DPP

DAILY PRACTICE PROBLEMS

Class : XIIth **Subject : PHYSICS**
Date : **DPP No. : 6**

Topic :-Electric charges and fields

1. Three condensers each of capacitance $2F$ are put in series. The resultant capacitance is

   a) $6F$ b) $\frac{3}{2}F$ c) $\frac{2}{3}F$ d) $5F$

2. A ball of mass 1 g and charge $10^{-8}C$ moves from a point A. where potential is 600 $volt$ to the point B where potential is zero. Velocity of the ball at the point B is 20 cm/s. The velocity of the ball at the point A will be

   a) 22.8 cm/s b) 228 cm/s c) 16.8 m/s d) $168\ m/s$

3. An electric dipole of moment p is placed in the position of stable equilibrium in uniform electric field of intensity E. It is rotated through an angle θ from the initial position. The potential energy of electric dipole in the final position is

   a) $pE\cos\theta$ b) $pE\sin\theta$ c) $pE(1-\cos\theta)$ d) $-pE\cos\theta$

4. The electric field intensity **E**, due to an electric dipole of moment **p**, at a point on the equatorial line is

   a) Parallel to the axis of the dipole and opposite to the direction of the dipole moment **p**
   b) Perpendicular to the axis of the dipole and is directed away from it
   c) Parallel to the dipole moment
   d) Perpendicular to the axis of the dipole and is directed towards it

5. When a piece of polythene is rubbed with wool, a charge of -2 × 10^{-7} C is developed on polythene. What mass, is transferred to polythene?

   a) 5.69×10^{-19} kg b) 2.25×10^{-19} kg c) 9.63×10^{-19} kg d) 11.38×10^{-19} kg

6. An electron moving with the speed $5 \times 10^6\ m$ per sec is shooted parallel to the electric field of intensity $1 \times 10^3 N/C$. Field is responsible for the retardation of motion of electron. Now evaluate the distance travelled by the electron before coming to rest for an instant (mass of $e = 9 \times 10^{-31}\ Kg$. charge $= 1.6 \times 10^{-19} C$)

a) $7\ m$ b) $0.7\ mm$ c) $7\ cm$ d) $0.7\ cm$

7. The capacitance of a parallel plate capacitor with air as medium is $3\mu F$. With the introduction of a dielectric medium between the plates, the capacitance becomes $15\mu F$. The permittivity of the medium is

a) 5 b) 15

c) $0.44 \times 10^{-10} C^2 N^{-1} m^{-2}$ d) $8.854 \times 10^{-11} C^2 N^{-1} m^{-2}$

8. Two similar spheres having $+q$ and $-q$ charge are kept at a certain distance. F force acts between the two. If in the middle of two spheres, another similar sphere having $+q$ charge is kept, then it experience a force in magnitude and direction as

a) Zero having no direction b) $8F$ towards $+q$ charge

c) $8F$ towards $-q$ charge d) $4F$ towards $+q$ charge

9. A spherical conductor of radius $2m$ is charged to a potential of $120\ V$. It is now placed inside another hollow spherical conductor of radius $6m$. Calculate the potential to which the bigger sphere would be raised

a) $20\ V$ b) $60\ V$ c) $80\ V$ d) $40\ V$

10. In a parallel plate capacitor of capacitance C, a metal sheet is inserted between the plates, parallel to them. If the thickness of the sheet is half of the separation between the plates. The capacitance will be

a) $C/2$ b) $3C/4$ c) $4C$ d) $2C$

11. A parallel plate condenser with oil between the plates (dielectric constant of oil $K = 2$) has a capacitance C. If the oil is removed, then capacitance of the capacitor becomes

a) $\sqrt{2}C$ b) $2C$ c) $\frac{C}{\sqrt{2}}$ d) $\frac{C}{2}$

12. A solid sphere of radius R has a charge Q distributed in its volume with a charge density$\rho = kr^a$, where k and a are constants and $r$is the distance from its centre. If the electric field at $r = \frac{R}{2}$ is$\frac{1}{8}$ times that at $r = R$, find the value of a.

a) 2 b) 3 c) 2.5 d) 0.2

13. Two spherical conductors A and B of radius a and $b(b > a)$ are placed in air concentrically B is given charge $+ Q\ coulomb$ and A is grounded. The equivalent capacitance of these is

a) $4\pi\varepsilon_0 \frac{ab}{b-a}$ b) $4\pi\varepsilon_0(a+b)$ c) $4\pi\varepsilon_0 b$ d) $4\pi\varepsilon_0 \frac{b^2}{b-a}$

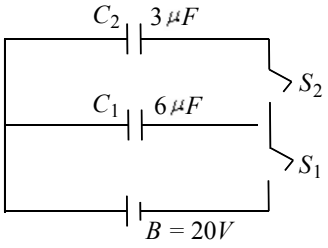
14. A neutral water molecule (H_2O) in it's vapor state has an electric dipole moment of magnitude $6.4 \times 10^{-30}\ C-m$. How far apart are the molecules centres of positive and negative charge
a) $4\ m$ b) $4\ mm$ c) $4\ \mu m$ d) $4\ pm$

15. A point charge q is placed at a distance $a/2$ directly above the centre of a square of side a. The electric flux through the square is
a) q/ε_0 b) $q/\pi\varepsilon_0$ c) $q/4\varepsilon_0$ d) $q/6\varepsilon_0$

16. C,V,U and Q are capacitance, potential difference, energy stored and charge of parallel plate capacitor respectively. The quantities that increases when a dielectric slab is introduced between the plates without disconnecting the battery are
a) V and C b) V and U c) U and Q d) V and Q

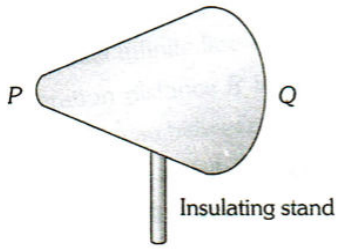
17. The potentials of the two plates of capacitor are $+10V$ and $-10\ V$. The charge on one of the plates is $40\ C$. The capacitance of the capacitor is
a) $2\ F$ b) $4\ F$ c) $0.5\ F$ d) $0.25\ F$

18. In the circuit shown here $C_1 = 6\mu F$, $C_2 = 3\mu F$ and battery $B = 20V$. The switch S_1 is first closed. It is then opened and afterwards S_2 is closed. What is the charge finally on C_2



a) $120\mu C$ b) $80\mu C$ c) $40\mu C$ d) $20\mu C$

19. Figure shows a charged conductor resting on an insulating stand. If at the point P the charge density is σ, the potential is V and the electric field strength is E, what are the values of these quantities at point Q



	Charge Density	Potential	Electric intensity
a)	$>\sigma$	$>V$	$>E$
b)	$>\sigma$	V	$>E$
c)	$<\sigma$	V	E
d)	$<\sigma$	V	$<E$

20. If q is the charge per unit area on the surface of a conductor, then the electric field intensity at a point on the surface is

a) $\left(\frac{q}{\varepsilon_0}\right)$ normal to surface

b) $\left(\frac{q}{2\varepsilon_0}\right)$ normal to surface

c) $\left(\frac{q}{\varepsilon_0}\right)$ tangential to surface

d) $\left(\frac{q}{2\varepsilon_0}\right)$ tangential to surface