DPP
DAILY PRACTICE PROBLEMS

Class : XIIth **Subject : PHYSICS**
Date : **DPP No. : 2**

Topic :-Electric charges and fields

1. Two charged spheres of radii R_1 and R_2 having equal surface charge density. The ratio of their potential is
a) R_1/R_2 b) R_2/R_1 c) $(R_1/R_2)^2$ d) $(R_2/R_1)^2$

2. The magnitude of electric field E in the annular region of a charged cylindrical capacitor
a) Is same throughout
b) Is higher near the outer cylinder than near the inner cylinder
c) Varies as $1/r$, where r is the distance from the axis
d) Varies as $1/r^2$, where r is the distance from the axis

3. A charge of Q *coulomb* is placed on a solid piece of metal irregular shape. The charge will distribute itself
a) Uniformly in the metal object
b) Uniformly on the surface of the object
c) Such that potential energy of the system is minimised
d) Such that the total heat loss is minimised

4. Charge on α-particle is
a) $4.8 \times 10^{-19}C$ b) $1.6 \times 10^{-19}C$ c) $3.2 \times 10^{-19}C$ d) $6.4 \times 10^{-19}C$

5. 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) $x = \frac{d}{2\sqrt{3}}$

6. Two unit negative charges are placed on straight line. A positive charge q is placed exactly at the mid-point between these unit charges. If the system of these three charges is in equilibrium, the value of q (in C) is
a) 1.0 b) 0.75 c) 0.5 d) 0.25

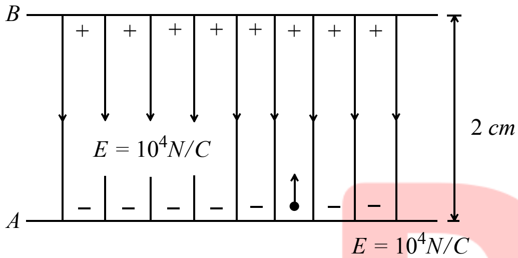
7. A capacitor of capacitance value $1\mu F$ is charged to $30\ V$ and the battery is then disconnected. If it is connected across a $2\mu F$ capacitor, the energy lost by the system is

a) $300\ \mu J$ b) $450\ \mu J$ c) $225\ \mu J$ d) $150\ \mu J$

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

a) $(\phi_2 - \phi_1)\varepsilon_0$ b) $\frac{\phi_1 + \phi_2}{\varepsilon_0}$ c) $\frac{\phi_1 - \phi_2}{\varepsilon_0}$ d) $\varepsilon_0(\phi_1 - \phi_2)$

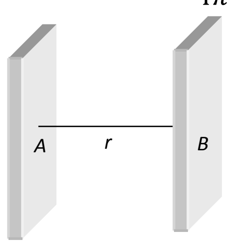
9. An electron is released from the bottom plate A as shown in the figure ($E = 10^4 N/C$). The velocity of the electron when it reaches plate B will be nearly equal to



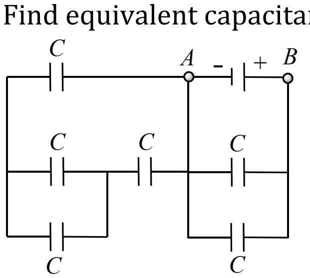
a) $0.85 \times 10^7\ m/s$ b) $1.0 \times 10^7\ m/s$ c) $1.25 \times 10^7\ m/s$ d) $1.65 \times 10^7\ m/s$

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

a) $W = \frac{1}{4\pi\varepsilon_0}\frac{q}{r}$ b) $W = \frac{1}{4\pi\varepsilon_0}\frac{q}{r^2}$ c) $W = -\frac{1}{4\pi\varepsilon_0}\frac{q}{r^2}$ d) $W =$ zero



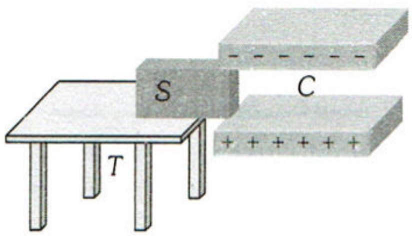
11. Find equivalent capacitance between A and B



a) $6C$ b) $5C$ c) $3C$ d) $2C$

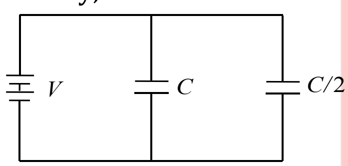
12. A frictionless dielectric plate S is kept on a frictionless table T. A charged parallel plate

capacitance C (of which the plates are frictionless) is kept near it. The plate S is in between the plates. When the plate S is left between the plates



a) It will remain stationary on the table
b) It is pulled by the capacitor and will pass on the other end
c) It is pulled between the plates and will remain there
d) All the above statements are false

13. Two condensers, one of capacity C and the other of capacity $C/2$, are connected to a V-volt battery, as shown



The work done in charging fully both the condensers is

a) $2CV^2$ b) $\frac{1}{4}CV^2$ c) $\frac{3}{4}CV^2$ d) $\frac{1}{2}CV^2$

14. A parallel plate capacitor is connected to a battery. The plates are pulled apart with a uniform speed. If x is the separation between the plates, the time rate of change of electrostatic energy of capacitor is proportional to

a) x^{-2} b) x c) x^{-1} d) x^2

15. 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

16. A capacitor 4 μF charged to 50 V is connected to another capacitor of $2\mu F$ charged to 100 V with plates of like charges connected together. The total energy before and after connection in multiples of $(10^{-2}\,J)$ is

a) 1.5 and 1.33 b) 1.33 and 1.5 c) 3.0 and 2.67 d) 2.67 and 3.0

17. Capacitors are used in electrical circuits where appliances need more

a) Current b) Voltage c) Watt d) Resistance

18. A hollow charged metal sphere has a radius r. If the potential difference between its surface and a point at a distance $3r$ from the centre is V, then electrical intensity at distance $3r$ from the centre is

a) $\frac{V}{2r}$ b) $\frac{V}{3r}$ c) $\frac{V}{4r}$ d) $\frac{V}{6r}$

19. In a charged capacitor, the energy resides

a) The positive charges b) Both the positive and negative charges
c) The field between the plates d) Around the edge of the capacitor plates

20. 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