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Chapter 2 Electrostatic Potential and Capacitance

Assignment 3

Class 12

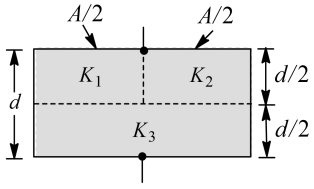
PRERNA EDUCATION

DPP
DAILY PRACTICE PROBLEMS

Class : XIIth | **Subject : PHYSICS**
Date : | **DPP No. : 3**

Topic :-ELECTROSTATIC POTENTIAL AND CAPACITANCE

1. A parallel plate capacitor of area A, plate separation d and capacitance C is filled with three different dielectric materials having dielectric constants K_1, K_2 and K_3 as shown. If a single dieletric material is to be used to have the same capacitance C is this capacitors, then its dielectric constant K is given by



a) $\frac{1}{K}=\frac{1}{K_1}+\frac{1}{K_2}+\frac{1}{2K_3}$ b) $\frac{1}{K}=\frac{1}{K_1+K_2}+\frac{1}{2K_3}$ c) $K=\frac{K_1K_2}{K_1+K_2}+2K_3$ d) $K=K_1+K_2+2K_3$

2. Out of two copper spheres of the same size, x is hollow while y is solid. If they are charged at the same potential, what can be said about the charges on them?
a) Charge on both the spheres is zero b) Charge on both the spheres is equal
c) Sphere y will have more charge d) Sphere x will have more charge

3. A hollow metallic sphere of radius R is given a charge Q. Then, the potential at the centre is
a) Zero b) $\frac{1}{4\pi\varepsilon_0}.\frac{Q}{R}$ c) $\frac{1}{4\pi\varepsilon_0}.\frac{2Q}{R}$ d) $\frac{1}{4\pi\varepsilon_0}.\frac{Q}{2R}$

4. On moving a charge of 20 C by 2cm, 2J of work is done, then the potential difference between the points is
a) 0.1V b) 8V c) 2V d) 0.5V

5. Three capacitors each of capacitance 1 μF are connected in parallel. To the combination, a fourth capacitor of capacitance 1 μF is connected in series. The resultant capacitance of the system is
a) 4 μF b) $(4/3)$μF c) 2 μF d) $(3/4)$μF

6. Number of electric lines of force from 0.5 C if positive charge in a dielectric medium of constant 10 is
a) 5.65×10^{9} b) 1.13×10^{11} c) 9×10^{9} d) 8.85×10^{-12}

7. A capacitor of capacitance 10μF charged to 100V is connected to an uncharged capacitor. The effective potential now is 40 V. The capacitance of uncharged capacitor is
   a) $12\mu F$ b) $15\ \mu F$ c) $25\ \mu F$ d) $30\ \mu F$

8. If dielectric is inserted in charged capacitor (battery removed), then quantity that remains constant is
   a) Capacitance b) Potential c) Intensity d) Charge

9. A uniform electric field pointing in positive x-direction exists in a region. Let A be the origin, B be the point on the x-axis at x=+1 cm and C be the point on the y-axis at y=+1 cm. them the potentials at the points A, B and C satisfy the condition
   a) $V_A < V_B$ b) $V_A > V_B$ c) $V_A < V_C$ d) $V_A > V_C$

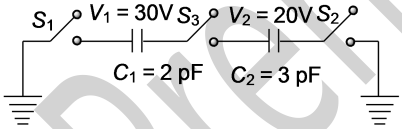
10. A 5.μF capacitor is charged to a potential difference of 800 V and discharged through a conductor. the energy given to the conductor during the discharge is
    a) 1.6×10^{-2} J b) 3.2 J c) 1.6 J d) 4.2 J

11. A dielectric of dielectric constant K is introduced such that half of its area of a capacitor of capacitance C is occupied by it. The new capacity is
    a) $2C$ b) $\frac{C}{2}$ c) $\frac{(1+K)C}{2}$ d) $2C(1+K)$

12. If dielectric constant and dielectric strength be denoted by K and X respectively, then a material suitable for use as a dielectric in a capacitor must have
    a) High K and high X b) High K and low X c) Low K and high X d) Low K and low X

13. Two capacitors each of capacity 2μF are connected in parallel. If they are connected to 100 V battery ,then energy stored in them is
    a) 0.02 J b) 0.04 J c) 0.01 J d) 200 J

14. For the circuit shown figure, which of the following statements is true?



    a) With S_1 closed, $V_1 = 15$ V, $V_2 = 20$ V b) With S_3 closed, $V_1 = V_2 = 20$ V
    c) With $S_1$and, S_3 closed, $V_1 = V_2 = 0$ d) With S_1 and S_3closed, $V_1 = 30$ V, $V_2 = 20$ V

15. An infinite line charge produces a field of 9×10^4 NC^{-1} at a distance of 2 cm. the linear density is
    a) $2 \times 10^{-7}\ Cm^{-1}$ b) $10^{-7}\ Cm^{-1}$ c) $9 \times 10^4\ Cm^{-1}$ d) None of these

16. Three capacitors of capacitance 1μF, 2μF and 3μF are connected in series and a potential difference of 11 V is applied across the combination. Then, the potential difference across the plate of 1μF capacitor is
    a) 2 V b) 4 V c) 1 V d) 6 V

17. Two equally charged small balls placed at a fixed distance experience a force *F.* A similar uncharged ball after touching one of them is placed at the middle point between the two balls. The force experienced by this ball is

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

18. In a capacitor of capacitance 20μF the distance between the plates is 2 mm. If a dielectric slab of width 1 mm and dielectric constant 2 is inserted between the plates , then the new capacitance will be

a) 22 μF b) 26.6 μF c) 52.2 μF d) 13 Mf

19. Electric field on the axis of a small electric dipole at a distance r is $\vec{E}_1$ and $\vec{E}_2$ at a distance of $2r$ on a line of perpendicular dissector. Then

a) $\vec{E}_2 = -\frac{\vec{E}_1}{8}$ b) $\vec{E}_2 = -\frac{\vec{E}_1}{16}$ c) $\vec{E}_2 = -\frac{\vec{E}_1}{4}$ d) $\vec{E}_2 = \frac{\vec{E}_1}{8}$

20. Two identical air core capacitors are connected in series to a voltage source of 15 V. If one of the capacitors is filled with a medium of dielectric constant 4, the new potential across this capacitor is

a) 5 V b) 8 V c) 10 V d) 12 V