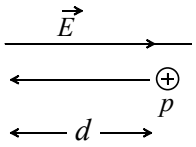
DPP

DAILY PRACTICE PROBLEMS

Class : XIIth **Subject : PHYSICS**
Date : **DPP No. : 3**

Topic :-Electric charges and fields

1. In the figure, a proton moves a distance d in a uniform electric field $\vec{E}$ as shown in the figure. Does the electric field do a positive or negative work on the proton? Does the electric potential energy of the proton increase or decrease

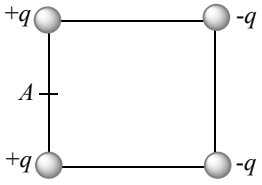


a) Negative, increase b) Positive, decrease c) Negative, decrease d) Positive, increase

2. When one electron is taken towards the other electron, then the electric potential energy of the system

a) Decreases b) Increases c) Remains unchanged d) Becomes zero

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

4. A charged particle q is shot towards another charged particle Q which is fixed, with a speed v.

   It approaches$Q$ upto a closest distance r and then returns. If q is shot with speed$2v$, the closest distance of approach would be

   a) $\frac{r}{4}$ b) $\frac{r}{2}$ c) $2r$ d) r

5. When the distance between the charged particles is halved, the force between them becomes

   a) One-fourth b) Half c) Double d) Four times

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

   a) 0 $volts/meter$ b) $\frac{\sigma}{2\varepsilon_0}$ $volts/meter$ c) $\frac{\sigma}{\varepsilon_0}$ $volts/meter$ d) $\frac{2\sigma}{\varepsilon_0}$ $volts/meter$

7. The capacity of the conductor does not depend upon

   a) Charge b) Voltage

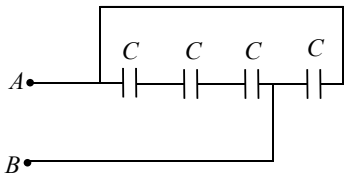
   c) Nature of the material d) All of these

8. The electric intensity due to an infinite cylinder of radius R and having charge q per unit length at a distance $r(r > R)$ from its axis is

   a) Directly proportional to r^2 b) Directly proportional to r^3

   c) Inversely proportional to r d) Inversely proportional to r^2

9. The equivalent capacitance between A and B is



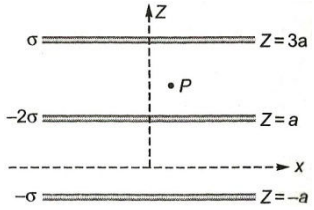
   a) $C/4$ b) $3C/4$ c) $C/3$ d) $4C/3$

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

a) $7.20N$ b) $11.25N$ c) $22.50N$ d) $45.00N$

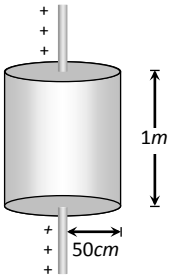
11. Identify the WRONG statement
a) In an electric field two equipotential surface can never intersect
b) A charged particle free to move in an electric field shall always move in the direction of $\vec{E}$
c) Electric field at the surface of a charged conductor is always normal to the surface
d) The electric potential decrease along a line of force in an electric field

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



a) $\frac{2\sigma}{\varepsilon_0}\hat{\boldsymbol{k}}$ b) $-\frac{2\sigma}{\varepsilon_0}\hat{\boldsymbol{k}}$ c) $\frac{4\sigma}{\varepsilon_0}\hat{\boldsymbol{k}}$ d) $-\frac{4\sigma}{\varepsilon_0}\hat{\boldsymbol{k}}$

13. 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



a) $\frac{Q}{\varepsilon_0}$ b) $\frac{100Q}{\varepsilon_0}$ c) $\frac{10Q}{(\pi\varepsilon_0)}$ d) $\frac{100Q}{(\pi\varepsilon_0)}$

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

a) qV b) mqV c) $\left(\frac{q}{m}\right)V$ d) $\frac{q}{mV}$

15. 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) $\frac{F}{4}$

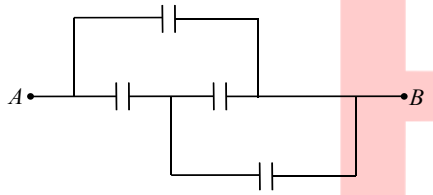
16. Charges $+2q$, $+q$ and $+q$ are placed at the corners A,B and C of an equilateral triangle ABC. If E is the electric field at the circumcentre O of the triangle, due to the charge $+q$, then the magnitude and direction of the resultant electric field at O is

a) E along AO b) $2E$ along AO c) E along BO d) E along CO

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

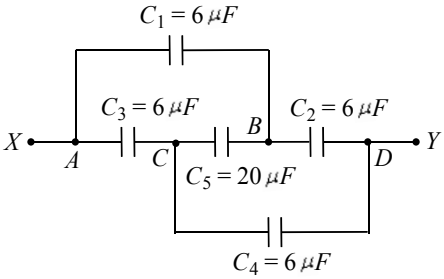
a) $k.\frac{\vec{p}\times\vec{r}}{r^2}$ b) $k.\frac{\vec{p}\times\vec{r}}{r^3}$ c) $k.\frac{\vec{p}.\vec{r}}{r^2}$ d) $k.\frac{\vec{p}.\vec{r}}{r^3}$

18. In the circuit shown in figure, each capacitor has a capacity of $3\mu F$. The equivalent capacity between A and B is



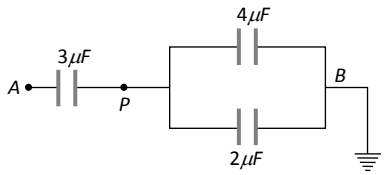
a) $\frac{3}{4}\mu F$ b) $3\mu F$ c) $6\mu F$ d) $5\mu F$

19. What is the effective capacitance between points X and Y



a) $24\mu F$ b) $18\mu F$ c) $12\mu F$ d) $6\mu F$

20. In the figure a potential of $+1200\ V$ is given to point A and point B is earthed, what is the potential at the point P



a) $100\ V$ b) $200\ V$ c) $400\ V$ d) $600\ V$