DPP

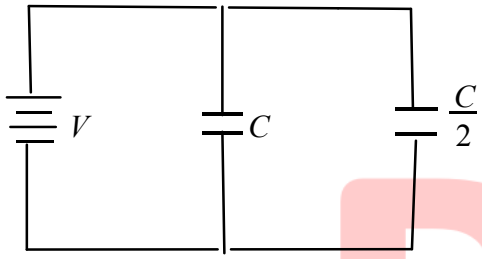
DAILY PRACTICE PROBLEMS

Class : XIIth **Subject : PHYSICS**

Date : **DPP No. : 1**

Topic :-ELECTROSTATIC POTENTIAL AND CAPACITANCE

1. Two condensers, one of capacity C and the other of capacity $\frac{C}{2}$, are connected to a V volt battery , as shown. The work done in charging fully both the condensers is



a) $2CV^2$ b) $\frac{1}{4}\ CV^2$ c) $\frac{3}{4}CV^2$ d)

2. Capacitance of a capacitor made by a thin metal foil is 2μF. If the foil is folded with paper of thickness 0.15 mm, dielectric constant of paper is 2.5 and width of paper is 400 mm, the length of foil will be

a) 0.34 m b) 1.33 m c) 13.4 m d) 33.9 m

3. The capacitance of a parallel plate capacitor with air as medium is 3μF. With the introduction of a dielectric medium between the plates, the capacitance becomes 15μF. The permittivity of the medium is

a) $5C^2N^{-1}m^{-2}$ b) $15C^2N^{-1}m^{-2}$

c) $0.44 \times 10^{-10}C^2N^{-1}m^{-2}$ d) $8.854 \times 10^{-11}C^2N^{-1}m^{-2}$

4. The SI unit of surface integral of electric field is

a) V-m b) V c) $NC^{-1}m$ d) Cm^{-3}

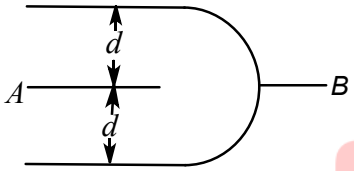
5. A capacitor is charged to store an energy U. the charging battery is disconnected. An identical capacitor is now connected to the first capacitor in parallel. The energy in each of the capacitor is

a) $3\ U/2$ b) U c) $U/4$ d) $U/2$

6. The plates of a parallel plate capacitor are charged up to 100 V. A 2 mm thick plate is inserted between the plates, then to maintain the same potential difference, the distance between the capacitor plated is increase by 1.6 mm. the dielectric constant of the plate, is

a) 5 b) 1.25 c) 4 d) 2.5

7. Two insulated charged conducting spheres of radii 20 cm and 15 cm respecting and having an equal charge of 10 μC are connected by a copper wire and then they are separated. Then
   a) Both spheres will have equal charges
   b) Surface charge density on the 20 cm sphere will be greater than that on the 15 cm sphere
   c) Surface charge density on the 15 cm sphere will be greater than that on the 20 cm sphere
   d) Surface charge density on the two sphere will be equal
8. A square of side a has charge Q at its centre and charge q at one of the corners. The work required to be done in moving the charge q from the corner to the diagonally opposite corner is
   a) Zero
   b) $\frac{Qq}{4\pi\varepsilon_0 a}$
   c) $\frac{Qq\sqrt{2}}{4\pi\varepsilon_0 a}$
   d) $\frac{Qq}{2\pi\varepsilon_0 a}$
9. The capacitance of an isolated conducting sphere of radius R is proportional to
   a) R^{-1}
   b) R^2
   c) R^{-2}
   d) R
10. Three plates of common surface area A are connected as shown. The effective capacitance will be



   a) $\frac{\varepsilon_0 A}{d}$
   b) $\frac{3\varepsilon_0 A}{d}$
   c) $\frac{3}{2}\frac{\varepsilon_0 A}{d}$
   d) $\frac{2\varepsilon_0 A}{d}$
11. The electric potential at centre of metallic conducting sphere is
   a) Zero
   b) Half from potential at surface of sphere
   c) Equal from potential at surface of sphere
   d) Twice from potential at surface of sphere
12. Two insulated metal spheres of adii 10 cm and 15 cm charged to a potential of 150V and 100 V respectively are connected by means of a metallic wire. What is the charge on the first sphere?
   a) 2 esu
   b) 4 esu
   c) 6 esu
   d) 8 esu
13. A large insulated sphere of radius r charged with Q units of electricity is placed in contact with a small insulated uncharged sphere of radius r' and in then separated. The charge on smaller sphere will now be
   a) $Q(r + r')$
   b) $\frac{Qr'}{r' + r}$
   c) $Q(r - r')$
   d) $\frac{Q}{r' + r}$
14. An electric charge 10^{-3}μC is placed at the origin (0, 0) of X-Y coordinate 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) 9V
   b) Zero
   c) 2V
   d) 4.5V
15. The work of electric field done during the displacement of a negatively charged particle towards a fixed positively charged particle is 9 J. As a result the distance between the charges has been decreased by half. What work is done by the electric field over the first half of this distance?
   a) 3 J
   b) 6 J
   c) 1.5 J
   d) 9 J
16. The electric flux from a cube of edge l is ϕ. What will be its value if edge of cube is made 2 l and charge enclosed is halved

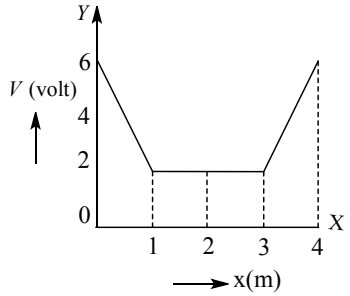
a) $\phi/2$ b) $2\,\phi$ c) $4\,\phi$ d) $5\,\phi$

17. The displacement of a charge Q in the electric field $\boldsymbol{E} = e_1\hat{\boldsymbol{i}} + e_2\hat{\boldsymbol{j}} + e_3\hat{\boldsymbol{k}}$ is $\boldsymbol{r} = a\hat{\boldsymbol{i}} + b\hat{\boldsymbol{j}}$. The work done is

a) $Q(ae_1 + be_2)$ b) $Q\sqrt{(ae_1)^2 + (be_2)^2}$

c) $Q(e_1 + e_2)\sqrt{a^2 + b^2}$ d) $Q\left(\sqrt{e_1^2 - e_2^2}\right)(a + b)$

18. The variation of electric potential with distance from a fixed point is shown in figure. What is the value of electric field at x=2 m.



a) Zero b) $6/2$ c) $6/1$ d) $6/3$

19. A spherical charged conductor has surface density of charge = σ, and electric field intensity on its surface is E. If radius of surface is doubled, point σ unchanged, what will be electric field intensity on the new sphere?

a) $E/2$ b) $2\,E$ c) $E/4$ d) E

20. A 100 eV electron is fired directly towards a large metal plate having surface charge density $-2 \times 10^{-6}\,\text{cm}^{-2}$. The distance from where the electrons be projected so that it just fails to strike the plate is

a) 0.22mm b) 0.44mm c) 0.66mm d) 0.88mm