DPP

DAILY PRACTICE PROBLEMS

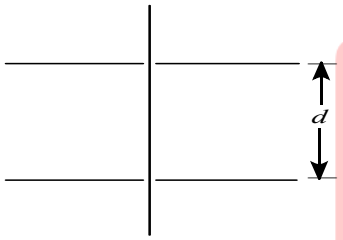
Class : XIIth **Subject : PHYSICS**
Date : **DPP No. : 5**

Topic :-ELECTROSTATIC POTENTIAL AND CAPACITANCE

1. Two plates are 20 cm apart and the potential difference between them is 10 V. The electric field between the plates is

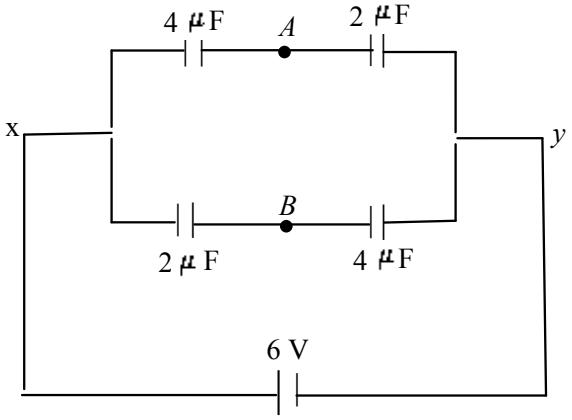
   a) 50 Vm^{-1} b) 500 Vm^{-1} c) 0.5 Vm^{-1} d) 20 Vm^{-1}

2. A capacitor of capacitance 1 μF is filled with two dielectrics of dielectric constant 4 and 6. What is the new capacitance?



   a) 10 μF b) 5 μF c) 4 μF d) 7 μF

3. What is the potential difference between points *A* and *B* in the circuit shown?



   a) 2 V b) 4 V c) 3 V d) 12 V

4. A metal foil of negligible thickness is introduced between two plates of a capacitor at the centre. The capacitance of capacitor will be

   a) Same b) Double c) Half d) *K* times

5. A capacitor of capacitance C is charged to a potential V. The flux of the electric field through a closed surface enclosing the capacitor is.

a) $\frac{CV}{\varepsilon_0}$ b) $\frac{2CV}{\varepsilon_0}$ c) $\frac{CV}{2\varepsilon_0}$ d) Zero

6. Two capacitors of capacitances C_1 and C_2 are connected in parallel across a battery. If Q_1 and Q_2 respectively be the charges on the capacitors, then $\frac{Q_1}{Q_2}$ will be equal to

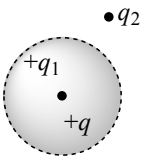
a) $\frac{C_2}{C_1}$ b) $\frac{C_1}{C_2}$ c) $\frac{C_1^2}{C_2^2}$ d) $\frac{C_2^2}{C_1^2}$

7. Two parallel plate capacitors of capacitance C and $2C$ are connected in parallel and charged to a potential difference V_0. The battery is then disconnected and the region between the plates of the capacitor C is completely filled with a material of dielectric constant 2. The potential difference across the capacitors now becomes

a) $\frac{F_0}{4}$ b) $\frac{V_0}{2}$ c) $\frac{3V_0}{4}$ d) V_0

8. 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



a) q_2 b) Only the positive charge
c) All the charges d) $+q_1$ and $-q_1$

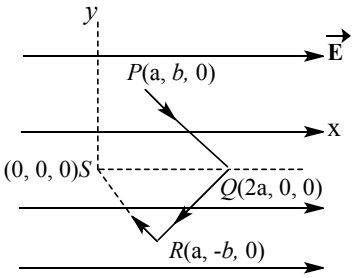
9. An AC source is rated at 220 V, 50 Hz. The time taken for voltage to change from its peak value to zero is

a) 50 s b) 0.02 s c) 5 s d) 5×10^{-3}s

10. A fully charged capacitor has a capacitance C. It is discharged through a small coil of resistance wire embedded in a thermally insulated block of specific heat capacity s and mass m. If the temperature of the block is raised by ΔT, the potential difference V across the capacitance is

a) $\sqrt{\frac{2mC\Delta T}{s}}$ b) $\frac{mC\Delta T}{s}$ c) $\frac{ms\Delta T}{C}$ d) $\sqrt{\frac{2m\,s\Delta T}{C}}$

11. A point charge q moves from point $\overset{P}{\rightarrow}$ to point S along the path $PQRS$ in a uniform electric field $\vec{E}$ pointing parallel to the positive direction of the x-axis, figure. The coordinates of the points P, Q, R and S are (a, b, 0), (2a, 0, 0), (a, -b, 0) and (0, 0, 0) respectively. The work done by the field in the above process is given by the expression

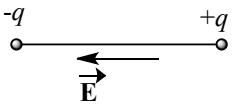


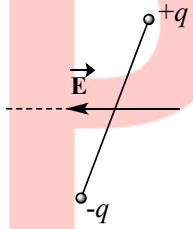
a) qE b) $-qaE$ c) $q(\sqrt{a^2+b^2})E$ d) $3qE\sqrt{a^2+b^2}$

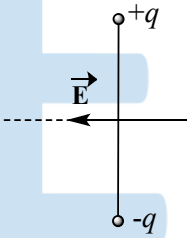
12. A variable condenser is permanently connected to a 100 V battery. If capacity is changed from 2 μF and 10 μF, then energy change is equal to

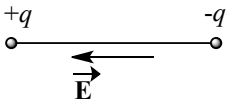
a) 2×10^{-2} J b) 2.5×10^{-2} J c) 6.5×10^{-2} J d) 4×10^{-2} J

13. In which of the states shown in figure is the potential energy of a electric dipole maximum?

a) 

b) 

c) 

d) 

14. A 10μF capacitors and a 20μF capacitor are connected in series across a 200 V supply line. The charged capacitors are then disconnected from the line and reconnected with their positive plates together and negative plates together and no external voltage is applied. The potential difference across each capacitor is

a) $\frac{400}{9}$ V b) $\frac{800}{3}$ V c) 400 V d) 200 V

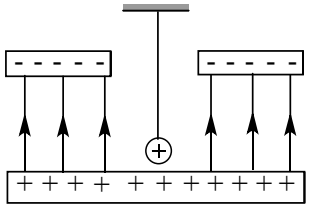
15. In bringing an electron towards another electron, the electrostatic potential energy of the system

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

16. A sphere of radius r is charged to a potential V. The outward pull per unit area of its surface is given by

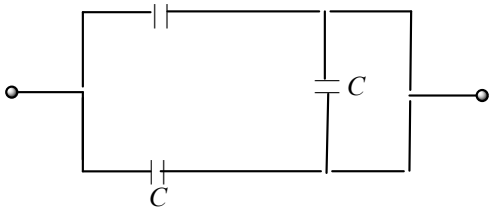
a) $\frac{4\pi\varepsilon_0 V^2}{r^2}$ b) $\frac{\varepsilon_0 V^2}{2r^2}$ c) $\frac{2\varepsilon_0 V^2}{r^2}$ d) $\frac{\varepsilon_0 V^2}{4r^2}$

17. 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

18. The equivalent capacitance of the combination shown in figure below is

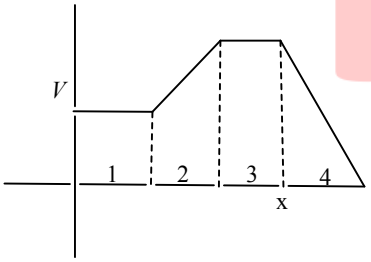


a) $2C$
b) C
c) $\frac{1}{2}C$
d) None of these

19. A hollow conducting sphere or radius R has a charge $(+Q)$ on its surface. What is the electric potential within the sphere at a distance $r = R/3$ from its centre?

a) $\frac{1}{4\pi\varepsilon_0}.\frac{Q}{r}$
b) $\frac{1}{4\pi\varepsilon_0}.\frac{Q}{r^2}$
c) $\frac{1}{4\pi\varepsilon_0}.\frac{Q}{R}$
d) Zero

20. The figure shows electric potential V as a function of x. Rank the four regions according to the magnitude of x-component of the electric field E within them, greatest first



a) $E_4 > E_2 > E_3 > E_1$
b) $E_2 > E_4 > E_1 = E_3$
c) $E_1 > E_2 > E_3 > E_4$
d) $E_1 > E_3 > E_2 > E_4$