

## **Chapter 2 Electrostatic Potential and**

## **Capacitance**

### **Assignment 4**

### **Class 12**

# PRERNA EDUCATION

## DPP

DAILY PRACTICE PROBLEMS

Class : XII<sup>th</sup>

Date :

Subject : PHYSICS

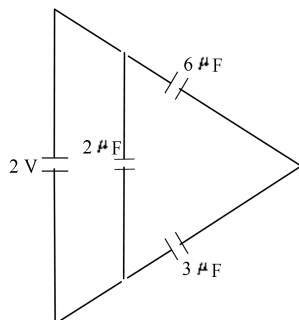
DPP No. : 4

### Topic :- ELECTROSTATIC POTENTIAL AND CAPACITANCE

1. If the potential of a capacitor having capacity  $6\mu\text{F}$  is increased from  $10\text{ V}$  to  $20\text{ V}$ , then increase in its energy is

a)  $12 \times 10^{-6}\text{ J}$       b)  $9 \times 10^{-4}\text{ J}$       c)  $4.5 \times 10^{-6}\text{ J}$       d)  $2.25 \times 10^{-6}\text{ J}$

2. The total energy stored in the condenser system shown in the figure will be



a)  $2\mu\text{J}$       b)  $4\mu\text{J}$       c)  $8\mu\text{J}$       d)  $16\mu\text{J}$

3. Two free protons are separated by a distance of  $1\text{ \AA}$ . If one proton is kept at rest and the other is released, the kinetic energy of second proton when at infinite separation is

a)  $23.0 \times 10^{-19}\text{ J}$       b)  $11.5 \times 10^{-19}\text{ J}$       c)  $2.3 \times 10^{-19}\text{ J}$       d) Zero

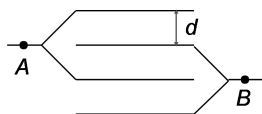
4. The work done in bringing a unit positive charge from infinity distance to a point at distance  $X$  from a positive charge  $Q$  is  $W$ . Then, the potential  $\phi$  at the point is

a)  $\frac{WQ}{X}$       b)  $W$       c)  $\frac{W}{Q}$       d)  $WQ$

5. An electric field is given by  $\vec{E} = (y\hat{i} + x\hat{j})\text{ m NC}^{-1}$ . The work done in moving a  $1\text{ C}$  charge from  $\vec{r}_A = (2\hat{i} + 2\hat{j})\text{ m}$  to  $\vec{r}_B = (4\hat{i} + 2\hat{j})\text{ m}$  is

a)  $+8\text{ J}$       b)  $+4\text{ J}$       c) Zero      d)  $-4\text{ J}$

6. The equivalent capacity between points  $A$  and  $B$  in figure will be, while capacitance of each capacitor is  $3\mu\text{F}$ .

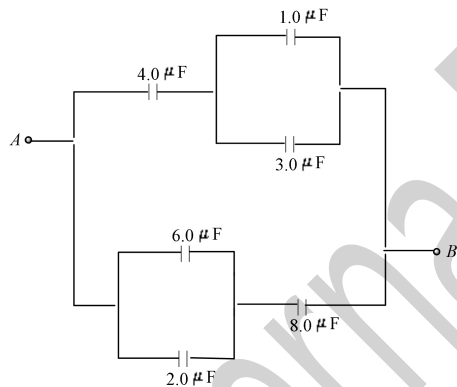


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- a)  $2 \mu\text{F}$                       b)  $4 \mu\text{F}$                       c)  $7 \mu\text{F}$                       d)  $9 \mu\text{F}$
7. 27 identical drops of mercury are charged simultaneously to the same potential of 10 V each. Assuming drops to be spherical, if all the charged drops are made to combine to form one large drop, then the potential of larger drop would be  
a) 45 V                      b) 135                      c) 270 V                      d) 90 V
8. A soap bubble is charged to a potential of 16V. Its radius is, then doubled. The potential of the bubble now will be  
a) 16V                      b) 8V                      c) 4V                      d) 2V
9. A  $10 \mu\text{F}$  capacitor is charges to 500 V and its plates are joined together through a resistance of  $10 \Omega$ . The heat produced in the resistance is  
a) 500 J                      b) 125 J                      c) 250 J                      d) 1.25 J
10. Work done in carrying a charge  $Q'$  once round the circle of radius  $r$  with a charge  $Q$  at the centre is  
a)  $\frac{1}{4\pi\epsilon_0} \frac{Q}{r}$                       b)  $\frac{1}{4\pi\epsilon_0} \frac{QQ'}{r}$                       c) Zero                      d)  $\frac{QQ'}{2r}$
11. An automobile spring extends 0.2 m for 5000 N load. The ratio of potential energy stored in this spring when it has been compressed by 0.2 m to the potential energy stored in a  $10\mu\text{F}$  capacitor at a potential difference of 10000 V will be  
a) 1/4                      b) 1                      c) 1/2                      d) 2
12. A parallel plate capacitor of capacitance 100 pF is to be constructed by using paper sheets of 1 mm thickness as dielectric. If the dielectric constant of paper is 4, the number of circular metal foils of diameter 2 cm each required for the purpose is  
a) 40                      b) 20                      c) 30                      d) 10
13. Two capacitor of capacity  $6\mu\text{F}$  and  $12\mu\text{F}$  in series are connected by potential of 150 V. the potential of capacitor of capacity  $12\mu\text{F}$  will be  
a) 25 V                      b) 50 V                      c) 100 V                      d) 150 V
14. A parallel plate capacitor or capacity  $C_0$  is charged to a potential  $V_0$ .  
I. The energy stored in the capacitor when the battery is disconnected and the plate separation is doubled is  $E_1$ .  
II. The energy stored in the capacitor when the charging battery is kept connected and the separation between the capacitor plates is doubled is  $E_2$ . Then  $\frac{E_1}{E_2}$  value is  
a)  $\frac{4}{1}$                       b)  $\frac{3}{2}$                       c) 2                      d)  $\frac{1}{2}$
15. The potential at a point  $P$  which is forming a corner of a square of side 93mm with charges,  $Q_1 = 33 \text{ nC}$ ,  $Q_2 = -51 \text{ nC}$ ,  $Q_3 = 47 \text{ nC}$  located at the other three corners is nearly  
a) 16kV                      b) 4kV                      c) 400V                      d) 160V

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16. If the plates of a parallel plate capacitor are not equal in area, then quantity of charge
- On the plates will be same but nature of charge will differ
  - On the plates as well as nature of charge will be different
  - On the plates will be different but nature of charge will be same
  - As well as nature of charge will be same
17. Two capacitors of capacitance  $2 \mu\text{F}$  and  $4 \mu\text{F}$  respectively are connected in series. The combination is connected across a potential difference of  $10 \text{ V}$ . The ratio of energies stored by capacitors will be
- $1 : \sqrt{2}$
  - $2 : 1$
  - $1 : 4$
  - $4 : 1$
18. A  $20 \mu\text{F}$  capacitor is connected to  $45 \text{ V}$  battery through a circuit whose resistance is  $2000 \Omega$ . What is the final charge on the capacitor?
- $9 \times 10^{-4} \text{ C}$
  - $9.154 \times 10^{-4} \text{ C}$
  - $9.8 \times 10^{-4} \text{ C}$
  - None of these
19. The equivalent capacitance between points  $A$  and  $B$  for the combination of capacitors shown in figure, where all capacitances are in microfarad is



- $6.0 \mu\text{F}$
  - $4.0 \mu\text{F}$
  - $2.0 \mu\text{F}$
  - $3.0 \mu\text{F}$
20. An air filled parallel plate capacitor has a capacity of  $2 \text{ pF}$ . The separation of the plates is doubled and the interspace between the plates is filled with wax. If the capacity is increased to  $6 \text{ pF}$ , the dielectric constant of wax is
- 2
  - 3
  - 4
  - 6