Electric charge and field

1. Electric Charge

Q1. Eight small drops, each of radius r and having same charge q are combined to form a big drop. The ratio between the potentials of the bigger drop and the smaller drop is

(A) $8:1$

(B) $4:1$

(C) $2:1$

(D) $1:8$

Correct Answer: **(B)** Level: **Easy** Tagging: **Understanding**

Q2. Object may acquire an excess or deficiency of charge by

(A) electric force

(B) heating

(C) shaking

(D) by rubbing

Correct Answer: **(A)** Level: **Easy** Tagging: **Understanding**

Q3. Out of two copper spheres of the same size, x is hollow while y is solid. If they are charged at the same potential, what can be said about the charges on them?

(A) Charge on both the spheres is zero

(B) Charge on both the spheres is equal

(C) Sphere y will have more charge

(D) Sphere x will have more charge

Correct Answer: **(B)** Level: **Easy** Tagging: **Understanding**

Q4. The charge on an electron was calculated by

(A) Faraday

(B) J. J. Thomson

(C) Millikan

(D) Einstein

Correct Answer: **(C)** Level: **Easy** Tagging: **Remembering**

Q5. There are two types of electric charges positive charges and negative charges. The property which differentiates the two types of charges is

(A) field of charge

(B) amount of charge

(C) strength of charge

(D) polarity of charge

Correct Answer: **(D)** Level: **Easy** Tagging: **Understanding**

Q6. Three concentric conducting spherical shells carry charges as follows :+Q on the inner shell, -2Q on the middle shell and -5 Q on the outer shell. The charge in the inner surface of the outer shell is

(A) 0

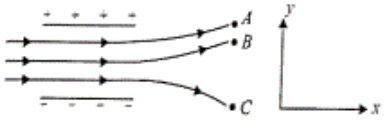
(B) + Q

(C) -2 Q

(D) -3 Q

Correct Answer: **(B)** Level: **Easy** Tagging: **Understanding**

The tracks of three charged particles in a uniform electrostatic field are shown in the figure. Which particle has the highest charge to mass ratio?



Q7.

(A) A

(B) B

(C) C

(D) A & B

Correct Answer: **(C)** Level: **Moderate** Tagging: **Applying**

Q8. Consider the following statements and choose the correct option

A. Charges were named positive and negative by the American scientist Benjamin Franklin.

B. In gold leaf electroscope the degree of divergence is an indicator of the amount of charge.

(A) Only Statement-A is correct

(B) Only Statement-B is correct

(C) Both Statement A & B are correct

(D) Both Statements A & B are incorrect

Correct Answer: **(C)** Level: **Moderate** Tagging: **Analyzing**

Q9. When a person combs his hair, static electricity is sometimes generated by what process?

(A) Contact between the comb and hair results in a charge.

(B) Friction between the comb and hair results in the transfer of electrons.

(C) Deduction between the comb and hair.

(D) Induction between the comb and hair.

Correct Answer: **(B)** Level: **Moderate** Tagging: **Analyzing**

Q10. An object is charged when it has a charge imbalance, which means the

(A) object contains no protons

(B) object contains no electrons

(C) object contains equal number of electrons and protons

(D) object contains unequal number of electrons and protons

Correct Answer: **(C)** Level: **Difficult** Tagging: **Creating**

Q11. The bob of simple pendulum is hanging vertically down from a fixed identical bob by means of string of length l. If both bobs are charged with a charge with a charge q each, time period of the pendulum is (ignore the radii of the bobs)

(A) $2\pi\sqrt{\frac{l}{g+\left(\frac{q^2}{l^2m}\right)}}$

(B) $2\pi\sqrt{\frac{l}{g-\left(\frac{q^2}{l^2m}\right)}}$

(C) $2\pi\sqrt{\frac{l}{g}}$

(D) $2\pi\sqrt{\frac{l}{g-\left(\frac{q2}{l}\right)}}$

Correct Answer: **(C)** Level: **Difficult** Tagging: **Understanding**

2. Conductors and insulators

Four metal conductors having different shapes
I. A sphere
II. Cylinder
III. Pear
IV. Lightning conductor
are mounted on insulating stands and charged. The one which is best suited to retain the charges for a longer time is

Q12.

(A) I

(B) II

(C) III

(D) IV

Correct Answer: **(A)** Level: **Easy** Tagging: **Understanding**

Q13. A conducting sphere is negatively charged. Which of the following statements is true?

(A) The charge is uniformly distributed throughout the entire volume.

(B) The charge is located at the center of the sphere.

(C) The charge is located at the bottom of the sphere because of gravity.

(D) The charge is uniformly distributed on the surface of the sphere.

Correct Answer: **(D)** Level: **Easy** Tagging: **Remembering**

Q14. A method for charging a conductor without bringing a charged body in contact with it is called

(A) Magnetization

(B) Electrification

(C) Electrostatic induction

(D) Electromagnetic induction

Correct Answer: **(C)** Level: **Easy** Tagging: **Understanding**

Q15. What will happen when we rub a glass rod with silk cloth?

(A) Some of the electrons from the glass rod are transferred to the silk cloth.

(B) The glass rod gets positive charge and silk cloth gets negative charge.

(C) New charge is created in the process of rubbing.

(D) both (1) and (2) are correct.

Correct Answer: **(D)** Level: **Easy** Tagging: **Remembering**

3. Basic Properties of Electric Charge

Q16. 1000 similar electrified rain drops merge together into one drop so that their total charge remains unchanged. How is the electric energy affected?

(A) 100 times

(B) 102 times

(C) 200 times

(D) 400 times

Correct Answer: **(A)** Level: **Easy** Tagging: **Understanding**

Q17. A cup contains 250 g of water. Find the total positive charge present in the cup of water.

(A) 1.34×10^{19} C

(B) 1.34×10^{7} C

(C) 2.43×10^{19} C

(D) 2.43×10^{7} C

Correct Answer: **(B)** Level: **Easy** Tagging: **Evaluating**

Q18. A polythene piece rubbed with wool is found to have a negative charge of 6×10^{-7} C. The number of electrons transferred to polythene from wool is

(A) 3.75×10^{10}

(B) 9.6×10^{10}

(C) 9.6×10^{12}

(D) 3.75×10^{12}

Correct Answer: **(D)** Level: **Easy** Tagging: **Evaluating**

Q19. The number of electrons present in 1 C of charge is

(A) 6×10^{18}

(B) 1.6×10^{19}

(C) 6×10^{19}

(D) 1.6×10^{18}

Correct Answer: **(A)** Level: **Easy** Tagging: **Evaluating**

Q20. A polythene piece rubbed with wool is found to have a negative charge of 9×10^{-8} C. Estimate the number of electron transferred.

(A) 5.625×10^{11}

(B) 10.2×10^{11}

(C) 2.62×10^{8}

(D) 9×10^{-8}

Correct Answer: **(A)** Level: **Moderate** Tagging: **Applying**

Q21. Charge q_2 of mass m revolves around a stationary charge q_1 in a circular orbit of radius r. The orbital periodic time of q_2 would be

(A) $\left[\frac{4\pi^3 mr^2}{kq_1q_2}\right]^{1/2}$

(B) $\left[\frac{kq_1q_2}{4\pi^2 mr^2}\right]^{1/2}$

(C) $\left[\frac{4\pi^2 mr^4}{kq_1q_2}\right]^{1/2}$

(D) $\left[\frac{4\pi^2 mr^2}{kq_1q_2}\right]^{1/2}$

Correct Answer: **(A)** Level: **Moderate** Tagging: **Applying**

Q22. Consider the following statement and choose the correct statement.

A. Quantisation of electric charge is a basic law of nature, there is no analogous law on quantisation of mass

B. Electric field due to discrete charge configuration is not defined at the location of the discrete charges while for continuous volume charge distribution it is defined at any point of distribution

(A) Only A

(B) Only B

(C) Both A and B

(D) Neither A and B

Correct Answer: **(C)** Level: **Moderate** Tagging: **Analyzing**

Q23. If 10^9 electrons move out of a body to another body every second, then the time required to get a total charge of 1 C on the other body is

(A) 250 years

(B) 100 years

(C) 198 years

(D) 150 years

Correct Answer: **(C)** Level: **Moderate** Tagging: **Applying**

4. Coulomb's Law

Q24. 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) $1/2$

(C) 4

(D) $1/4$

Correct Answer: **(A)** Level: **Easy** Tagging: **Applying**

Q25. 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) $\sqrt{\frac{G}{4\pi\varepsilon_0}}$

(D) $\sqrt{4\pi\varepsilon_0 G}$

Correct Answer: **(D)** Level: **Easy** Tagging: **Applying**

Q26. An electron is moving around the nucleus of a hydrogen atom in a circular orbit of radius r. The coulomb force $\vec{F}$ between the two is $\left(\text{where } K = \frac{1}{4\pi\varepsilon_0}\right)$

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

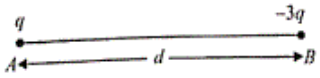
(B) $K\frac{e^2}{r^3}\vec{r}$

(C) $-K\frac{e^2}{r^3}\vec{r}$

(D) $K\frac{e^2}{r^3}\hat{r}$

Correct Answer: **(C)** Level: **Easy** Tagging: **Applying**

Q27. Two charges q and -3q are fixed on x-axis separated by distance d, Where should a third charge 2q be placed from A such that it will not experience any force?



(A) $\frac{d - \sqrt{3}d}{2}$

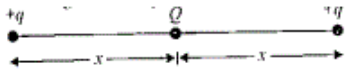
(B) $\frac{d + \sqrt{3}d}{2}$

(C) $\frac{d + 3d}{2}$

(D) $\frac{d - 3d}{2}$

Correct Answer: **(B)** Level: **Easy** Tagging: **Understanding**

Q28. A charge Q is placed at the centre of the line joining two point charges +q and +q as shown in figure. The ratio of charges Q and q is such that the whole system in equilibrium.



(A) 4

(B) 1/4

(C) -4

(D) -1/4

Correct Answer: **(D)** Level: **Easy** Tagging: **Understanding**

Q29. 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) $Q_2 = \frac{Q}{4}, Q_1 = \frac{3Q}{4}$

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

Correct Answer: **(D)** Level: **Easy** Tagging: **Understanding**

Q30. Coulomb's law relates two charges and distance between them describing the electric force as being

(A) proportional to the sum of the charges

(B) inversely proportional to the distance between charges

(C) proportional to the product of the charges and inversely proportional to the distance

(D) proportional to the product of the charges and inversely proportional to the square of distance.

Correct Answer: **(D)** Level: **Easy** Tagging: **Remembering**

Q31. Identify the true/false statements about coulomb law

1. Force acted between two charges is directly proportional to the product of their magnitude.
2. Coulomb law is applied to static charges.
3. It is very difficult to apply for irregular shape.

(A) true - false - true

(B) true - true - true

(C) true -true - false

(D) false - false - true

Correct Answer: **(B)** Level: **Easy** Tagging: **Remembering**

Q32. If two same charges are 3 X 10^{-7} C and acted upon by a force of 0.5N. Determine the distance between them, if both the charges are in a vacuum.

(A) 0.04 m

(B) 0.02 m

(C) 0.05 m

(D) 0.03 m

Correct Answer: **(A)** Level: **Easy** Tagging: **Remembering**

Q33. On rotating a point charge having a charge q around a charge Q in a circle of radius r. The work done will be

(A) $Q \times 2\pi r$

(B) $\frac{q \times 2\pi Q}{r}$

(C) Zero

(D) $\frac{Q}{2\varepsilon_0 r}$

Correct Answer: **(C)** Level: **Easy** Tagging: **Understanding**

Q34. SI unit of permittivity of free space ls

(A) Farad

(B) Weber

(C) $C^2\ N^{-1}\ m^{-2}$

(D) $C^2 N^{-1} m^{-1}$

Correct Answer: **(C)** Level: **Easy** Tagging: **Remembering**

Q35. The constant k in Coulomb's law depends on

(A) nature of medium

(B) system of units

(C) intensity of charge

(D) both (a) and (b)

Correct Answer: **(D)** Level: **Easy** Tagging: **Remembering**

Q36. There are two charges +1 μC and +5 μC respectively. The ratio of the forces acting on them will be

(A) $1:5$

(B) $1:1$

(C) $5:1$

(D) $1:25$

Correct Answer: **(B)** Level: **Easy** Tagging: **Remembering**

Q37. Two equally charged small balls placed at a fixed distance experience a force F. A similar uncharged ball after touching one of them is placed at the middle point between the two balls. The force experienced by this ball is

(A) F/2

(B) F

(C) 2F

(D) 4F

Correct Answer: **(B)** Level: **Easy** Tagging: **Applying**

Q38. Which of the option is correct regarding Coulomb's law?

(A) Valid for point charges

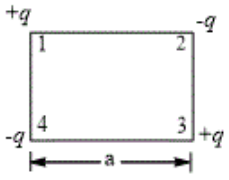
(B) Coulomb used a torsion balance for measuring the force between two charged metallic spheres

(C) Force between two charged particles varies inversely with the square of distance between them

(D) All of these

Correct Answer: **(D)** Level: **Easy** Tagging: **Understanding**

Q39. The work required to put the four charges at the corners of a square of side a, as shown in figure, is



(A) $1/4\pi\varepsilon_0\ q^2/a$

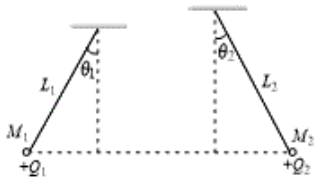
(B) $-2.6/4\pi\varepsilon_0\ q^2/a$

(C) $+2.6/4\pi\varepsilon_0\ q^2/a$

(D) None of these

Correct Answer: **(B)** Level: **Moderate** Tagging: **Understanding**

Q40. Two small spheres of masses M_1 and M_2 are suspended by weightless insulating threads of lengths L_1 and L_2. The spheres carry charges Q_1 and Q_2 respectively. The spheres are suspended such that they are in level with one another and the threads are inclined to the vertical at angles of θ_1 and θ_2 as shown. Which one of the following conditions is essential, if $\theta_1 = \theta_2$



(A) $M_1 \neq M_2$ but $Q_1 = Q_2$

(B) $M_1 = M_2$

(C) $Q_1 = Q_2$

(D) $L_1 = L_2$

Correct Answer: **(B)** Level: **Moderate** Tagging: **Applying**

Q41. Charge q_1 =+ 6.0 nC is on Y- axis at y=+3 cm and charge q_2 =-6.0 nC is on Y- axis at y=-3 cm calculate force on a test charge q_0 =2nC placed on X-axis at x=4 cm.

(A) $-51.8\,\hat{\jmath}\mu N$

(B) $+51.8\,\hat{\jmath}\mu N$

(C) $-5.18\,\hat{\jmath}\mu N$

(D) $5.18\,\hat{\jmath}\mu N$

Correct Answer: **(A)** Level: **Moderate** Tagging: **Applying**

Q42. The electrostatic force on a small sphere of charge 0.8 μC due to another small sphere of charge –1.6 μC in air is 0.4 N. What is the force on the second sphere due to first sphere?

(A) 0.8 N

(B) 1.6 N

(C) 3.5 N

(D) 0.4 N

Correct Answer: **(D)** Level: **Moderate** Tagging: **Applying**

Q43. 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 between them, the force now will be

(A) $4F$

(B) $2F$

(C) $\frac{F}{2}$

(D) $\frac{F}{4}$

Correct Answer: **(D)** Level: **Moderate** Tagging: **Applying**

Q44. Two identical spheres with charges 4q, -2q kept some distance apart exert a force F on each other. If they are made to touch each other and replaced at their old positions, the force between them will be

(A) $\frac{1}{9}F$

(B) $\frac{1}{8}F$

(C) $\frac{9}{8}F$

(D) $\frac{8}{9}F$

Correct Answer: **(B)** Level: **Moderate** Tagging: **Applying**

Q45. Two point charges exert on each other a force F when they are placed r distance apart in air. When they are placed R distance apart in a medium of dielectric constant K, they exert the same force. The distance R equals

(A) $\frac{r}{k}$

(B) rK

(C) $r\sqrt{K}$

(D) $\frac{r}{\sqrt{K}}$

Correct Answer: **(D)** Level: **Moderate** Tagging: **Evaluating**

Q46. Which of the following statement is not a similarity between electrostatic and gravitational forces?

(A) Both forces obey inverse square law.

(B) Both forces operate over very large distances.

(C) Both forces arc conservative in nature.

(D) Both forces arc attractive in nature always.

Correct Answer: **(A)** Level: **Moderate** Tagging: **Analyzing**

Q47. Which of the following statements is true about electrical forces?

(A) Electrical forces are produced by electrical charges.

(B) Like charges attract, unlike charges repel.

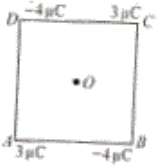
(C) Electric forces are weaker than gravitational forces.

(D) Positive and negative charges can combine to produce a third type of charge.

Correct Answer: **(A)** Level: **Moderate** Tagging: **Analyzing**

5. Forces between Multiple Charges

Q48. Four point charges are placed at the corners of a square ABCD of side 10 cm, as shown in figure. The force on a charge of l μC placed at the centre of square is



(A) 7N

(B) 8N

(C) 2N

(D) zero

Correct Answer: **(D)** Level: **Easy** Tagging: **Understanding**

Q49. Four charges equal to -Q are placed at the four corners of a square and a charge q is at its centre. If the system is in equilibrium the value of q is

(A) $-\frac{Q}{4}(1+2\sqrt{2})$

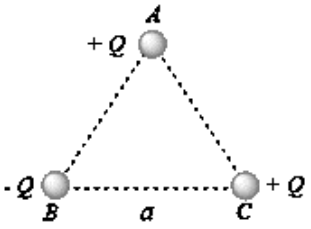
(B) $\frac{Q}{4}(1+2\sqrt{2})$

(C) $-\frac{Q}{2}(1+2\sqrt{2})$

(D) $\frac{Q}{2}(1+2\sqrt{2})$

Correct Answer: **(B)** Level: **Easy** Tagging: **Applying**

Q50. Three charges are placed at the vertices of an equilateral triangle 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) $Q^2/(4\pi\varepsilon_0 a^2)$

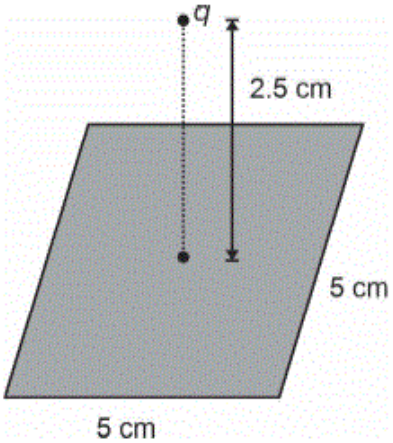
(B) $-Q^2/(4\pi\varepsilon_0 a^2)$

(C) Zero

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

Correct Answer: **(C)** Level: **Easy** Tagging: **Understanding**

A point charge q is at a distance of 2.5 cm directly above the centre of a square of side 5cm as shown in figure. What is the magnitude of electric flux through the square?



Q51.

(A) $\frac{q}{6\varepsilon_0}$

(B) $\frac{q}{4\varepsilon_0}$

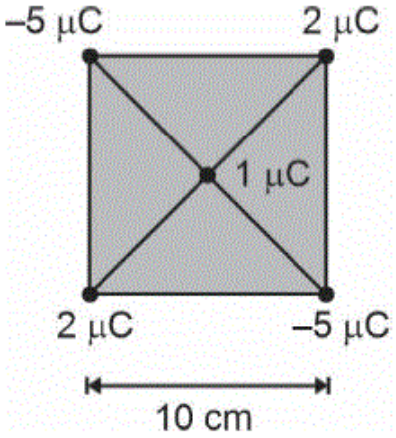
(C) $\frac{q}{2\varepsilon_0}$

(D) $\frac{q}{8\varepsilon_0}$

Correct Answer: **(A)** Level: **Moderate** Tagging: **Applying**

Q52.

What is the force on the charge 1 μ C placed at the centre of the square in the given figure?



(A) 2×10^8 N

(B) 5×10^{-3} N

(C) 6×10^{-2} N

(D) Zero

Correct Answer: **(D)** Level: **Moderate** Tagging: **Applying**

Q53.

An infinite number of electric charges each equal to 5 $nano - coulomb$ (magnitude) are placed along X axis at $x = 1\ cm,\ x = 2\ cm,\ x = 4\ cm\ x = 8\ cm$ ... ... and so on. In the setup if the consecutive charges have opposite sign, then the electric field in $Newton/Coulomb$ at $X = 0$ is $\left[\frac{1}{4\pi\varepsilon_0} = 9 \times 10^9 N - m^2/c^2\right]$

(A) 12×10^4

(B) 24×10^4

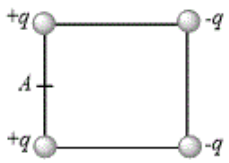
(C) 36×10^4

(D) 48×10^4

Correct Answer: **(C)** Level: **Moderate** Tagging: **Analyzing**

Q54.

Four electric charges $+q, +q, -q$ and $-q$ are placed at the corners of a square of side $2L$ (see figure). The electric potential at point A, midway between the two charges $+q$



(A) Zero

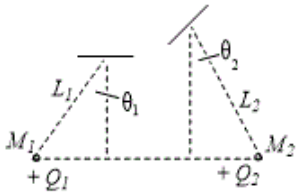
(B) $\frac{1}{4\pi\varepsilon_0}\frac{2q}{L}(1+\sqrt{5})$

(C) $\frac{1}{4\pi\varepsilon_0}\frac{2q}{L}\left(1+\frac{1}{\sqrt{5}}\right)$

(D) $\frac{1}{4\pi\varepsilon_0}\frac{2q}{L}\left(1-\frac{1}{\sqrt{5}}\right)$

Correct Answer: **(D)** Level: **Moderate** Tagging: **Analyzing**

Two small spheres of masses M_1 and M_2 are suspended by weightless insulating threads of lengths L_1 and L_2. The spheres carry charges Q_1 and Q_2 respectively. The spheres are suspended such that they are in level with one another and the threads are inclined to the vertical at angles of θ_1 and θ_2 as shown. Which one of the following conditions is essential, if $\theta_1 = \theta_2$?



Q55.

(A) $M_1 \neq M_2$, but $Q_1 = Q_2$

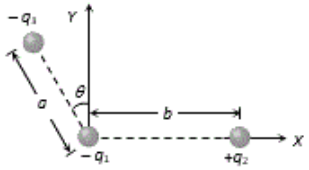
(B) $M_1 = M_2$

(C) $Q_1 = Q_2$

(D) $L_1 = L_1$

Correct Answer: **(B)** Level: **Moderate** Tagging: **Applying**

Three charges $-q_1$, $+q_2$ and $-q_3$ are placed as shown in the figure. The x-component of the force on $-q_1$ is proportional to



Q56.

(A) $\frac{q_2}{b^2}-\frac{q_3}{a^2}\sin\theta$

(B) $\frac{q_2}{b^2}-\frac{q_3}{a^2}\cos\theta$

(C) $\frac{q_2}{b^2}+\frac{q_3}{a^2}\sin\theta$

(D) $\frac{q_2}{b^2}+\frac{q_3}{a^2}\cos\theta$

Correct Answer: **(C)** Level: **Moderate** Tagging: **Understanding**

Q57. Consider the charges q, q and -q placed at the vertices of an equilateral triangle of each side 1 . The sum of forces acting 011 each charge is

(A) $\frac{q^2}{4\pi\varepsilon_0 2l^2}$

(B) $\frac{-q^2}{4\pi\varepsilon_0 l^2}$

(C) $\frac{q^2}{4\pi\varepsilon_0 l^2}$

(D) Zero

Correct Answer: **(D)** Level: **Moderate** Tagging: **Applying**

Q58. Three charges of equal magnitude q is placed at the vertices of an equilateral triangle of side "l" . The force on a charge Q placed at the centroid of the triangle is

(A) $\frac{3Qq}{4\pi\varepsilon_0 l^2}$

(B) $\frac{2Qq}{4\pi\varepsilon_0 l^2}$

(C) $\frac{Qq}{4\pi\varepsilon_0 l^2}$

(D) zero

Correct Answer: **(D)** Level: **Moderate** Tagging: **Applying**

Q59. Three identical charges, each of 2μC are placed at the vertices of a triangle ABC as shown in the figure If AB + AC = 12 cm and AB.AC = 32 cm^2, the potential energy of the charge at A is 

(A) 1.53 J

(B) 5.31 J

(C) 3.15 J

(D) 1.35 J

Correct Answer: **(D)** Level: **Moderate** Tagging: **Applying**

Q60. Two equal charges are separated by a distance d. A third charge placed on a perpendicular bisector at x distance will experience maximum coulomb force when

(A) $x = \frac{d}{\sqrt{2}}$

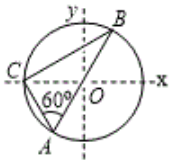
(B) $x = \frac{d}{2}$

(C) $x = \frac{d}{2\sqrt{2}}$

(D) $x = \frac{d}{2\sqrt{3}}$

Correct Answer: **(C)** Level: **Moderate** Tagging: **Applying**

Consider a system of three charges $\frac{q}{3}, \frac{q}{3}$ and $-\frac{2q}{3}$ placed at point *A*, *B* and *C*, respectively, as shown in the figure. Take *O* to be the centre of the circle of radius *R* and angle *CAB*=60°.



Q61.

(A) The electric field at point O is $\frac{q}{8\pi\varepsilon_0 R^2}$ directed along the negative x-axis

(B) The potential energy of the system is zero

(C) The magnitude of the force between the charges at C and B is $\frac{q^2}{54\pi\varepsilon_0 R^2}$

(D) The potential at point O is $\frac{q}{12\pi\varepsilon_0 R}$

Correct Answer: **(C)** Level: **Difficult** Tagging: **Applying**

Q62. A point charge of 2.0 μC is at one of the corners of a cube having 9.0cm edge length. What is net electric flux linked through the surface

(A) 2.26×10^5 Nm^2/C

(B) 2.82×10^4 Nm^2/C

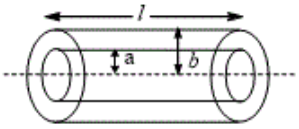
(C) 5.65×10^5 Nm^2/C

(D) 1.13×10^6 Nm^2/C

Correct Answer: **(A)** Level: **Difficult** Tagging: **Evaluating**

6. Electric Field

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



Q63.

(A) Is same throughout

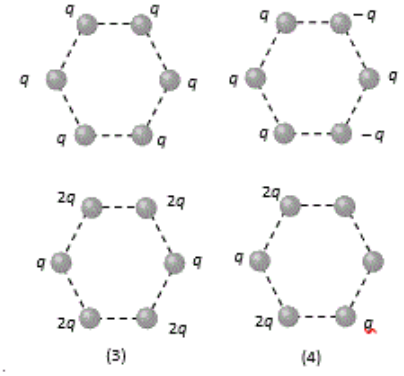
(B) Is higher near the outer cylinder than near the inner cylinder

(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

Correct Answer: **(C)** Level: **Easy** Tagging: **Remembering**

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



Q64.

(A) 1

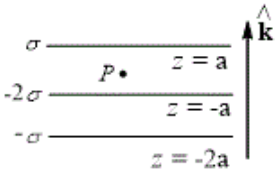
(B) 2

(C) 3

(D) 4

Correct Answer: **(B)** Level: **Easy** Tagging: **Evaluating**

Three large parallel plates have uniform surface change densities as shown in the figure. Find the electric field at point P.



Q65.

(A) $\frac{-4\sigma}{\varepsilon_0}\hat{k}$

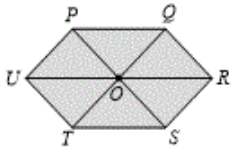
(B) $\frac{4\sigma}{\varepsilon_0}\hat{k}$

(C) $\frac{-2\sigma}{\varepsilon_0}\hat{k}$

(D) $\frac{2\sigma}{\varepsilon_0}\hat{k}$

Correct Answer: **(C)** Level: **Easy** Tagging: **Analyzing**

Six charges, three positive and three negative of equal magnitude are to be placed at the vertices of a regular hexagon such that the electric field at O is double the electric field when only one positive charge of same magnitude is placed at R. which of the following arrangements of charges is possible for P, Q, R, S, T and U respectively?



Q66.

(A) +,-,+,-,-,+

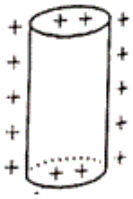
(B) +,-,+,-,+,-

(C) +,+,-,+,-,-

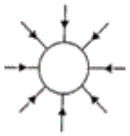
(D) -,+,+,-,+,-

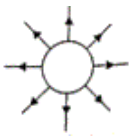
Correct Answer: **(D)** Level: **Easy** Tagging: **Understanding**

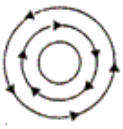
Which of the following figures correctly shows the top view sketch of the electric field lines for a uniformly charged hollow cylinder as shown in figure?

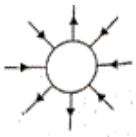


Q67.

(A) 

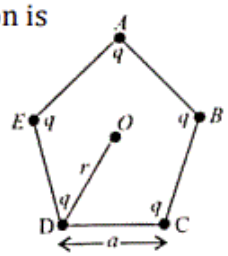
(B) 

(C) 

(D) 

Correct Answer: **(B)** Level: **Easy** Tagging: **Understanding**

Q68. Five equal charges each of value q are placed at the corners of a regular pentagon of side a. The electric field at the centre of the pentagon is



(A) $\frac{q}{4\pi\varepsilon_0 r^2}$

(B) $\frac{q^2}{4\pi\varepsilon_0 r^2}$

(C) $\frac{2q}{4\pi\varepsilon_0 r^2}$

(D) zero

Correct Answer: **(D)** Level: **Easy** Tagging: **Understanding**

Q69. Conduction electrons are almost uniformly distributed within a conducting plate. When placed in an electrostatic field $\vec{E}$, the electric field within the plate

(A) Is zero

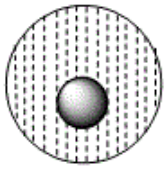
(B) Depends upon E

(C) Depends upon $\vec{E}$

(D) Depends upon the atomic number of the conducting element

Correct Answer: **(A)** Level: **Easy** Tagging: **Understanding**

Q70. A spherical portion has been removed from a solid sphere having a charge distributed uniformly in its volume as shown in the figure. The electric field inside the emptied space is



(A) Zero everywhere

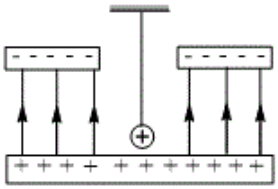
(B) Non-zero and uniform

(C) Non-uniform

(D) Zero only at its centre

Correct Answer: **(B)** Level: **Easy** Tagging: **Understanding**

Q71. If a positively charged pendulum is oscillating in a uniform electric field as shown in figure. Its time period as compared to that when it was uncharged will



(A) Increase

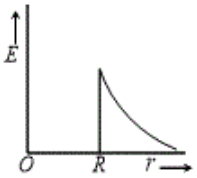
(B) Decrease

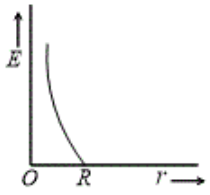
(C) Not change

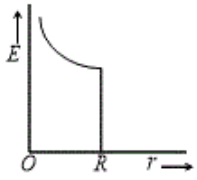
(D) First increase and then decrease

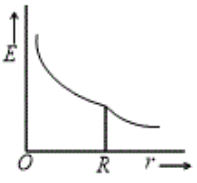
Correct Answer: **(A)** Level: **Easy** Tagging: **Understanding**

Q72. A metallic shell of radius R has a charge -Q on it. A point charge +Q is placed at the centre of the shell. Which of the graphs shown below may correctly represent the variation of the electric field E with distance r from the centre of the shell

(A) 

(B) 

(C) 

(D) 

Correct Answer: **(B)** Level: **Easy** Tagging: **Understanding**

Q73. A particle of mass 10^{-3} kg and charge 5 mC is thrown at a speed of 20 ms^{-1} against a uniform electric field of strength 2×10^5 NC^{-1} . The distance travelled by particle before coming to rest is

(A) 0.1 m

(B) 0.2 m

(C) 0.3 m

(D) 0.4 m

Correct Answer: **(B)** Level: **Easy** Tagging: **Evaluating**

Q74. 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 t_1/t_2 is nearly equal to

(A) 1

(B) $\sqrt{M_p/M_e}$

(C) $\sqrt{M_e/M_p}$

(D) 1836

Correct Answer: **(B)** Level: **Easy** Tagging: **Analyzing**

Q75. Equal charges q are placed at the vertices A and B of an equilateral 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) $\frac{q}{2\pi\varepsilon_0 a^2}$

Correct Answer: **(C)** Level: **Easy** Tagging: **Understanding**

Q76. Identify the wrong statement.

(A) In an electric field two equipotential surfaces can never intersect.

(B) A charged particle free to move in an electric field shall always move in the direction of E.

(C) Electric field at the surface of a charged conductor is always normal to the surface.

(D) The electric potential decrease along a line of force in an electric field.

Correct Answer: **(C)** Level: **Easy** Tagging: **Analyzing**

Q77. If the charge on an object is doubled then electric field becomes

(A) Half

(B) Double

(C) Unchanged

(D) Thrice

Correct Answer: **(B)** Level: **Easy** Tagging: **Understanding**

Q78. The dimensional formula of electric field intensity is

(A) $[M^1L^1T^3A^{-1}]$

(B) $[M\ L^{-1}Y^{-3}A^1]$

(C) $[M^1L^1Y^{-3}A^{-1}]$

(D) $[M^1L^2T^1A^1]$

Correct Answer: **(C)** Level: **Easy** Tagging: **Remembering**

Q79. The force per unit charge is known as

(A) electric flux

(B) electric field

(C) electric potential

(D) electric current

Correct Answer: **(B)** Level: **Easy** Tagging: **Remembering**

Q80. 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) $\frac{e^2}{m^2}g$

Correct Answer: **(B)** Level: **Easy** Tagging: **Understanding**

Q81. The maximum field intensity on the axis of a uniformly charged ring of charge q and radius R will be

(A) $\frac{1}{4\pi\varepsilon_0}\cdot\frac{q}{3\sqrt{3R^2}}$

(B) $\frac{1}{4\pi\varepsilon_0}\cdot\frac{2q}{3R^2}$

(C) $\frac{1}{4\pi\varepsilon_0}\cdot\frac{2q}{3\sqrt{3R^2}}$

(D) $\frac{1}{4\pi\varepsilon_0}\cdot\frac{3q}{3\sqrt{3R^2}}$

Correct Answer: **(C)** Level: **Easy** Tagging: **Applying**

Q82. The SI unit of surface integral of electric field is Q

(A) V-m

(B) V

(C) NC^{-1} m

(D) Cm^{-3}

Correct Answer: **(A)** Level: **Easy** Tagging: **Remembering**

Q83. The SI unit of the line integral of electrical field I s

(A) NC^{-1}

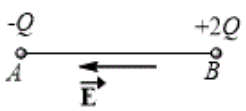
(B) $Nm^2\ C^1$

(C) JC^{-1}

(D) Vm^{-1}

Correct Answer: **(C)** Level: **Easy** Tagging: **Understanding**

Q84. Charges $+2Q$ and $-Q$ are placed as shown is figure. The point at which electric filed intensity is zero will be



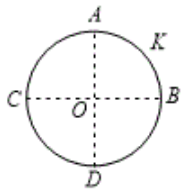
(A) Somewhere between –Q and +2Q

(B) Somewhere on the left of –Q

(C) Somewhere on the right of +2Q

(D) Somewhere on the right bisector of line joining –Q and +2Q.

Correct Answer: **(B)** Level: **Moderate** Tagging: **Understanding**



Q85. A thin conducting ring of radius R is given a charge $+Q$. The electric field at the centre O of the ring due to the charge on the part AKB of the ring is E. The electric field at the centre due to the charge on the part $ACDB$ of the ring is

(A) E along KO

(B) 3 E along OK

(C) 3 E along KO

(D) E along OK

Correct Answer: **(D)** Level: **Moderate** Tagging: **Understanding**

Q86. The displacement of a charge Qin the electric field $\boldsymbol{E} = e_1\hat{\boldsymbol{\imath}} + e_2\hat{\boldsymbol{\jmath}} + e_3\hat{\boldsymbol{k}}$ is $\boldsymbol{r} = a\hat{\boldsymbol{\imath}} + b\hat{\boldsymbol{\jmath}}$. 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) $Q\left(\sqrt{e_1^2 - e_2^2}\right)(a + b)$

Correct Answer: **(A)** Level: **Moderate** Tagging: **Applying**

Q87. An electron initially at rest falls a distance of 1.5 cm in a uniform electric field of magnitude 2×10^4 N/C. The time taken by the electron to fall this distance is

(A) 1.3×10^2 s

(B) 2.1×10^{-12} s

(C) 1.6×10^{-10} s

(D) 2.9×10^{-9} s

Correct Answer: **(D)** Level: **Moderate** Tagging: **Applying**

Q88. Charge Q is placed on each of (n-1) corners of a polygon of n sides. The distance of centre of the polygon from each corners is 'r', then electric field at centre is

(A) $\frac{1}{4\pi\varepsilon_0}\frac{Q}{r^2}$

(B) $\frac{(n-1)}{4\pi\varepsilon_0}\frac{Q}{r^2}$

(C) $\frac{n}{(n-1)}\frac{1}{4\pi\varepsilon_0}\frac{Q}{r^2}$

(D) Zero

Correct Answer: **(A)** Level: **Moderate** Tagging: **Applying**

Q89. Electrical as well as gravitational affects can thought to be caused by fields. Which of the following is true of an electrical or gravitational field?

(A) The field concept is often used to describe contact forces.

(B) Gravitational or electric field does not exist in the space around an object.

(C) Fields are useful for understanding forces acting through a distance.

(D) There is no way to verify the existence of a force field since it is just a concept.

Correct Answer: **(C)** Level: **Moderate** Tagging: **Understanding**

Q90. Match the following and choose appropriate option

Column -I	**Column -II**
a. Electric flux	(i) $[MLT^{-3}A^{-1}]$
b. Dipole moment	(ii) $[ML^3T^{-3}A^{-1}]$
c. Electric field	(iii) [LTA]
Surface charge density	(iv) $[L^{-2}TA]$

(A) a(i), b(ii), c(iii), d(iv)

(B) a(ii), b(iii), c(iv), d(i)

(C) a(ii), b(iii), c(i), d(iv)

(D) a(iv), b(i), c(ii), d(iii)

Correct Answer: **(C)** Level: **Moderate** Tagging: **Analyzing**

Q91. The electric field that can balance a charged particle of mass 3.2×10^{-27} kg is (Given that the charge on the particle is 1.6×10^{-19} C)

(A) 19.6×10^{-8} N C^{-1}

(B) 20×10^{-6} N C^{-1}

(C) 19.6×10^{8} N C^{-1}

(D) 20×10^{6} N C^{-1}

Correct Answer: **(A)** Level: **Moderate** Tagging: **Applying**

Q92. The electric potential V at any point x,y,z (all the metre) in space is given by $V = 4x^2$ volt. The electric field at the point (1m, 0, 2m) in Vm^{-1} is

(A) $-8\hat{i}$

(B) $+8\hat{i}$

(C) $-16\hat{i}$

(D) $16\hat{k}$

Correct Answer: **(A)** Level: **Moderate** Tagging: **Applying**

Q93. The Value (in vacuum) of energy density at a place in a region of electric field intensity E, due to it, is given by

(A) $\frac{\varepsilon_0 E^2}{2}$

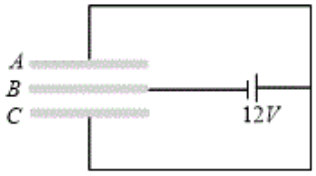
(B) $\frac{\varepsilon_0 E}{2}$

(C) $\frac{E^2}{2\varepsilon_0}$

(D) $\frac{E\varepsilon_0^2}{2}$

Correct Answer: **(A)** Level: **Moderate** Tagging: **Understanding**

Q94. Three plates A,B,C each of area 50cm^2 have separation 3mm between A and B and 3mm between B and C. The



energy stored when the plates are fully charged is

(A) 1.6×10^{-9} J

(B) 2.1×10^{-9} J

(C) 5×10^{-9} J

(D) 7×10^{-9} J

Correct Answer: **(B)** Level: **Moderate** Tagging: **Analyzing**

Q95. Two equal charges q are placed at a distance of 2a and a third charge -2q is placed at the midpoint. The potential energy of the system is

(A) $\frac{q^2}{8\pi\varepsilon_0 a}$

(B) $\frac{6q^2}{8\pi\varepsilon_0 a}$

(C) $-\frac{7q^2}{8\pi\varepsilon_0 a}$

(D) $\frac{9q^2}{8\pi\varepsilon_0 a}$

Correct Answer: **(C)** Level: **Moderate** Tagging: **Applying**

Q96. 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) $\frac{L}{4}$

Correct Answer: **(C)** Level: **Moderate** Tagging: **Evaluating**

Q97. Two unlike charges of the same magnitude Q are placed at a distance d. The intensity of the electric field at the middle point in the line joining the two charges.

(A) Zero

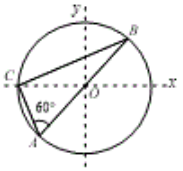
(B) $\frac{3Q}{4\pi\varepsilon_0 d^2}$

(C) $\frac{6Q}{2\pi\varepsilon_0 d^2}$

(D) $\frac{4Q}{4\pi\varepsilon_0 d^2}$

Correct Answer: **(B)** Level: **Moderate** Tagging: **Evaluating**

Consider a system of three charges $\frac{q}{3}, \frac{q}{3}$ and $-\frac{2q}{3}$ placed at points A, B and C, respectively, as shown in the figure. Take O to be the centre of the circle of radius R and angle CAB = 60°



Q98.

(A) The electric field at point O is $\frac{q}{8\pi\varepsilon_0 R^2}$ directed along the negative x −axis

(B) The Potential energy of the system is zero

(C) The magnitude of the force between the charges at C and B is $\frac{q^2}{54\pi\varepsilon_0 R^2}$

(D) The potential at point O is $\frac{q}{12\pi\varepsilon_0 R}$

Correct Answer: **(C)** Level: **Difficult** Tagging: **Evaluating**

7. Electric Field Lines

Figure shows the electric field lines around three point charges A, B and C. Which of the following charges are positive?

Q99.

(A) Only A

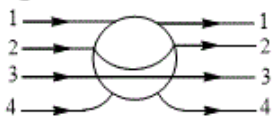
(B) Only C

(C) Both A and C

(D) Both B and C

Correct Answer: **(C)** Level: **Easy** Tagging: **Remembering**

A metallic solid sphere is placed in a uniform electric field. The lines of force follow the paths shown in figure



Q100.

(A) 1

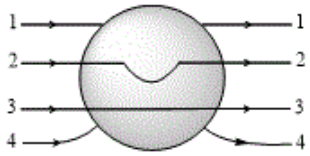
(B) 2

(C) 3

(D) 4

Correct Answer: **(D)** Level: **Easy** Tagging: **Understanding**

Q101. A metallic solid sphere is placed in a uniform electric field. The lines of force follow the path(s) shown in figure as



(A) 1

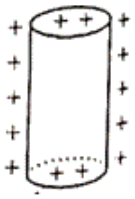
(B) 2

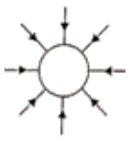
(C) 3

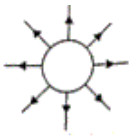
(D) 4

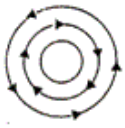
Correct Answer: **(D)** Level: **Easy** Tagging: **Remembering**

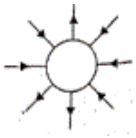
Q102. Which of the following figures correctly shows the top view sketch of the electric field lines for a uniformly charged hollow cylinder as shown in figure?



(A) 

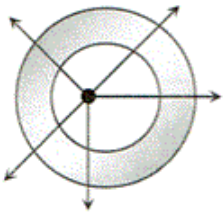
(B) 

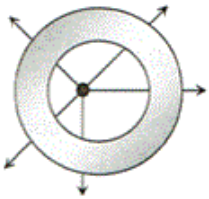
(C) 

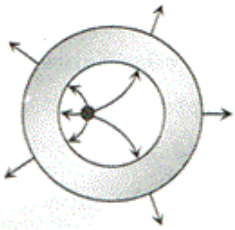
(D) 

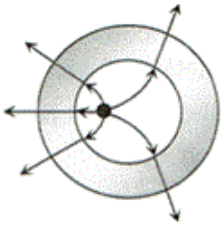
Correct Answer: **(B)** Level: **Easy** Tagging: **Understanding**

Q103. A metallic shell has a point charge 'q' kept inside its cavity. Which one of the following diagrams correctly represents the electric lines of forces

(A) 

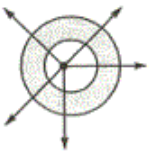
(B) 

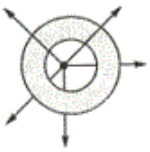
(C) 

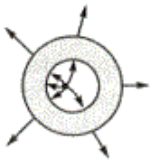
(D) 

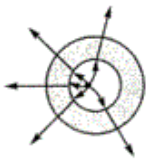
Correct Answer: **(C)** Level: **Easy** Tagging: **Understanding**

Q104. A metallic shell has a point charge q kept inside its cavity. Which one of the following diagrams correctly represents the electric lines or forces?

(A) 

(B) 

(C) 

(D) 

Correct Answer: **(C)** Level: **Easy** Tagging: **Understanding**

Q105. Electric field lines provide information about

(A) field strength

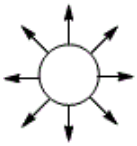
(B) direction

(C) nature of charge

(D) all of these

Correct Answer: **(D)** Level: **Easy** Tagging: **Remembering**

Q106. If a point charge q is placed at a point inside a hollow conducting sphere, then which of the following electric lines of force pattern is correct?

(A) 

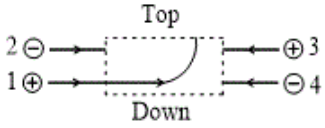
(B) 

(C) 

(D) None of these

Correct Answer: **(B)** Level: **Easy** Tagging: **Understanding**

Q107. The figure shows the path of a positively charged particle 1 through a rectangular region of uniform electric field as shown in the figure. What is the direction of electric field and the direction of particles 2, 3 and 4



(A) Top; down, top, down

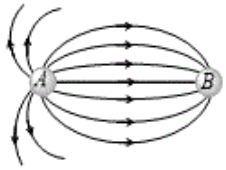
(B) Top; down, down, top

(C) Down; top, top, down

(D) Down; top, down, down

Correct Answer: **(A)** Level: **Easy** Tagging: **Applying**

Q108. The spatial distribution of the electric field due to charges (A,B) is shown in figure. Which one of the following statements is correct



(A) A is +ve and B -ve and | A | > | B |

(B) A is -ve and B +ve; | A | = | B |

(C) Both are +ve but A > B

(D) Both are -ve but A > B

Correct Answer: **(A)** Level: **Easy** Tagging: **Understanding**

Q109. Charge Q is given a displacement $\vec{r} = a\hat{i} + b\hat{j}$ in an electric field $\vec{E} = E_1\hat{i} + E_2\hat{j}$. The work done is

(A) $Q(E_1 a + E_2 b)$

(B) $Q\sqrt{(E_1 a)^2 + (E_2 b)^2}$

(C) $Q(E_1 + E_2)\sqrt{a^2 + b^2}$

(D) $Q(\sqrt{E_1^2 + E_2^2})\sqrt{a^2 + b^2}$

Correct Answer: **(A)** Level: **Moderate** Tagging: **Applying**

Q110. A charged particle of mass m and charge q is released from rest in a uniform electric field E. Neglecting the effect of gravity, the kinetic energy of the charged particle after 't' second is

(A) $\frac{Eq^2m}{2t^2}$

(B) $\frac{2E^2t^2}{mq}$

(C) $\frac{E^2q^2t^2}{2m}$

(D) $\frac{Eqm}{t}$

Correct Answer: **(C)** Level: **Moderate** Tagging: **Applying**

Q111. Choose the incorrect option regarding electric field lines.

(A) In charge free region, an electrostatic field line is a continuous curve i.e., a field line can't have sudden breaks

(B) Electrostatic field lines form closed loop in similar manner as that of magnetic field

(C) Two electric field lines can never intersect

(D) Tangent drawn at any point of electric field line gives the direction of electric field at that point

Correct Answer: **(B)** Level: **Moderate** Tagging: **Applying**

Q112. The potential at a point x(measured in μm) due to some charges situated on the x-axis is given by $V(x) = 20/(x^2 - 4)$ volt The electric field E at x = 4 μm is given by

(A) $\frac{5}{3}\text{Vμ}^{-1}\text{m}^{-1}$ and in the $-$ ve x direction

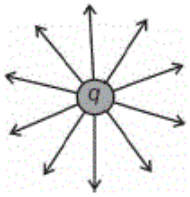
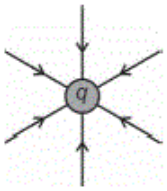
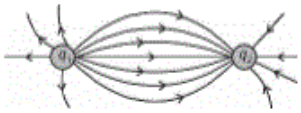
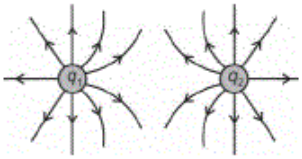
(B) $\frac{5}{3}\text{Vμ}^{-1}\text{m}^{-1}$ and in the $+$ ve x direction

(C) $\frac{10}{9}\text{Vμ}^{-1}\text{m}^{-1}$ and in the $-$ ve x direction

(D) $\frac{10}{9}\text{Vμ}^{-1}\text{m}^{-1}$ and in the $+$ ve x direction

Correct Answer: **(D)** Level: **Moderate** Tagging: **Analyzing**

Match the following

	Column-I		Column-II
a.	$q< 0$	(i)	
b.	$q> 0$	(ii)	
c.	$q_1> 0, q_2< 0$	(iii)	
d.	$q_1> 0, q_2> 0$	(iv)	

Q113.

(A) a(i), b(ii), c(iv), d(iii)

(B) a(ii), b(i), c(iv), d(iii)

(C) a(ii), b(i), c(iii), d(iv)

(D) a(i), b(ii), c(iii), d(iv)

Correct Answer: **(C)** Level: **Difficult** Tagging: **Evaluating**

8. Electric Flux

Q114. Consider a uniform electric field $E = 8 \times 10^3 \hat{\imath}$ N/C. What is the flux through a square of side length 10 cm, if normal to its plane makes an angle 60° with x-axis?

(A) $40 \frac{\text{Nm}^2}{\text{C}}$

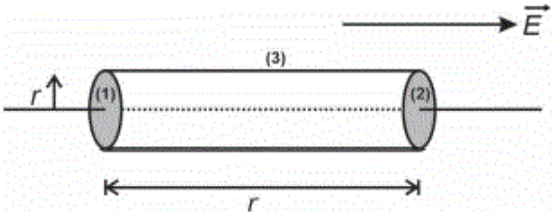
(B) $80 \frac{\text{Nm}^2}{\text{C}}$

(C) $20 \frac{\text{Nm}^2}{\text{C}}$

(D) $10 \frac{\text{Nm}^2}{\text{C}}$

Correct Answer: **(A)** Level: **Easy** Tagging: **Understanding**

What is the net flux passing through the curved surface of Cylinder (base radius = r, length l) as shown in figure?



Q115.

(A) E(2 π r)

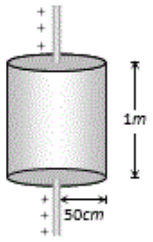
(B) E(π r2)

(C) $2E\pi r^2$

(D) Zero

Correct Answer: **(D)** Level: **Easy** Tagging: **Remembering**

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



Q116.

(A) $\frac{Q}{\varepsilon_0}$

(B) $\frac{100Q}{\varepsilon_0}$

(C) $\frac{10Q}{(\pi\varepsilon_0)}$

(D) $\frac{100Q}{(\pi\varepsilon_0)}$

Correct Answer: **(B)** Level: **Easy** Tagging: **Understanding**

Q117. A charged body has an electric flux ϕ associated with it the body is now placed inside a metallic container. The electric flux ϕ_1 associated with the container will be

(A) $\phi_1 = 0$

(B) $0<\phi_1<\phi$

(C) $\phi_1 = \phi$

(D) $\phi_1 > \phi$

Correct Answer: **(C)** Level: **Easy** Tagging: **Understanding**

Q118. A point charge +q is placed at the midpoint of a cube of sidea. The electric flux emerging from the cube is

(A) Zero

(B) $\frac{3qa^2}{\varepsilon_0}$

(C) $\frac{q}{\varepsilon_0}$

(D) $\frac{\varepsilon_0}{4qa^2}$

Correct Answer: **(C)** Level: **Easy** Tagging: **Understanding**

Q119. A sphere of radius 1 m encloses a charge of 5 μC. Another charge of -5 μC is placed inside the sphere. The net electric flux would be

(A) Double

(B) Four times

(C) 0

(D) None of these

Correct Answer: **(C)** Level: **Easy** Tagging: **Understanding**

Q120. An electric charge q is placed at the centre of a cube of side a. The electric flux on one of its faces will be

(A) $\frac{q}{6\varepsilon_0}$

(B) $\frac{q}{\varepsilon_0 a^2}$

(C) $\frac{q}{4\pi\varepsilon_0 a^2}$

(D) $\frac{q}{\varepsilon_0}$

Correct Answer: **(A)** Level: **Easy** Tagging: **Applying**

Q121. If a 10C charge is placed in a medium having relative permittivity 5.4, what will be the amount of flux coming out of that charge?

(A) $7.1*10^{11}$ Nm^2C^{-1}

(B) $2.1*10^{11}$ Nm^2C^{-1}

(C) $1*10^{11}$ Nm^2C^{-1}

(D) $2.1*10^{10}$ Nm^2C^{-1}

Correct Answer: **(B)** Level: **Easy** Tagging: **Remembering**

Q122. If the electric flux entering and leaving an enclosed surface respectively is ϕ_1 and ϕ_1, then, charge enclosed in closed surface is

(A) $\phi_2 - \phi_1)/\varepsilon_0$)

(B) $\phi_1 + \phi_2)/\varepsilon_0$

(C) $(\phi_1 - \phi_2)/\varepsilon_0$

(D) $\varepsilon_0 (\phi_2 - \phi_1)$

Correct Answer: **(D)** Level: **Easy** Tagging: **Understanding**

Q123. In a region of space having a uniform electric field E, a hemispherical bowl of radius r is placed. The electric flux ϕ through the bowl is

(A) 2πrE

(B) $4\pi r^2 E$

(C) $2\pi r^2 E$

(D) $\pi r^2 E$

Correct Answer: **(C)** Level: **Easy** Tagging: **Understanding**

Q124. Number of electric lines of force from 0.5 C if positive charge in a dielectric medium of constant 10 is

(A) 5.65×10^9

(B) 1.13×10^{11}

(C) 9×10^9

(D) 8.85×10^{-12}

Correct Answer: **(A)** Level: **Easy** Tagging: **Understanding**

Q125. If the electric field given by $(5\hat{\mathbf{i}} + 4\hat{\mathbf{j}} + 9\hat{\mathbf{k}})$, the electric flux through a surface of area 20 unit lying in the Y-Z plane will be

(A) 100 unit

(B) 80 unit

(C) 180 unit

(D) 20 unit

Correct Answer: **(A)** Level: **Moderate** Tagging: **Understanding**

Q126. In a region of space, the electric field is given by $\vec{E} = 8\hat{\mathrm{i}} + 4\hat{\mathrm{j}} + 3\hat{k}$. The electric flux through a surface of area of 100 units x-y plane is

(A) 800 units

(B) 300 units

(C) 400 units

(D) 1500 units

Correct Answer: **(B)** Level: **Moderate** Tagging: **Understanding**

Q127. The flux entering and leaving a closed surface are 5×10^5 and 4×10^5 MKS units respectively, then the charge inside the surface will be

(A) -8.86×10^{-7}C

(B) 8.85×10^{-7}C

(C) 8.85×10^{7}C

(D) 6.85×10^{-7} C

Correct Answer: **(A)** Level: **Moderate** Tagging: **Applying**

9. Electric Dipole

Q128. An electric dipole of moment $\vec{p}$ is placed normal to the lines of force of electric intensity $\vec{E}$, then the work done in deflecting it through an angle of 180° is

(A) pE

(B) $+2pE$

(C) $-2pE$

(D) Zero

Correct Answer: **(D)** Level: **Easy** Tagging: **Understanding**

Q129.

Electric field on the axis of a small electric dipole at a distance r is $\vec{E}_1$ and $\vec{E}_2$ at a distance of $2r$ on a line of perpendicular dissector. Then

(A) $\vec{E}_2 = -\frac{\vec{E}_1}{8}$

(B) $\vec{E}_2 = -\frac{\vec{E}_1}{16}$

(C) $\vec{E}_2 = -\frac{\vec{E}_1}{4}$

(D) $\vec{E}_2 = \frac{\vec{E}_1}{8}$

Correct Answer: **(B)** Level: **Easy** Tagging: **Understanding**

Q130. A dipole of electric dipole moment p is placed in a uniform electric field of strength E. If θ is the angle between positive directions of p and E, then the potential energy of the electric dipole is largest when θ is

(A) $\frac{\pi}{4}$

(B) $\frac{\pi}{2}$

(C) π

(D) Zero

Correct Answer: **(C)** Level: **Moderate** Tagging: **Applying**

Q131. An electric dipole is placed at an angle of 60° with an electric field of intensity 10_5 NC_{-1}. It experiences a torque equal to 8 $\sqrt{3}$ Nm. Calculate the charge on the dipole, if the dipole length is 2

(A) $-8 \times 10^3\ C$

(B) $8.54 \times 10^{-4}\ C$

(C) 8×10^{-4} C

(D) $0.85 \times 10^{-6}\ C$

Correct Answer: **(C)** Level: **Moderate** Tagging: **Applying**

Q132. An electric dipole is situated in an electric field of uniform intensity E whose dipole moment is p and moment of inertia is I. If the dipole is displaced slightly from the equilibrium position, then the angular frequency of its oscillations is

(A) $\left(\frac{pE}{I}\right)^{1/2}$

(B) $\left(\frac{pE}{I}\right)^{3/2}$

(C) $\left(\frac{I}{pE}\right)^{1/2}$

(D) $\left(\frac{p}{IE}\right)^{1/2}$

Correct Answer: **(A)** Level: **Moderate** Tagging: **Applying**

Q133. An electric dipole of moment p is placed in the position 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 cosθ

(B) pE sinθ

(C) pE(1-cosθ)

(D) $-pE\cos\theta$

Correct Answer: **(C)** Level: **Moderate** Tagging: **Applying**

Q134. If the electric field due to an electric dipole at a distance r_1 from it on axial position is E_1 and at a distance r_2 from it on the equatorial position is E_2. Best possible option for the ratio of E_1 & $E_2$is

(A) $\frac{E_1}{E_2} = \frac{r_2^3}{r_1^3}$

(B) $\frac{E_1}{E_2} = \frac{2r_2^3}{r_1^3}$

(C) $\frac{E_1}{E_2} = \frac{r_1^3}{r_2^3}$

(D) $\frac{E_1}{E_2} = \frac{2r_1^3}{r_2^3}$

Correct Answer: **(B)** Level: **Moderate** Tagging: **Analyzing**

Q135. Two point changes +q and −q are held fixed at (-d, 0) and (d, 0) respectively of a (x, y) coordinate system, then

(A) The electric field $\vec{E}$ at all points on the x-axis has the same direction.

(B) $\vec{E}$ at all points on the y-axis is along $\hat{j}$

(C) Work has to be done in bringing a test charge from infinity to the origin.

(D) The dipole moment is $2\,qd$ directed along $\hat{j}$

Correct Answer: **(B)** Level: **Moderate** Tagging: **Applying**

Q136. In a certain region of space, electric field is along the z-direction throughout. The magnitude of electric field increases uniformly along the positive z-direction at the rate of 10^2N/C per metre. What is the force experienced by the system having a dipole moment equal to 10^{-7}C m in the negative z-direction?

(A) 10^{-5} N

(B) Zero

(C) 10^2 N

(D) 10^{-2} N

Correct Answer: **(A)** Level: **Difficult** Tagging: **Evaluating**

10. Dipole in a Uniform External Field

Q137. If the dipole moment $\vec{P}$ of an electric dipole is parallel or antiparallel with the electric field $\vec{E}$, then which of the following options can be correct?

(A) Torque as well as force acting on the dipole is zero

(B) Only force acting on the dipole is zero

(C) Only torque acting on the dipole is zero

(D) Both (1) & (3)

Correct Answer: **(D)** Level: **Easy** Tagging: **Understanding**

Q138. 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) qV

(B) $-pE$

(C) pE

(D) 2 pE

Correct Answer: **(D)** Level: **Easy** Tagging: **Understanding**

Q139. An electric dipole of dipole moment p is placed parallel to a uniform electric field E. The work done required to rotate the dipole by an angle 180 degree will be:

(A) pE

(B) pE/2

(C) 2pE

(D) Zero

Correct Answer: **(C)** Level: **Easy** Tagging: **Remembering**

Q140. An electric field is placed in a varying electric field. The dipole then experiences:

(A) No torque

(B) A torque and a net force

(C) A torque and no net force

(D) No force

Correct Answer: **(B)** Level: **Easy** Tagging: **Remembering**

Q141. If a dipole of dipole moment 'p' is kept in a uniform electric field 'E' then the cross product (p*E) is equal to _____ the dipole.

(A) torque on

(B) angular acceleration of

(C) force on

(D) angular momentum of

Correct Answer: **(A)** Level: **Easy** Tagging: **Remembering**

Q142. The formation of a dipole is due to two equal and dissimilar point charges placed at _____.

(A) Long distance

(B) Short distance

(C) Touching each other

(D) None of these

Correct Answer: **(B)** Level: **Easy** Tagging: **Remembering**

Q143. The product of the magnitude of the charge and the distance between the centers of positive and negative charge is called

(A) Magnetic Moment

(B) Charge ratio

(C) Dipole

(D) Current flow

Correct Answer: **(C)** Level: **Easy** Tagging: **Remembering**

Q144. The surface charge density on the copper sphere is σ. The electric field strength on the surface of Sphere of radius r is:

(A) σ/ε0

(B) σ/2

(C) σ

(D) σ/2ε0

Correct Answer: **(A)** Level: **Easy** Tagging: **Remembering**

Q145. Two charges 30C and -30C are separated from each other by a distance of 3 cm. Then find the magnitude of electric dipole moment(Cm).

(A) 0.2

(B) 0.9

(C) 0

(D) 0.4

Correct Answer: **(B)** Level: **Easy** Tagging: **Remembering**

Q146. When an electric dipole is placed at an angle in a uniform electric field, then the torque produced on the dipole will:

(A) Try to align the dipole at an angle of 45 degree from the electric field.

(B) Try to align the dipole in the direction of electric field.

(C) Try to align the dipole in the direction perpendicular to the electric filed.

(D) Can't say.

Correct Answer: **(B)** Level: **Easy** Tagging: **Remembering**

Q147. An electric dipole of moment $\vec{p}$ is placed in a uniform electric field $\vec{E}$. Then

(A) (i), (ii) and (iii) are correct

(B) (i) and (iii) are correct and (ii) is wrong

(C) Only (i) is correct

(D) (i) and (ii) are correct (iii) is wrong

Correct Answer: **(B)** Level: **Moderate** Tagging: **Understanding**

Q148. The ratio of electric field and potential (E/V) at midpoint of electric dipole, for which separation is l

(A) $\frac{1}{l}$

(B) l

(C) $\frac{2}{l}$

(D) None of these

Correct Answer: **(D)** Level: **Moderate** Tagging: **Analyzing**

11. Continuous Charge Distribution

Q149. 64 small drops of mercury, each of radius r and charge q coalesce to form a big drop. The ratio of the surface density of charge of each small drop with that of the big drop is

(A) $1:64$

(B) $64:1$

(C) $4:1$

(D) $1:4$

Correct Answer: **(D)** Level: **Moderate** Tagging: **Understanding**

Q150. A 100 eV electron is fired directly towards a large metal plate having surface charge density -2×10^{-6} cm^{-2}. The distance from where the electrons be projected so that it just fails to strike the plate is

(A) 0.22mm

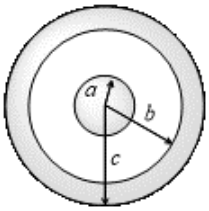
(B) 0.44mm

(C) 0.66mm

(D) 0.88mm

Correct Answer: **(B)** Level: **Moderate** Tagging: **Applying**

Q151. 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

Correct Answer: **(A)** Level: **Moderate** Tagging: **Analyzing**

Q152. An infinite line charge produces a field of 9×10^4 NC^{-1} at a distance of 2 cm. the linear density is

(A) 2×10^{-7} Cm^{-1}

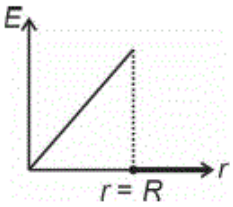
(B) 10^{-7} Cm^{-1}

(C) 9×10^4 Cm^{-1}

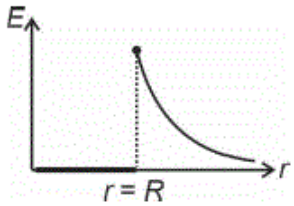
(D) None of these

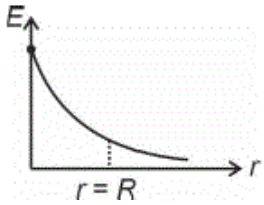
Correct Answer: **(B)** Level: **Moderate** Tagging: **Applying**

Q153. Choose the correct graph for the variation of electric field with radial distance r for a spherical shell having uniform surface charge density.

(A) 

(B) 

(C) 

(D) 

Correct Answer: **(C)** Level: **Moderate** Tagging: **Analyzing**

Q154. Two conducting sphere of radii r_1 and r_2 are charged to the same surface charge density. The ratio of electric field near their surface is

(A) r_1^2 / r_2^2

(B) r_2^2 / r_1^2

(C) r_1 / r_2

(D) $1 : 1$

Correct Answer: **(D)** Level: **Moderate** Tagging: **Understanding**

Q155. 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) $\frac{\sigma}{\varepsilon_0}$

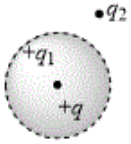
(C) $\frac{\sigma}{2\varepsilon_0}$

(D) Depends upon the location of the point

Correct Answer: **(B)** Level: **Moderate** Tagging: **Applying**

12. Gauss's Law

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



Q156.

(A) q_2

(B) Only the positive charge

(C) All the charges

(D) $+q_1$ and $-q_1$

Correct Answer: **(C)** Level: **Easy** Tagging: **Understanding**

Q157. A charge q is enclosed by a Gaussian spherical surface of radius R. If the radius of spherical surface is doubled, then the electric flux through the surface will

(A) Increase four times

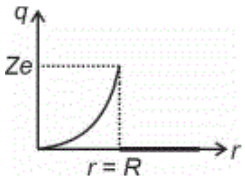
(B) Be doubled

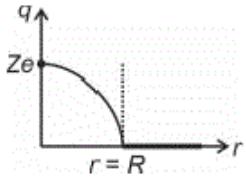
(C) Be reduced to half

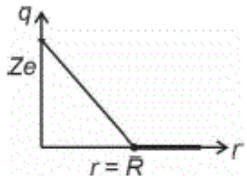
(D) Remain the same

Correct Answer: **(D)** Level: **Easy** Tagging: **Remembering**

Q158. An early model for an atom considered it to have a positively charged point nucleus of charge Ze, surrounded by a uniform density of negative charge up to radius R. The atom as a whole is neutral. For this model choose the best possible graph for charge enclosed inside the Gaussian surface with radial distance r from nucleus

(A) 

(B) 

(C) 

(D) 

Correct Answer: **(B)** Level: **Easy** Tagging: **Remembering**

Q159. Gauss's Law cannot be applied in _____

(A) Unbounded surface

(B) Solid sphere

(C) Hollow sphere

(D) Cube

Correct Answer: **(A)** Level: **Easy** Tagging: **Remembering**

Q160. The electric flux from a cube of side 'a' is 'Φ'. What will be its value if the side of the cube is made '2a' and the charge enclosed is made half?

(A) Φ

(B) Φ/2

(C) 2 Φ

(D) 4 Φ

Correct Answer: **(B)** Level: **Easy** Tagging: **Remembering**

Q161. The magnitude of electric field at distance r from an infinitely thin rod having a linear charge density λ is(use Gauss's law)

(A) $E = \frac{\lambda}{2\pi\varepsilon_0 r}$

(B) $E = \frac{2\lambda}{\pi\varepsilon_0 r}$

(C) $E = \frac{\lambda}{4\pi\varepsilon_0 r}$

(D) $E = \frac{4\lambda}{\pi\varepsilon_0 r}$

Correct Answer: **(A)** Level: **Easy** Tagging: **Applying**

Q162. The total electric flux through a closed surface in which a certain amount of charge is placed depends on the:

(A) Size of the surface

(B) Shape of the surface

(C) Both shape and size of the surface

(D) None of these

Correct Answer: **(D)** Level: **Easy** Tagging: **Remembering**

Q163. Which of the following is the correct statement of Gauss law for electrostatics in a region of charge distribution in free space?

(A) $\oint \mathrm{E}.\mathrm{ds} = 0$

(B) $\oint E.ds = \frac{\rho}{\varepsilon_0}$

(C) $\oint E.ds = \rho$

(D) $\oint E.ds = \varepsilon_0\rho$

Correct Answer: **(B)** Level: **Easy** Tagging: **Analyzing**

Q164. Which of the following statements is not true about Gauss's law?

(A) The term q on the right side of Gauss's law includes the sum of all charges enclosed by the surface.

(B) Gauss's law is true for any closed surface.

(C) Gauss's law is not much useful in calculating the electrostatic field when the system has some symmetry.

(D) Gauss's law is based on the inverse square dependence on distance contained in coulomb's law.

Correct Answer: **(C)** Level: **Easy** Tagging: **Remembering**

Q165. Which statement is true for Gauss law-

(A) Electric flux depends upon the geometry of the gaussian surface.

(B) All the charges whether inside or outside the gaussian surface contribute to the electric flux.

(C) The electric field over the gaussian surface remains continuous and uniform at every point.

(D) Gauss theorem can be applied to non-uniform electric field.

Correct Answer: **(C)** Level: **Easy** Tagging: **Remembering**

Q166. Choose the correct statement regarding Gauss law $\left(\phi = \frac{q}{\varepsilon_0}\right)$

(A) Gauss's law is true for any closed surface, no matter what its shape or size

(B) The term q on the right side of Gauss's lawincludes the sum of all charges enclosed by the surface. The charges may be located anywhere inside the surface

(C) Gauss's law is based on the inverse square dependence on distance contained in the coulomb's law. Any violation of Gauss's law will indicate departure from the inverse square law

(D) All of these

Correct Answer: **(D)** Level: **Moderate** Tagging: **Analyzing**

Q167. A non-conducting ring of radius 0.5 m carries total charge of 1.11×10^{-10} C distributed non-uniformly on its circumference producting an electric field everywhere in space. The value of the line integral $\int_{l=\infty}^{l=0} -E.dl$ ($l = 0$ being centre of ring) in volt is

(A) +2

(B) -1

(C) -2

(D) 0

Correct Answer: **(A)** Level: **Moderate** Tagging: **Applying**

Q168. The electric flux from a cube of edge l is ϕ. What will be its value if edge of cube is made 2 l and charge enclosed is halved

(A) $\phi/2$

(B) $2\ \phi$

(C) $4\ \phi$

(D) $5\ \phi$

Correct Answer: **(A)** Level: **Moderate** Tagging: **Analyzing**

13. Applications of Gauss's Law

Q169. A hollow sphere of charge doesn't produce an electrical field at any

(A) Outer point

(B) Surface point

(C) Interior point

(D) All the above

Correct Answer: **(C)** Level: **Easy** Tagging: **Remembering**

Q170. A ring of radius r carries a charge Q uniformly distributed over its length. A charge q is placed at its centre will experience a force equal to

(A) $\frac{qQ}{4\pi\varepsilon_0 r^2}$

(B) $\frac{qQ}{8\pi\varepsilon_0 r^3}$

(C) Zero

(D) None of these

Correct Answer: **(C)** Level: **Easy** Tagging: **Understanding**

Q171. According to Gauss's law, the electric field due to an infinitely long thin charged wire varies as:

(A) r

(B) 1/r

(C) 1/(r*r)

(D) r*r

Correct Answer: **(B)** Level: **Easy** Tagging: **Remembering**

Q172. Electric flux coming out of a single Na^+ ion is _____ Nm^2C^{-1}

(A) $1.8*10^{-10}$

(B) $1.8*10^{-8}$

(C) $5.4*10^{-8}$

(D) $3.6*10^{-8}$

Correct Answer: **(B)** Level: **Easy** Tagging: **Remembering**

Q173. If an insulated non-conducting sphere of radius R has charge density ρ. The electric field at a distance r from the centre of sphere (r

(A) $\frac{\rho R}{3\varepsilon_0}$

(B) $\frac{\rho r}{\varepsilon_0}$

(C) $\frac{\rho r}{3\varepsilon_0}$

(D) $\frac{3\rho R}{\varepsilon_0}$

Correct Answer: **(C)** Level: **Easy** Tagging: **Applying**

Q174. 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

Correct Answer: **(A)** Level: **Easy** Tagging: **Understanding**

Q175. The electric intensity outside a charged sphere of radius R at a distance r(r>R) is

(A) $\frac{\sigma R^2}{\varepsilon_0 r^2}$

(B) $\frac{\sigma r^2}{\varepsilon_0 R^2}$

(C) $\frac{\sigma r}{\varepsilon_0 R}$

(D) $\frac{\sigma R}{\varepsilon_0 r}$

Correct Answer: **(A)** Level: **Easy** Tagging: **Understanding**

Q176. Which of the following can be compute by Gauss's law?

(A) Electric potential

(B) Radius of the Gaussian surface

(C) Permeability

(D) Permittivity

Correct Answer: **(B)** Level: **Easy** Tagging: **Remembering**

Q177. A solid sphere of radius R has a charge Q distributed in its volume with a charge density $\rho = kr^a$, where k and a are constants and r is the distance from its centre. If the electric field at $r = \frac{R}{2}$ is $\frac{1}{8}$ times that at $r = R$, find the value of a.

(A) 2

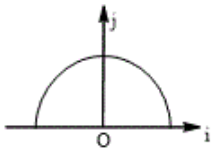
(B) 3

(C) 2.5

(D) 0.2

Correct Answer: **(A)** Level: **Moderate** Tagging: **Evaluating**

Q178. A thin semi-circular ring of radius r has a positive charge q distributed uniformly over it. The net field $\mathbf{E}$ at the centre O is



(A) $\frac{q}{4\pi^2\varepsilon_0 r^2}\hat{\mathbf{i}}$

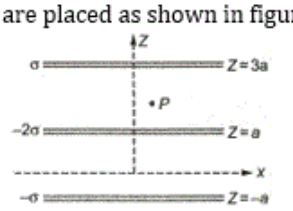
(B) $-\frac{q}{4\pi^2\varepsilon_0 r^2}\hat{\mathbf{j}}$

(C) $-\frac{q}{2\pi^2\varepsilon_0 r^2}\hat{\mathbf{i}}$

(D) $\frac{q}{2\pi^2\varepsilon_0 r^2}\hat{\mathbf{j}}$

Correct Answer: **(C)** Level: **Moderate** Tagging: **Applying**

Q179. Three infinitely long charge sheets are placed as shown in figure. The electric field at point P is



(A) $\frac{2\sigma}{\varepsilon_0}\hat{k}$

(B) $-\frac{2\sigma}{\varepsilon_0}\hat{k}$

(C) $\frac{4\sigma}{\varepsilon_0}\hat{k}$

(D) $-\frac{4\sigma}{\varepsilon_0}\hat{k}$

Correct Answer: **(A)** Level: **Moderate** Tagging: **Analyzing**

Q180. A solid sphere of radius R has a charge Q distributed in its volume with a charge density $\rho = k\,r^a$, where k and a are constants and r is the distance from its centre. If the electric field at $r = \frac{R}{2}$ is $\frac{1}{8}$ times that at $r = R$, find the value of a

(A) 3

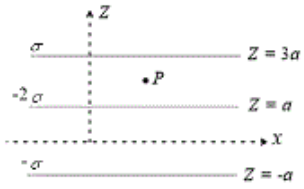
(B) 5

(C) 2

(D) Both (a) and (b)

Correct Answer: **(C)** Level: **Moderate** Tagging: **Applying**

Q181. Three infinitely long charge sheets are placed as shown in figure. The electric field at point P is



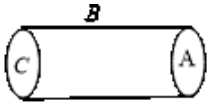
(A) $\frac{2\sigma}{\varepsilon_0}\hat{k}$

(B) $-\frac{2\sigma}{\varepsilon_0}\hat{k}$

(C) $\frac{4\sigma}{\varepsilon_0}\hat{k}$

(D) $-\frac{4\sigma}{\varepsilon_0}\hat{k}$

Correct Answer: **(B)** Level: **Moderate** Tagging: **Understanding**

Q182. A hollow cylinder has a charge q coulomb within it. If ϕis the electric flux in unit of voltmeter associated with the curved surface B, the flux linked with the plane surface A in unit of voltmeter will be 

(A) $\frac{1}{2}\left(\frac{q}{\varepsilon_0} - \phi\right)$

(B) $\frac{q}{2\varepsilon_0}$

(C) $\frac{\phi}{3}$

(D) $\frac{q}{\varepsilon_0} - \phi$

Correct Answer: **(A)** Level: **Moderate** Tagging: **Applying**

Q183. A spherical charged conductor has surface density of charge = σ, and electric field intensity on its surface is E. If radius of surface is doubled, point σ unchanged, what will be electric field intensity on the new sphere?

(A) E/2

(B) 2E

(C) E/4

(D) E

Correct Answer: **(D)** Level: **Moderate** Tagging: **Applying**

Q184. The electric flux for Gaussian surface A that encloses the charged particles in free space. (Given, q_1 = -14 nC, q_2 = 78.85 nC,q_3 = -56 nC)

(A) 10^3 Nm^2 C^{-1}

(B) $10^{3\cdot}$ CN^{-1} m^{-2}

(C) 6.32×10^3 Nm^2 C^{-1}

(D) 6.32×10^3 CN^{-1} m^{-2}

Correct Answer: **(A)** Level: **Moderate** Tagging: **Analyzing**

Q185. Two identical conducting spheres carrying different charges attract each other with a force F when placed in air medium at a distance 'd' apart. The spheres are brought into contact and then taken to their original positions. Now the two spheres repel each other with a force whose magnitude is equal to that of the initial attractive force. The ratio between initial charges on the spheres is

(A) $-(3+\sqrt{8})$ only

(B) $-3+\sqrt{8}$ only

(C) $-(3+\sqrt{8})$ or $(-3+\sqrt{8})$

(D) $+\sqrt{3}$

Correct Answer: **(C)** Level: **Moderate** Tagging: **Applying**

Q186. Two metallic spheres of radii 1 cm and 2 cm are given charges of 10^{-2} C and 5×10^{-2} C respectively. If these are connected by a conducting wire, the final charge on the smaller sphere is

(A) 3×10^{-2} C

(B) 1×10^{-2} C

(C) 4×10^{-2} C

(D) 2×10^{-2} C

Correct Answer: **(D)** Level: **Moderate** Tagging: **Applying**

Q187. Two spherical conductors A and B of radii 1 mm and 2 mm are separated by a distance of 5 cm and are uniformly charged. If the spheres are connected by a conducting wire then in equilibrium condition, the ratio of the magnitude of the electric fields at the surfaces of spheres A and B is

(A) 1:2

(B) 2:1

(C) 1:4

(D) 4:1

Correct Answer: **(B)** Level: **Moderate** Tagging: **Evaluating**