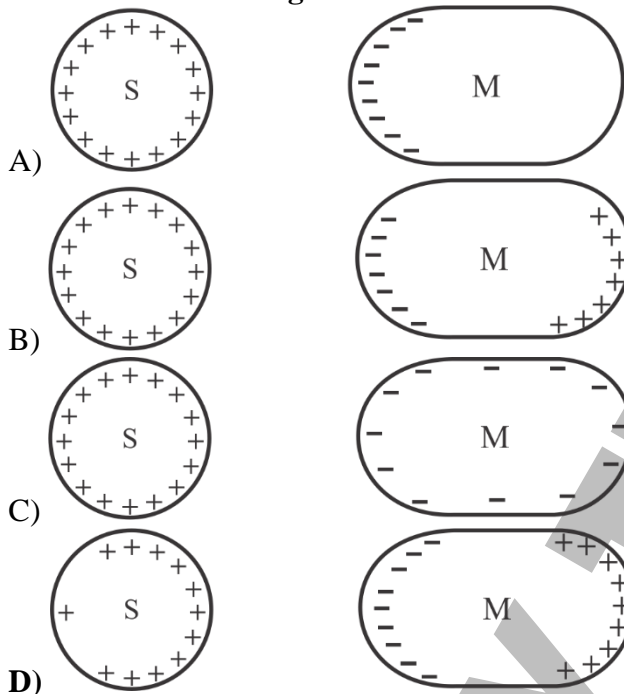


PHYSICS MDCAT

Electrostatics

TEST#01 (UNIT # 9)

- Q.86** An uncharged metal object M is insulated from its surroundings. A positively charged metal sphere S is then brought near to M. Which diagram best illustrates the resultant distributions of charge on S and M?



- Q.87** Three particles have charges $+10\ \mu\text{C}$ each, and they are fixed at the corners of an equilateral triangle of side 0.5 m. The force on each of the particles has magnitude:

- A) 6.2 N
B) 11.5 N
C) 2.3 N
D) None of these

- Q.88** The correct expression for the Coulomb's force between two charges placed in vacuum is:

- A) $\vec{F} = \frac{1}{4\pi\epsilon_0} \times \frac{q_1 q_2}{r^2} \vec{r}$
B) $\vec{F} = \frac{1}{4\pi\epsilon_0} \times \frac{q_1 q_2}{r^2} \hat{r}$
C) $\vec{F} = \frac{1}{4\pi\epsilon_0} \times \frac{q_1 q_2}{r^3} \vec{r}$
D) $\vec{F} = \frac{1}{4\pi\epsilon_0} \times \frac{q_1 q_2}{r^2} \hat{r}$

- Q.89** The coulomb force between a positron and a proton placed at a distance of 3.2 cm is:

- A) 5.2×10^{-25} N, repulsive
B) 9.1×10^{-25} N, attractive
C) 1.5×10^{-25} N, repulsive
D) 2.2×10^{-25} N, repulsive

- Q.90** If the distance between two equal point charges is doubled and magnitude of either charge is also doubled, what would happen to the force between them?

- A) Force is doubled
B) Force is quadrupled
C) Force is halved
D) Force remains same

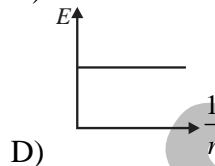
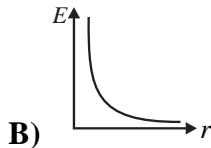
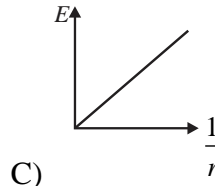
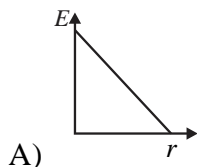
- Q.91** The electric field produced by a point charge $q = -4 \times 10^{-6}$ C (placed at origin) at a point 3 m from origin on the y-axis is:

- A) $(-4 \times 10^3 \hat{j})\ \text{N C}^{-1}$
B) $(-8 \times 10^3 \hat{i})\ \text{N C}^{-1}$
C) $(-6 \times 10^3 \hat{j})\ \text{N C}^{-1}$
D) $(-9 \times 10^3 \hat{k})\ \text{N C}^{-1}$

- Q.92** If a charge of $5\ \mu\text{C}$ experiences a force of 10^{-7} N at a point then electric intensity at that point:

- A) $5 \times 10^1\ \text{N C}^{-1}$
B) $8 \times 10^2\ \text{N C}^{-1}$
C) $1 \times 10^{-2}\ \text{N C}^{-1}$
D) $2 \times 10^{-2}\ \text{N C}^{-1}$

Q.93 The electric field produced by a point charge varies with distance from point charge as:



Q.94 The zero-field spot for two equal and opposite charges lies:

- A) At mid-point of charges
- B) Between the charges but closer to smaller charge
- C) Between the charges but closer to larger charge
- D) None of these

Q.95 Two positive point charges $32 \mu\text{C}$ and $8 \mu\text{C}$ are separated by a distance of 6 m. The zero-field spot will be at:

- A) Between the charges and at 2 m from smaller charge
- B) Between the charges and at 2 m from larger charge
- C) Between the charges and at 4 m from the larger charge
- D) Both A and C

Q.96 A 10 C charge experiences a force of 4000 N when moved between two points separated by a distance of 8 cm in a uniform electric field. The potential difference between the two points is:

- A) 8 V
- B) 16 V
- C) 32 V
- D) 24 V

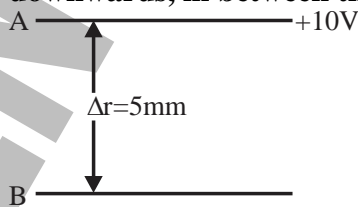
Q.97 The potential gradient between the two charged plates having separation of 0.25 cm and potential difference of 24 volts is:

- A) 9600 N C^{-1}
- B) 7200 N C^{-1}
- C) 4800 N C^{-1}
- D) 2400 N C^{-1}

Q.98 The potential difference between two points is two volts. The work done in moving one electron from one point to other point is:

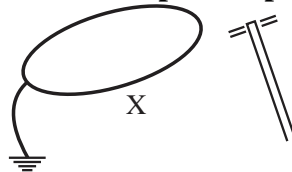
- A) One kWh
- B) One electron volt
- C) Two electron volt
- D) One joule

Q.99 What potential should be applied to the lower plate in the diagram shown to create an electric field of $20,000 \text{ V m}^{-1}$ downwards, in between the plates.



- A) -90 V
- B) +90 V
- C) -45 V
- D) +45 V

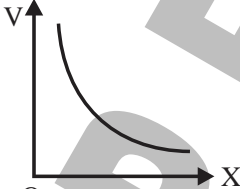
Q.100 A negatively charged rod is held near a capacitor plate X that is earthed. X is:

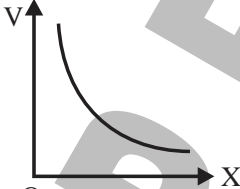


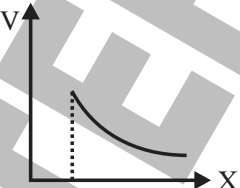
- A) Uncharged and at a negative potential
- B) Positively charged and at Earth potential
- C) Uncharged and at a positive potential
- D) Negatively charged and at earth potential

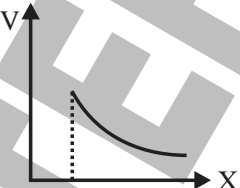
Q.101 The capacitor stores charge on its plates by:

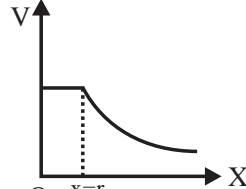
- A) Electrostatic Induction
- B) Electromagnetic Induction
- C) Electromotive Induction
- D) Electromagnetism

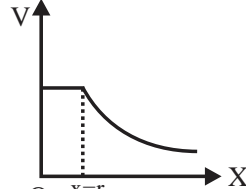
- Q.102** A capacitor which has a capacitance of $100 \mu\text{F}$ will:
- Be fully charged in 1 second by a current of $1 \mu\text{A}$
 - Store 0.1 mC of charge at a potential difference of 1 volt
 - Gain 1 joule of energy when 1 coulomb of charge is stored on it
 - Discharge in 1 second when connected across a resistor of resistance 1 ohm
- Q.103** The capacity of a parallel plate capacitor is $2 \mu\text{F}$. When a glass plate is placed between the plates of the condenser, its potential difference reduces to $\frac{1}{3}$ of the original value. The value of dielectric constant of glass is:
- 1.5
 - 3
 - 6
 - 12
- Q.104** The capacity of a parallel plate capacitor is $5 \mu\text{F}$ when the distance between the plates is 2.5 cm. If the distance between the plates is increased to 7.5 cm, then the capacitance becomes:
- $5 \mu\text{F}$
 - $\frac{5}{3} \mu\text{F}$
 - $\frac{5}{7} \mu\text{F}$
 - $15 \mu\text{F}$
- Q.105** The potentials of the two plates of capacitor are $+7.5 \text{ V}$ and -7.5 V . The charge on one of the plates is $15 \mu\text{C}$. The capacitance of the capacitor is:
- $1 \mu\text{F}$
 - $0.5 \mu\text{F}$
 - $2 \mu\text{F}$
 - $4 \mu\text{F}$
- Q.106** A dielectric is inserted between the plates of an isolated charge capacitor. Which of the following is not true about that capacitor?
- Its energy stored decreases
 - Its potential difference decreases
 - Its charge stored decreases
 - Its potential gradient decreases
- Q.107** A $6 \mu\text{F}$ capacitor is charged to 300 V and then its plates are connected by a wire. How much heat will be produced?
- 0.27 J
 - 0.54 J
 - 0.81 J
 - 1.08 J
- Q.108** A capacitor is charged to store an energy U . The charging battery is now disconnected. An identical capacitor is now connected to the first capacitor in parallel. The energy stored by combination is:
- $\frac{U}{4}$
 - $\frac{U}{2}$
 - U
 - $\frac{3U}{2}$
- Q.109** For a uniformly charged spherical shell of radius "r", which one of the following graphs shows the variation of the potential with distance "x" from the centre of the shell?
- 

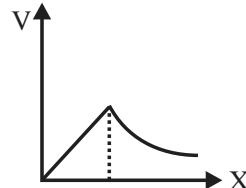
A) 

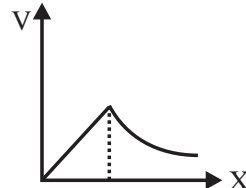


B) 



C) 



D) 
- Q.110** Compare the electrons accelerated through a certain potential difference and protons accelerated through the same potential difference. If initial velocities are negligible, then the emergent:
- Electrons have smaller K.E
 - Protons have larger velocity
 - Electrons have larger momentum
 - Protons have larger momentum

- Q.111** A charge of 5 C is given a displacement of 0.5 m and work-done in the process is 10 J. The difference of potential between two points is:
A) 2 V
B) 1 V
C) 0.25 V
D) 4 V
- Q.112** Two charges 2 μC and 10 μC separated by 20 cm, the ratio of electrical forces acting on them will be:
A) 1 : 2
B) 1 : 1
C) 1 : 5
D) 5 : 1
- Q.113** The electrostatic force between charges is 42 N. If we place a dielectric of $\epsilon_r = 2.1$ between the charges, then the force become equal to:
A) 42 N
B) 20 N
C) 88.2 N
D) 2 N
- Q.114** The electric field strength and electric field lines between two oppositely charged parallel plates is/are:
A) Uniform, Parallel and evenly spaced
B) Non-Uniform, Parallel and evenly spaced
C) Zero, No lines exist
D) Non-Uniform, Curved
- Q.115** The electric potential at a point of distance 1 m from 2 μC charge is:
A) $1.8 \times 10^6 \text{ V}$
B) $1.8 \times 10^4 \text{ V}$
C) $1.8 \times 10^6 \text{ N/C}$
D) $1.8 \times 10^5 \text{ N/C}$