PRERNA EDUCATION
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Chapter 2 Electrostatic Potential and Capacitance

Assignment 2

Class 12

PRERNA EDUCATION

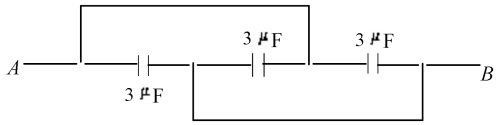
DPP
DAILY PRACTICE PROBLEMS

Class : XIIth **Subject : PHYSICS**
Date : **DPP No. : 2**

Topic :-.ELECTROSTATIC POTENTIAL AND CAPACITANCE

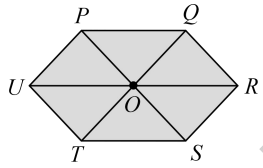
1. Small drops of the same size are charged to V volt each. If n such drops coalesce to form a single large drop, its potential will be
   a) Vn b) V/n c) $Vn^{1/3}$ d) $Vn^{2/3}$

2. The effective capacitance between points A and B is



   a) 9 μF b) 3 μF c) 6 μF d) 1 μF

3. Six charges, three positive and three negative of equal magnitude are to be placed at the vertices of a regular hexagon such that the electric field at O is double the electric field when only one positive charge of same magnitude is placed at R. which of the following arrangements of charges is possible for P, Q, R, S, T and U respectively?

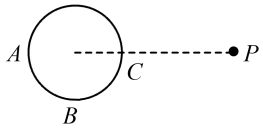


   a) $+,-,+,-,-,+$ b) $+,-,+,-,+,-$ c) $+,+,-,+,-,-$ d) $-,+,+,-,+,-$

4. The plates of a parallel plate capacitor are charged upto 200 V. A dielectric slab of thickness 4 mm is inserted between its plates. Then, to maintain the same potential difference between the plates of the capacitor, the distance between the plates is increased by 3.2 mm. The dielectric constant of the dielectric slab is
   a) 1 b) 4 c) 5 d) 6

5. A 4μF capacitor is charged to 400V and then its plates are joined through a resistance. The heat produced in the resistance is
   a) 0.16 J b) 0.32 J c) 0.64 J d) 1.28 J

6. A hollow conducting sphere is placed in an electric field produced by a point charge placed at P as shown in figure. V_A, V_B, V_c be the potentials at points A, B and C respectively. Then



a) $V_C > V_B$ b) $V_B > V_C$ c) $V_A > V_B$ d) $V_A = V_C$

7. A parallel plate capacitor is made by stacking n equally spaced plates connected alternatively. If the capacitance between any two adjacent plates is C, then the resultant capacitance is

a) $(n-1)C$ b) $(n+1)C$ c) C d) nC

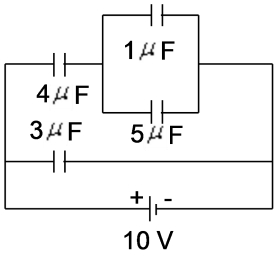
8. There are 10 condensers each of capacity 5 μF. The radio between maximum and minimum capacities obtained from these condenses will be

a) 25 : 5 b) 40 : 1 c) 60 : 3 d) 100 : 1

9. Taking earth to be a metallic spheres, its capacity will approximately be

a) 6.4×10^6F b) 700 F c) 711 μF d) 700 pF

10. For the circuit shown in figure the charge on 4 μF capacitor is

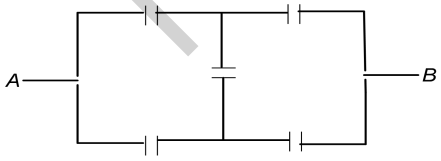


a) 40 μC b) 30 μC c) 24 μC d) 54 μC

11. A solid conducting sphere having a charge Q us surrounded by an uncharged concentric conducting hollow spherical shell. Let the potential difference between the surface of the solid sphere and that of the outer surface of the hollow shell be V. if the shell is now given a charge $-3Q$. the new potential difference between the same two surface is

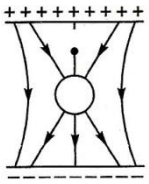
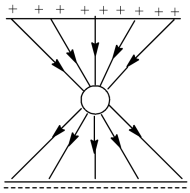
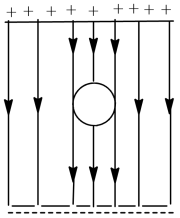
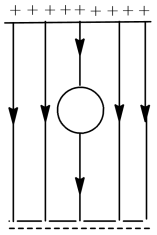
a) V b) $2V$ c) $4V$ d) $-2V$

12. Each capacitor shown in figure is 2 μF. Then the equivalent capacitance between points A and B is



a) 2 μF b) 4 μF c) 6 μF d) 8 μF

13. An uncharged sphere of metal is placed inside a charged parallel plate capacitor. The lines of force will look like

a)  b)  c)  d) 

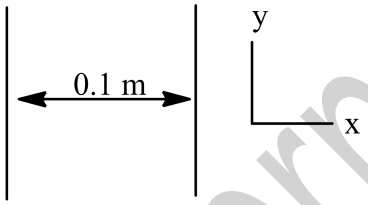
14. Along the x-axis, three charges $\frac{q}{2}, -q\ and \frac{q}{2}$ are placed at $x = 0$, $x = a$ and $x = 2a$ respectively. The resultant electric potential at a point P located at a distance r from the charge $-q(a << r)$ is ($\varepsilon_0$is the permittivity of free space)

a) $\frac{qa}{4\pi\varepsilon_0 r^2}$ b) $\frac{qa^2}{4\pi\varepsilon_0 r^3}$ c) $\frac{q\left(\frac{a^2}{4}\right)}{4\pi\varepsilon_0 r^3}$ d) $\frac{q}{4\pi\varepsilon_0 r}$

15. A parallel plate capacitor is charged. If the plates are pulled apart

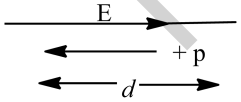
a) The capacitance increases
b) The potential difference increases
c) The total charge increases
d) The charge and potential difference remain the same

16. Two insulating plates are both uniformly charged in such a way that the potential difference between them is $V_2 - V_1 = 20$V. (ie, plate 2 is at a higher potential). The plates are separated by $d = 0.1$m and can be treated as infinitely large. An electron is released from rest on the inner surface of plate 1. What is its speed when it hits plate 2? (e=1.6× 10^{-19}C, $m_0 = 9.11 \times 10^{-31}$kg)



a) 2.65×10^6 ms^{-1} b) 7.02×10^{12} ms^{-1} c) 1.87×10^6 ms^{-1} d) 32×10^{-19} ms^{-1}

17. In the figure, a proton moves a distance d in a uniform electric field **E** as shown in the figure. Does the electric field do a positive or negative work on the proton? Does the electric potential energy of the proton increase or decrease?



a) Negative, increase b) Positive, decrease c) Negative, decrease d) Positive, increase

18. A hollow metal sphere of radius 10 cm is charged such that the potential on its surface becomes 80V. The potential at the centre of the sphere is

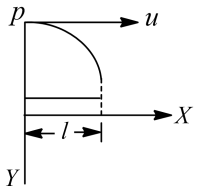
a) 80 V b) 800 V c) 8 V d) Zero

19. A parallel plate condenser with oil (dielectric constant 2) between the plates has capacitance C.

If oil is removed, the capacitance of capacitor becomes

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

20. The electron is projected from a distance d and with initial velocity u parallel to a uniformly charged flat conducting plate as shown in figure. It strikes the plate after travelling a distance l along the direction. The surface charge density of conducting plate is equal to



a) $\frac{2d\varepsilon_0 mu^2}{el^2}$ b) $\frac{2d\varepsilon_0 mu}{el}$ c) $\frac{d\varepsilon_0 mu^2}{el}$ d) $\frac{d\varepsilon_0 mu}{el}$