DPP

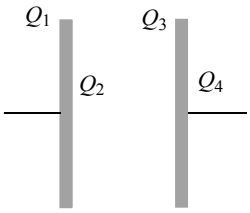
DAILY PRACTICE PROBLEMS

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

Topic :-Electric charges and fields

1. The electric field inside a spherical shell of uniform surface charge density is
   a) Zero
   b) Constant, less than zero
   c) Directly proportional to the distance from the centre
   d) None of the above

2. In an isolated parallel plate capacitor of capacitance C, the four surface have charges Q_1,Q_2,Q_3 and Q_4 as shown. The potential difference between the plates is



   a) $\frac{Q_1+Q_2+Q_3+Q_4}{2C}$ b) $\frac{Q_2+Q_3}{2C}$ c) $\frac{Q_2-Q_3}{2C}$ d) $\frac{Q_1+Q_4}{2C}$

3. A pendulum bob carries a negative charge $-q$ .A positive charge $+q$ is held at the point of support. Then, the time period of the bob is
   a) Greater than $2\pi\sqrt{\frac{L}{g}}$ b) Less than $2\pi\sqrt{\frac{L}{g}}$ c) equal to $2\pi\sqrt{\frac{L}{g}}$ d) Equal to $2\pi\sqrt{\frac{2L}{g}}$

4. $0.2F$ capacitor is charged to 600 V by a battery. On removing the battery, it is connected with another parallel plate condenser of $1F$. The potential decreases to
   a) 100 $volts$ b) 120 $volts$ c) 300 $volts$ d) 600 $volts$

5. Identify the wrong statement in the following. Coulomb's law correctly describes the electric force that
   a) Binds the electrons of an atom to its nucleus
   b) Binds the protons and neutrons in the nucleus of an atom
   c) Binds atoms together to form molecules
   d) Binds atoms and molecules together to form solids

6. An electric dipole is placed in an electric field generated by a point charge
   a) The net electric force on the dipole must be zero
   b) The net electric force on the dipole may be zero
   c) The torque on the dipole due to the field must be zero
   d) The torque on the dipole due to the field may be zero

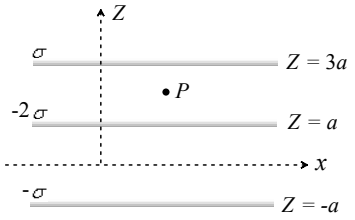
7. A cube of side b has a charge q at each of its vertices. The electric field due to this charge distribution at the centre of this cube will be
   a) q/b^2 b) $q/2b^2$ c) $32q/b^2$ d) Zero

8. Two capacitors of capacitance $3\mu F$ and $6\mu F$ are charged to a potential of 12 V each. They are now connected to each other, with the positive plate of each joined to the negative plate of the other. The potential difference across each will be
   a) 6 $volt$ b) 4 $volt$ c) 3 $volt$ d) Zero

9. There are two metallic spheres of same radii but one is solid and the other is hollow, then
   a) Solid sphere can be given more charge b) Hollow sphere can be given more charge
   c) They can be charged equally (maximum) d) None of the above

10. An infinite line charge produce a field of $7.182 \times 10^8\ N/C$ at a distance of 2 cm. The linear charge density is
    a) $7.27 \times 10^{-4}\ C/m$ b) $7.98 \times 10^{-4}\ C/m$ c) $7.11 \times 10^{-4}\ C/m$ d) $7.04 \times 10^{-4}\ C/m$

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



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

12. A given charge is situated at a certain distance from an electric dipole in the end-on position experiences a force F. If the distance of the charge is doubled, the force acting on the charge will be

a) $2F$ b) $F/2$ c) $F/4$ d) $F/8$

13. A slab of material of dielectric constant K has the same area as the plates of a parallel plate capacitor but has a thickness $\left(\frac{3}{4}\right)d$, where d is the separation of the plates. The ratio of the capacitance C (in the presence of the dielectric) to the capacitance C_0 (in the absence of the dielectric) is

a) $\frac{3K}{K+4}$ b) $\frac{3}{4}K$ c) $\frac{4K}{K+3}$ d) $\frac{4}{3}K$

14. The magnitude of electric field at distance r from an infinitely thin rod having a linear charge density λ is(use Gauss's law)

a) $E = \frac{\lambda}{2\pi\varepsilon_0 r}$ b) $E = \frac{2\lambda}{\pi\varepsilon_0 r}$ c) $E = \frac{\lambda}{4\pi\varepsilon_0 r}$ d) $E = \frac{4\lambda}{\pi\varepsilon_0 r}$

15. When two identical capacitors are in series have $3\mu F$ capacitance and when parallel $12\mu F$. What is the capacitance of each

a) $6\mu\ F$ b) $3\mu\ F$ c) $12\mu\ F$ d) $9\mu\ F$

16. The ratio of the forces between two small spheres with constant charge (a) in air (b) in a medium of dielectric constant K is

a) $1:K$ b) $K:1$ c) $1:K^2$ d) $K^2:1$

17. An electric dipole has a pair of equal and opposite point charges q and $-q$ separated by a distance$2x$. The axis of the dipole is defined as

a) Direction from positive charge to negative charge
b) Direction from negative charge to positive charge
c) Perpendicular to the line joining the two charges drawn at the centre and pointing upward direction
d) Perpendicular to the line joining the two charges drawn at the centre and pointing downward direction

18. If $4 \times 10^2\ eV$ energy is required to moves a charge of $0.25\ coulomb$ between two points. Then what will be the potential difference between them

a) $178\ V$ b) $256\ V$ c) $356\ V$ d) None of these

19. Condenser A has a capacity of $15\mu F$ when it is filled with a medium of dielectric constant 15. Another condenser B has a capacity of $1\pi F$ with air between the plates. Both are charged separately by a battery of 100 V. After charging, both are connected in parallel without the battery and the dielectric medium being removed. The common potential now is

a) 400 V b) 800 V c) 1200 V d) 1600 V

20. A capacitor is charged by a battery and the energy stored is U. The battery is now removed and the separation distance between the plates is doubled. The energy stored now is

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