SHAHEEN GROUP OF INSTITUTIONS
Bidar (Head Office)

Class : NEET Repeaters Sub: Physics Worksheet–8 Date: 28-01-2019

Electric Potential and Capacitance–2

1. A thin spherical conducting shell of radius R has a charge q. Another charge Q is placed at the centre of the shell. The electrostatic potential at a point P at a distance R/2 from the centre of the shell is

   (A) $\frac{2Q}{4\pi\varepsilon_0 R}$ (B) $\frac{2Q}{4\pi\varepsilon_0 R} - \frac{2q}{4\pi\varepsilon_0 R}$ (C) $\frac{2Q}{4\pi\varepsilon_0 R} + \frac{q}{4\pi\varepsilon_0 R}$ (D) $\frac{(q+Q)}{4\pi\varepsilon_0}\frac{2}{R}$

2. Two thin wire rings each having a radius R are placed at a distance d apart with their axes coinciding. The charges on the two rings are +Q and –Q. The potential difference between the centers of the two rings is

   (A) zero (B) $\frac{Q}{4\pi\varepsilon_0}\left[\frac{1}{R} - \frac{1}{\sqrt{R^2+d^2}}\right]$ (C) $\frac{QR}{4\pi\varepsilon_0 d^2}$ (D) $\frac{Q}{2\pi\varepsilon_0}\left[\frac{1}{R} - \frac{1}{\sqrt{R^2+d^2}}\right]$

3. Two spherical conductors A and B or radii 1mm and 2mm are separated by a distance of 5cm and are uniformly charged. If the spheres are connected by a conducting wire then in equilibrium condition, the ratio of the magnitude of the electric fields at the surface of spheres A and B is

   (A) 1 : 4 (B) 4 : 1 (C) 1 : 2 (D) 2 : 1

4. An electric charge 10^{-3} μC is placed at the origin (0, 0) of X–Y co-ordinate system. Two points A and B are situated at $(\sqrt{2},\sqrt{2})$ and (2,0) respectively. The potential difference between the points A and B will be

   (A) 4.5 volt (B) 9 volt (C) zero (D) 2 volt

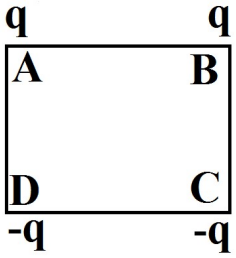
5. Charges are placed on the vertices of a square as shown. Let $\vec{E}$ be the electric field and V the potential at the centre. If the charges on A and B are interchanged with those on D and C respectively, then

   (A) $\vec{E}$ changes, V remains unchanged.

   (B) $\vec{E}$ remains unchanged, V changes.

   (C) both $\vec{E}$ and V change.

   (D) $\vec{E}$ and V remain unchanged.



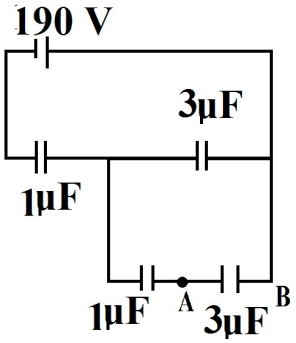
6. In the circuit shown in the figure, the potential difference between A and B is

   (A) 10 V

   (B) 20 V

   (C) 30 V

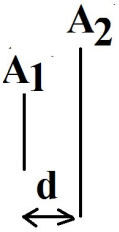
   (D) 40 V



7. Capacitance of a capacitor becomes 4/3 times its original value if a dielectric slab of thickness t = d/2 is inserted between the plates, where d is the separation between the plates of the capacitor. The dielectric constant of the slab is

(A) 2 (B) 3 (C) 4 (D) 5

8. The capacitance of the capacitor of plate areas A_1 and A_2 ($A_1 < A_2$) at a distance d is



(A) $\frac{\varepsilon_0 A_1}{d}$ (B) $\frac{\varepsilon_0(A_1+A_2)}{2d}$

(C) $\frac{\varepsilon_0\sqrt{A_1A_2}}{2d}$ (D) $\frac{\varepsilon_0 A_2}{d}$

9. A parallel plate capacitor with air between the plates has a capacitance of 8pF. What will be the capacitance if the distance between the plates is reduced by half and the space between them is filled with a space substance of dielectric constant 6.

(A) 60 pF (B) 72 pF (C) 84 pF (D) 96 pF

10. Between the plates of a parallel plate capacitor of capacity C, two parallel plates, of the same material and area same as the plate of the original capacitor, are placed. If the thickness of each plate is equal to $1/5^{th}$ of the distance between the plates of the original capacitor, then the capacity of the new capacitor is

(A) $\frac{5}{3}C$ (B) $\frac{3}{5}C$ (C) $\frac{3C}{10}$ (D) $\frac{10C}{3}$

11. Which one of the following methods will reduce the capacitance of a parallel plate capacitor?

(A) Connecting another capacitor in series with this.
(B) Reducing the potential difference between the plates.
(C) Introducing a dielectric slab between the plates.
(D) Introducing a metal plate of suitable thickness.

12. Capacitance (in F) of a spherical conductor with radius 1m is

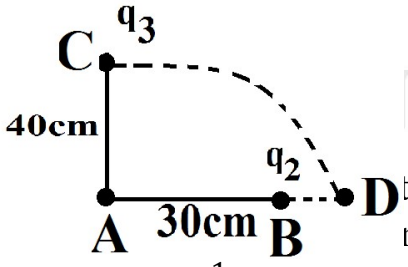
(A) 1.1×10^{-10} (B) 10^{-6} (C) 9×10^{-9} (D) 10^{-3}

13. A sheet of aluminium foil of negligible thickness is introduced between the plates of a capacitor. The capacitance of the capacitor.

(A) decreases (B) remains unchanged (C) becomes infinite (D) increases

14. Two charges q_1 and q_2 are placed 30cm apart, as shown in the figure. A third charge q_3 is moved along the arc of a circle of radius 40cm from C to D. The change in the potential energy of the system is $\frac{q_3}{4\pi\varepsilon_0}k$, where k is

(A) $8q_2$
(B) $6q_1$
(C) $8q_1$
(D) $6q_2$



15. The electr[ic potential at any point on the axis of an electric dipole depends on the distanc[e r of the point from the midpoint of the dipole as

(A) $\propto \frac{1}{x^2}$ (B) $\propto \frac{1}{x^3}$ (C) $\propto \frac{1}{x^4}$ (D) $\propto \frac{1}{x^{3/2}}$

Physics Worksheet–8				Electric Potential and Capacitance–2									28-01-2019
1-C	2-D	3-D	4-C	5-A	6-A	7-A	8-A	9-D	10-A	11-A	12-A	13-B	14-A	15-A