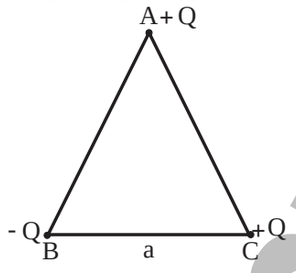
PHYSICS MDCAT

Electrostatics

TEST#02 (UNIT # 9)

Q.86 Three charges are placed at the vertices of an equilateral triangle of side 'a' as shown in figure. The force experienced by the charge placed at the vertex A in a direction normal to BC is_____. Which charge exerts more force on the charge at vertex A?



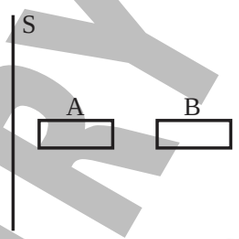
A) $\frac{Q^2}{\left(4\pi \in_0 a^2\right)}$, charge at vertex B

B) $-Q^2\left(4\pi \in_0 a^2\right)$, charge at vertex C

C) Zero, both exert equal force

D) $\frac{Q^2}{\left(2\pi \in_0 a^2\right)}$, charge at vertex B exerts double force than charge at vertex C

Q.87 A large non-conducting sheet S is given a uniform negative charge density. Two uncharged small metal plates A and B are placed near the sheet as shown. Which of the following is true?

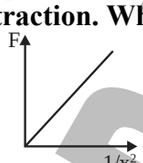


A) S attracts A
B) A attracts B
C) S attracts B
D) All of these

Q.88 An electric dipole is placed in a uniform electric field. The net electric force on the dipole:

A) Is always zero
B) Can never be zero
C) Depends on the orientation of the dipole
D) Depends on the strength of the dipole

Q.89 A point charge at a distance "x" from another point charge experiences a force of attraction. Which one of following graphs shows how the force is related to "x".

A)


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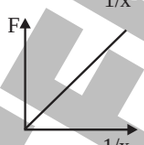
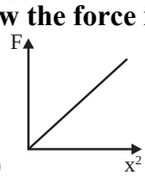
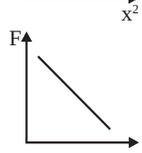


C)


D)


Q.90 A sphere of charge "+Q" is fixed in position. A smaller sphere of charge "+q" is placed near the larger sphere and released from rest. The smaller sphere will move away from larger sphere with _____ velocity and _____ slope of velocity time graph?

A) Decreasing, Increasing
B) Increasing, increasing
C) Increasing, Decreasing
D) Increasing, Constant

Q.91 The force between two charged spheres with charges q_1= +8 C and q_2= -4 C is 32 N. If these spheres are brought in contact and then separated, the new force between these spheres will be?

A) 16 N
C) 64 N
B) 4 N
D) 256 N

Q.92 If 6 N is the force between two charges when dielectric is present. Now if that dielectric of dielectric constant "$\varepsilon_r = \frac{3}{2}$" is removed, the new force will be:

A) 4 N
C) 3 N
B) 9 N
D) 16 N

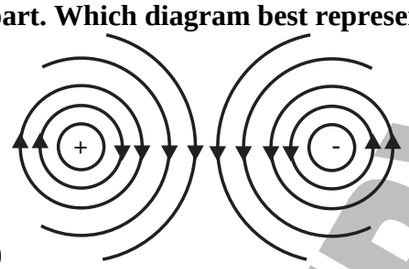
Q.93 The electric field strength produced by a charge "q" at a distance of "r" from the charge "q" (where there is present a test charge "$q_\circ$") is defined as:

A) $\frac{\vec{F}}{q}$
C) $\frac{\vec{F}}{q_\circ}$
B) $\frac{kq_\circ\hat{r}}{r^2}$
D) All of these

Q.94 The electric field strength at the position $\vec{r} = \left(4\hat{i} + 3\hat{j}\right)m$ caused by a point charge of 5 µC placed at origin is:

A) $1240\hat{i} + 1080\,\hat{j}\ N\ C^{-1}$
C) $1440\hat{i} + 1080\,\hat{j}\ V\ m^{-1}$
B) $1440\hat{i} + 1280\,\hat{j}\ N\,C^{-1}$
D) $1240\hat{i} + 1280\,\hat{j}\ N\,C^{-1}$

Q.95 A positive charge and a negative charge of equal magnitude are placed at a short distance apart. Which diagram best represents the associated electric field?

A)


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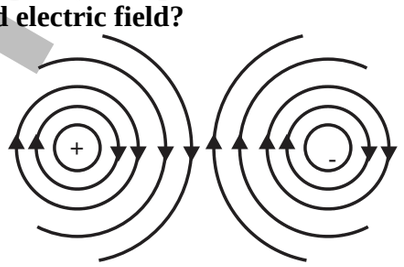
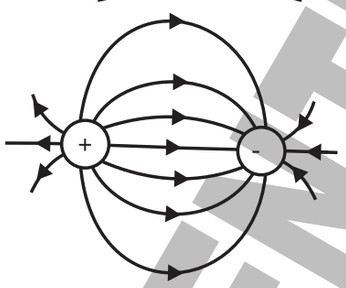
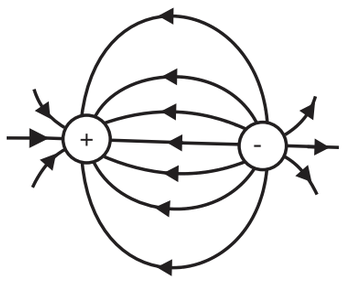
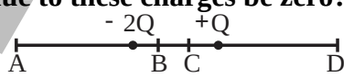


B)


D)


Q.96 Two-point charges "– 2Q" and "+ Q" are situated as shown in figure. At which point could the resultant electric field due to these charges be zero?



A) D
C) C
B) B
D) A

Q.97 In bringing a positron towards a proton, the electrostatic potential energy of the system:

A) Becomes zero
C) Remains the same
B) Decreases
D) Increases

Q.98 Two charges of +5 µC each are kept at a distance of 5 m from each other. Their potential energy will be:

A) 4.5×10^{-3} J
C) 4.5×10^{-2} J
B) 9×10^{-3} J
D) 9×10^{-9} J

Q.99 Sixty-four drops of water of the same size are equally and similarly charged. They are then united to form a bigger drop. By what factor will the electrical potential change?

A) 16 times
C) 64 times
B) 8 times
D) 4 times

Q.100 A point charge "-q" is brought from a point "A" to another point "B". The electric potential at "A" and "B" is V_1=+5 V and V_2=-3 V. The numerical value of work done on the charge is:

A) -3q
C) -8q
B) +5q
D) +8q

Q.101 The negative of potential gradient in an electric field region between two charged plates represents?

A) Electric Potential energy stored in a charge
B) Electric field strength between plates
C) Work done on the charge
D) Kinetic Energy gained by charge

Q.102 The electric potential at a point 3.2 cm away from a singly ionized lithium atom will be:

A) 4.5×10^{-8} V
C) 4.5×10^{-6} V
B) 9×10^{-8} V
D) 9×10^{-4} V

Q.103 A capacitor has a capacitance of 2.5×10^{-8} F. In the charging process, electrons are removed from one plate and transferred to other one. When the potential difference between the plates is 450 V, how many electrons have been transferred?

A) 7×10^{13} electrons
C) 7×10^{11} electrons
B) 7×10^{16} electrons
D) 7×10^{9} electrons

Q.104 One of the plates of a capacitor is given a charge of +5 C. The charge on the other plate is:

A) 10 C
C) -5 C
B) -10 C
D) +5 C

Q.105 When a parallel plate capacitor is connected to a source of constant potential difference,

A) The whole of the charge drawn from the source is stored in the capacitor
B) The whole of the energy drawn from the source is stored in the capacitor
C) The capacity of the capacitor is decreased
D) The potential difference across the capacitor becomes infinite

Q.106 A parallel plate capacitor has capacitance C. The separation between plates is halved and dielectric is inserted between plates. The new capacitance becomes 7C. The dielectric constant of medium is:

A) 3.5
C) 5.5
B) 4.5
D) 6.5

Q.107 A parallel plate capacitor has a capacitance of 25 pF in air and 112.5 pF when immersed in oil. The dielectric constant of the oil is:

A) 4.5
C) 3.7
B) 2.9
D) 5.3

Q.108 A battery is permanently connected to a parallel plate capacitor and the energy stored is 10 joules. When one plate is moved so that separation of the plates is halved, the energy now stored in joule is:

A) 40 J
C) 20 J
B) 5 J
D) 2.5 J

Q.109 Which of the following is not the expression for electric P.E stored in capacitor?

A) $\frac{1}{2}QV$
C) $\frac{1}{2}E^2\varepsilon_\circ\varepsilon_r(Ad)$
B) $\frac{1}{2}\frac{Q^2}{C}$
D) $\frac{1}{2}\frac{C^2V^2}{Q}$

Q.110 The capacity of a parallel plate capacitor is 5 µF and it is given a charge of 20 µC. The electrical energy stored in erg is:

A) 400×10^{0}
C) 800×10^{0}
B) 8000×10^{-5}
D) 4000×10^{-5}

Q.111 Electric potential V at some point in space is zero. This means:

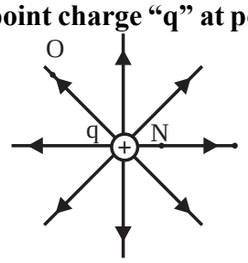
A) Electric field at that point is necessarily zero
B) Electric field at that point is necessarily non-zero
C) Electric field at that point may or may not be non-zero
D) None of these

Q.112 When a charge of 3 C is placed in a uniform electric field, it experiences a force of 3000 N, within this field, potential difference between two points separated by 1 cm is:

A) 10 V C) 90 V

B) 1000 V D) 3000 V

Q.113 Two protons are placed near a point charge "q" at point "N" and "O" as shown in diagram.



Which of following describe the force on both protons correctly?

	Magnitude of force on N	Direction of force
A)	Less than force on O	Radially outward
B)	**Greater than force on O**	**Radially outward**
C)	Less than force on O	Radially Inward
D)	Greater than force on O	Radially Inward

Q.114 Two charges of 10 µC and 14.4 µC are 12 cm apart. The force between them:

A) 0.01 N **C) 90 N**

B) 9×10^{3} N D) 9×10^{5} N

Q.115 Two opposite point charge of same magnitude q are separated by distance 2d, electric potential mid-way between them is (if electric potential due to each charge is V):

A) V C) 2V

B) Zero D) $\frac{V}{2}$