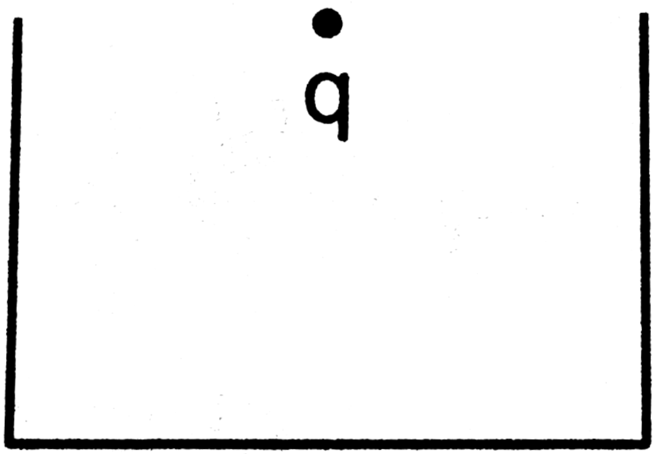
9. A charge q is placed at the centre of the open end of a cylindrical vessel . The flux of the electric field through the surface of the vessel is



A. Zero

B. $\frac{q}{\in_0}$

C. $\frac{q}{2 \in_0}$

D. $\frac{2q}{\in_0}$

Answer: C

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10. It is not convenient to use a spherical Gaussian surface to find the electric field due to an electric dipole using Gauss's theorem because

A. Gauss's law fails in this case

B. This problem does not have spherical symmetry

C. Coulomb's law is more fundamental than Gauss's law

D. Spherical Gaussian surface will alter the dipole moment

Answer: B

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11. In case of infinite long wire electric field is proportional to

A. r

B. $\frac{1}{r^2}$

C. $\frac{1}{r^3}$

D. $\frac{1}{r}$

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12. Electric charge is uniformly distributed along a long straight wire of radius 1 mm. The charge per cm length of the wire Q coulomb. Another cylindrical surface of radius 50 cm and length 1 m symmetrical encloses the wire as shown in the figure. The total electric flux passing through the cylindrical surface is

A. $\frac{Q}{\in_0}$

B. $\frac{100Q}{\in_0}$

C. $\frac{10Q}{(\pi \in_0)}$

D. $\frac{100Q}{(\pi \in_0)}$

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13. The SI unit of electric flux is

A. $\frac{Nm^2}{C}$

B. Newton per coulomb

C. Volt $\times$ metre

D. Joule per coulomb

Answer: A

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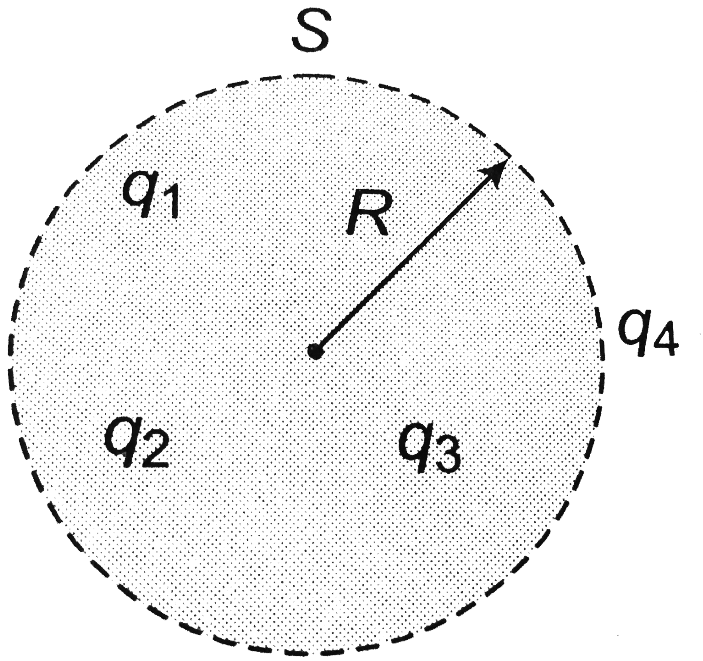
14. q_1, q_2, q_3 and q_4 are point charges located at point as shown in the figure and s is a spherical Gaussian surface of radius R. Which of the following is true according to the Gauss's law



A. $\oint_s \left(\vec{E}_1 + \vec{E}_2 + \vec{E}_3\right) . d\vec{A} = \frac{q_1 + q_2 + q_3}{2 \epsilon_0}$

B. $\oint_s \left(\vec{E}_1 + \vec{E}_2 + \vec{E}_3\right) . d\vec{A} = \frac{(q_1 + q_2 + q_3)}{\epsilon_0}$

C.

$$\oint_s \left(\vec{E}_1 + \vec{E}_2 + \vec{E}_3\right) . d\vec{A} = \frac{(q_1 + q_2 + q_3 + q_4)}{\epsilon_0}$$

D. None of the above

Answer: C

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15. Gauss's law should be invalid if

A. There were magnetic monopoles

B. The inverse square law were not exactly true

C. The velocity of light were not a universal constant

D. None of these

Answer: B

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16. The inward and outward electric flux for a closed surface unit of $N - m^2 / C$ are respectively 8×10^3 and 4×10^3. Then the total charge inside the surface is [where $\varepsilon_0 =$ permittivity constant]

A. $4 \times 10^3 C$

B. $-4 \times 10^3 C$

C. $\frac{(-4 \times 10^3)}{\in} C$

D. $-4 \times 10^3 \in_0 C$

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17. If a point charge q is placed at the centre of a cube, then find out flux through any one face of cube.

A. $\frac{q}{\in_0}$

B. $\frac{q}{2 \in_0}$

C. $\frac{q}{4 \in_0}$

D. $\frac{q}{6 \in_0}$

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18. If a spherical conductor comes out from the closed surface of the sphere then total flux emitted from the surface will be

A. $\frac{1}{\in_0} \times$ (the charge enclosed by surface)

B. $\in_0 \times$ (the charge enclosed by surface)

C. $\frac{1}{4\pi \in_0} \times$ (the charge enclosed by surface)

D. 0

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19. If the electric flux entering and leaving an enclosed surface respectively is ϕ_1 and ϕ_2, the electric charge inside the surface will be

A. $(\phi_1 + \phi_2) \in_0$

B. $(\phi_2 - \phi_1) \in_0$

C. $(\phi_1 + \phi_2) / \in_0$

D. $(\phi_2 - \phi_1) / \in_0$

Answer: B

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20. A charge q is located at the centre of a cube. The electric flux through any face is

A. $\dfrac{4\pi q}{6(4\pi \in_0)}$

B. $\dfrac{\pi q}{6(4\pi \in_0)}$

C. $\dfrac{q}{6(4\pi \in_0)}$

D. $\dfrac{2\pi q}{6(4\pi \in_0)}$

Answer: A

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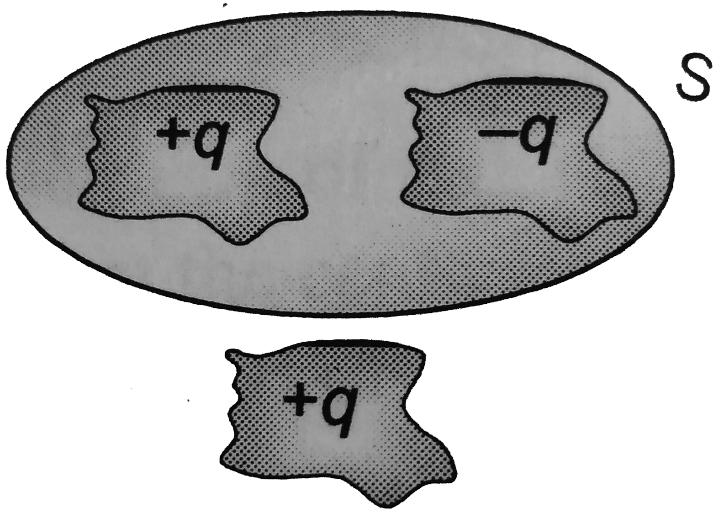
21. Shown below is a distribution of charges. The flux of electric field due to these charges through the surface S is



A. $3q/\in_0$

B. $2q/\in_0$

C. $q/\in_0$

D. Zero

Answer: D

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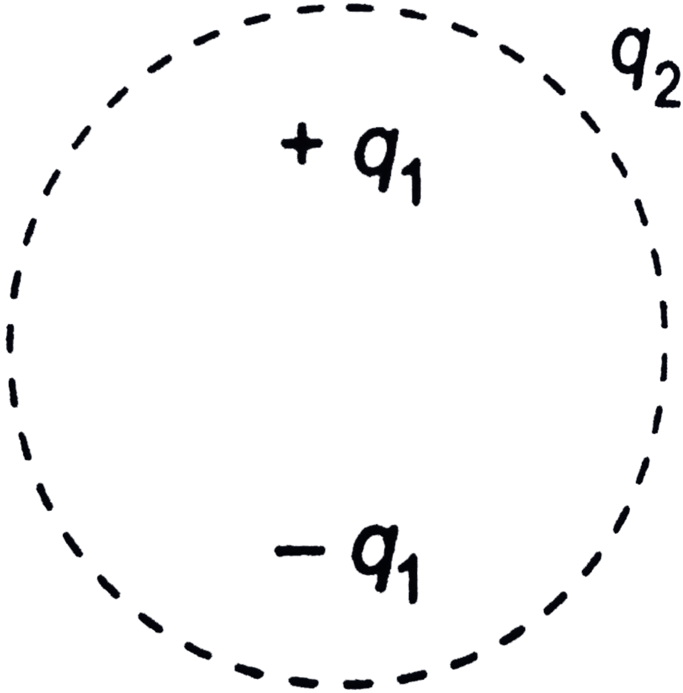
22. Consider the charge configuration and a spherical Gaussian surface as shown in the figure. When calculating the flux of the electric field over the spherical surface, the electric field will be due to.



A. q_2

B. Only the positive charges

C. All the charges

D. $+q_1$ and $-q_1$

Answer: C

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23. Gauss's law is true only if force due to a charge varies as

A. r^{-1}

B. r^{-2}

C. r^{-3}

D. r^{-4}

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24. An electric dipole is put in north-south direction in sphere filled with water. Which statement is correct

A. Electric flux is coming towards sphere

B. Electric flux is coming out of sphere

C. Electric flux entering into sphere and leaving the sphere are same

D. Water does not permit electric flux to enter into sphere

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25. Two infinite plane parallel sheets, separated by a distance d have equal and opposite uniform charge densities σ. Electric field at a point between the sheets is

A. Zero

B. $\frac{\sigma}{\in_0}$

C. $\frac{\sigma}{2 \in_0}$

D. Depends upon the location of the point

Answer: B

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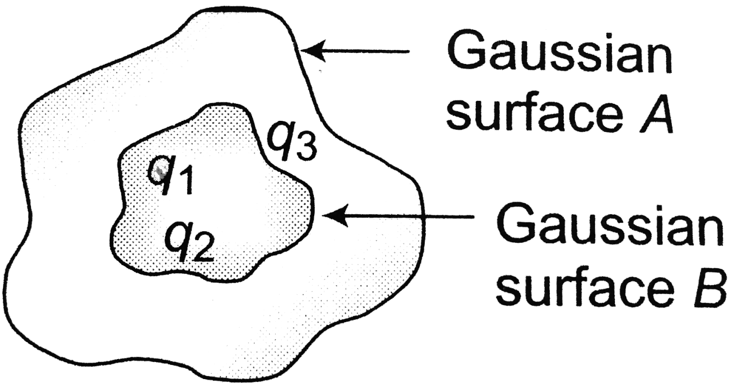
26. The electric flux for Gaussian surface A that enclose the charge particles in free space is (given $q_1 = -14nC, q_2 = 78.85nC, q_3 = -56nC$)



A. $10^3 Nm^2C^{-1}$

B. $10^3 CN^{-1}m^{-2}$

C. $6.32 \times 10^3 Nm^2C^{-1}$

D. $6.32 \times 10^3 CN^{-1}m^{-2}$

Answer: A

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27. The electric intensity due to a uniformly charged infinite cylinder of radius R, at a distance $r(>R)$, from its axis is proportional to

A. Directly proportional to r^2

B. Directly proportional to r^3

C. Inversely proportional to r

D. Inversely proportional to r^2

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28. A sphere of radius R has a uniform distribution of electric charge in its volume. At a distance x from its centre, for $x < R$, the electric field is directly proportional to

A. $\frac{1}{x^2}$

B. $\frac{1}{x}$

C. x

D. x^2

Answer: C

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