DPP-2

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1. There are two charges $+10\mu C$ having mass 10 mg and $+5\mu C$ having mass 5 mg. The ratio of their accelerations under coulomb's force acting between them is:
(a) 1 : 2 (b) 1 : 1
(c) 2 : 1 (d) 4 : 1

2. F_g and F_e represents gravitational and electrostatic force respectively between protons situated at a distance $11\mu m$. The ratio of F_g/F_e is of the order of:
(a) 10^{42} (b) 10^{36}
(c) 10^{-36} (d) 10^{-43}

3. A total charge Q is broken in two parts Q_1 and Q_2 and they are placed at a distance *R* from each other. The maximum force of repulsion between them will occur, when:
(a) $Q_2 = \frac{Q}{R}, Q_1 = Q - \frac{Q}{R}$ (b) $Q_2 = \frac{Q}{4}, Q_1 = Q - \frac{2Q}{3}$
(c) $Q_2 = \frac{Q}{4}, Q_1 = \frac{3Q}{4}$ (d) $Q_1 = \frac{Q}{2}, Q_2 = \frac{Q}{2}$

4. Two small spheres each having the charges $+Q$ are suspended by insulating threads of length *L* from a hook. This arrangement is taken in space where there is no gravitational effect, then the angle between the two suspensions and the tension in each will be:
(a) $180^0, \frac{1}{4\pi\varepsilon_0}\frac{Q^2}{(2L)^2}$ (b) $90^0, \frac{1}{4\pi\varepsilon_0}\frac{Q^2}{L^2}$
(c) $180^0, \frac{1}{4\pi\varepsilon_0}\frac{Q^2}{2L^2}$ (d) $180^0, \frac{1}{4\pi\varepsilon_0}\frac{Q^2}{L^2}$

5. Two charges each of $1\mu C$ are at a distance 1 cm apart in vacuum, the force between them is:
(a) 9×10^3 N (b) 90 N
(c) 1.1×10^{-4} N (d) 10^4 N

6. $+2C$ and $+6C$ two charges are repelling each other with a force of 12 N. If each charge is given $-2C$ of charge, then the value of the force will be:
(a) 4 N (Attractive) (b) 4 N (Repulsive)
(c) 8 N (Repulsive) (d) Zero

7. Dielectric constant of pure water is 81. Its permittivity will be in MKS units:
(a) 7.17×10^{-10} (b) 8.86×10^{-12}
(c) 1.02×10^{13} (d) cannot be calculated

8. Two small conducting spheres of equal radius have charges $+10\mu C$ and $-20\mu C$, respectively and placed at a distance *R* from each other experience force F_1. If they are brought in contact and separated to the same distance, they experience force F_2. The ratio of F_1 to F_2 is:
(a) 1 : 8 (b) $-8:1$
(c) 1 : 2 (d) $-2:1$

9. Two charges placed in air repel each other by a force of 10^{-4} N. When oil is introduced between the charges, the force on the charge becomes 2.5×10^{-5}N. The dielectric constant of oil is:
(a) 2.5 (b) 0.25
(c) 2.0 (d) 4.0

10. Two particle of equal mass *m* and charge *q* are placed at a distance of 16 cm. They do not experience any force. The value of $\frac{q}{m}$ is:
(a) 1 (b) $\sqrt{\frac{\pi\varepsilon_0}{G}}$
(c) $\sqrt{\frac{G}{\pi\varepsilon_0}}$ (d) $\sqrt{4\pi\varepsilon_0 G}$

11. An electron is moving round the nucleus of a hydrogen atom in a circular orbit of radius *r*. The coulomb force $\vec{F}$ between the tow is (where $K = \frac{1}{4\pi\varepsilon_0}$):
(a) $-K\frac{e^2}{r^3}\hat{r}$ (b) $K\frac{e^2}{r^3}\vec{r}$
(c) $-K\frac{e^2}{r^3}\vec{r}$ (d) $K\frac{e^2}{r^3}\hat{r}$

12. Two spherical conductors B and C having equal rad and carrying equal charges in then repel each other with a force *F* when kept apart at some distance. A thin spherical conductor having same radius as that of B bt uncharged is brought in contact with B, then brought i contact with C and finally removed away from bot The new force of repulsion between B and C is:

(a) $\frac{F}{4}$ (b) $\frac{3F}{4}$

(c) $\frac{F}{8}$ (d) $\frac{3F}{8}$

13. The charges on two sphere are $+7\mu C$ and $-5\mu C$ respectively. They experience a force *F*. If each of the given and additional charge of $-2\mu C$, the new force attraction will be:

(a) F (b) $F/2$

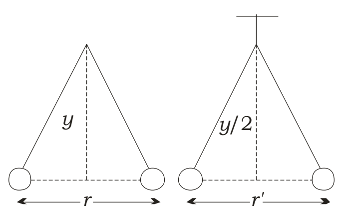
(c) $F/\sqrt{3}$ (d) $2F$

14. The ratio of electrostatic and gravitational forces acting between electron and proton separated by a distance 5×10^{-11} m will be (Charge on electron = 1.6×10^{-19} m mass of electron = 9.1×10^{-31} kg, mass of proton = 1.6×10^{-27} kg, G = 6.7×10^{-11} Nm^2/kg^2):

(a) 2.36×10^{39} (b) 2.36×10^{40}

(c) 2.34×10^{41} (d) 2.34×10^{42}

15. Two pith balls carrying equal charges are suspended from a common point by strings of equal length, the equilibrium separation between them is *r*. Now the strings are rigidly clamped at half the height. The equilibrium separation between the balls now become



(a) $\left(\frac{1}{\sqrt{2}}\right)^2$ (b) $\left(\frac{r}{\sqrt[3]{2}}\right)$

(c) $\left(\frac{2r}{\sqrt{3}}\right)$ (d) $\left(\frac{2r}{3}\right)$

16. Charge q_2 of mass *m* revolves around a statior charge q_1 in a circular orbit of radius r. The orbit periodic time of q_2 would be:

(a) $\left[\frac{4\pi^2mr^3}{kq_1q_2}\right]^{1/2}$ (b) $\left[\frac{kq_1q_2}{4\pi^2mr^3}\right]^{1/2}$

(c) $\left[\frac{4\pi^2mr^4}{kq_1q_2}\right]^{1/2}$ (d) $\left[\frac{4\pi^2mr^2}{kq_1q_2}\right]^{1/2}$

17. Two identical size conducting balls A and B have positive charges q_1 and q_2 respectively but $q_1 \neq q_2$. The balls are brought together so that touch each other and then kept in the original positions. The force between them is:

(a) less than that before the balls touched
(b) greater than that before the balls touched
(c)same as that before the balls touched
(d) zero

18. Two equal point charges each of $3\mu C$ are separated by a certain distance in metres. If they are located at $(\hat{i}+\hat{j}+\hat{k})$ and $(2\hat{i}+3\hat{j}+3\hat{k})$, then the electrostatic force between them is:

(a) 9×10^3 N (b) 9×10^{-3} N

(c) 10^{-3} N (d) 9×10^{-2} N

19. Two identical charges repel each other with a force equal to 10 g. wt when they are 0.6 m a part in an (g = 10 ms^{-2}). The value of each charge is:

(a) $2mC$ (b) 2×10^{-7}

(c) $2nC$ (d) $2\mu C$

20. Two positive ions, each carrying a charge q, are separated by a distance *d*. If F is the force of repulsion between the ions, the number of electrons missing from each ion will be (*e* being the charge on an electron)

(a) $\frac{4\pi\varepsilon_0 Fd^2}{e^2}$ (b) $\sqrt{\frac{4\pi\varepsilon_0 Fd^2}{d^2}}$

(c) $\sqrt{\frac{4\pi\varepsilon_0 Fd^2}{e^2}}$ (d) $\frac{4\pi\varepsilon_0 Fd}{q^2}$

ANSWER

1.	**(a)**	**2.**	**(c)**	**3.**	**(d)**
4.	**(a)**	**5.**	**(b)**	**6.**	**(d)**
7.	**(a)**	**8.**	**(b)**	**9.**	**(d)**
10.	**(d)**	**11.**	**(c)**	**12.**	**(d)**
13.	**(a)**	**14.**	**(a)**	**15.**	**(b)**
16.	**(a)**	**17.**	**(b)**	**18.**	**(b)**
19.	**(d)**	**20.**	**(c)**		