

CLASS : XII

## ST. LAWRENCE HIGH SCHOOL A JESUIT CHRISTIAN MINORITY INSTITUTION

## SOLUTION TO WORK SHEET 9

## Subject : PHYSICS

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Date : 15.5.20

 $1 \times 15 = 15$ 

	Topic : Parallel plate capacitor, series & parallel combination,
Chapter : Electrostatics	spherical capacitor when outer shell is earthed.

## Multiple Choice Question :

- 1. Dimensionl formula of capacitance is (a)  $[M^{-1} L^{-2} T^4 A^2]$  (b)  $[M L^{-2} T^4 A^2]$  (c)  $[M^{-1} L^2 T^{-4} A^2]$  (d)  $[M L^{-2} T^{-4} A^2]$ Ans : (a)  $[M^{-1} L^{-2} T^4 A^2]$
- 2. Each plate of a parallel plate capacitor has charge  $Q_0$  (in magnitude), when connected to a battery. What will be the magnitude of charge on each plate of this capacitor if dielectric of dielectric constant 6 is introduced between the plates of the capacitor?

(a) 
$$\frac{Q_0}{6}$$
 (b)  $6 Q_0$  (c)  $Q_0$  (d)  $12 Q_0$   
Ans. : (b)  $6 Q_0$ 

- 3. If the distance between two plates of a parallel plate capacitor is doubled, its capacitance.
  (a) increases 2 times
  (b) decreases 2 times
  (c) increases 4 times
  (d) decreases 4 times
  Ans. : (b) decreases 2 times
- 4. A and B are two concentric metallic hollow spheres. If A is given a charge q while B is earthed, then
  - (a) charge density of A and B are same
  - (b) field inside and outside *A* is zero
  - (c) field between A and B is not zero.
  - (d) field inside and outside *B* is zero

Ans. : (c) field between A and B is not zero.



5. A parallel-plate capacitor has circular plates of radius 8 cm and plate separation 1 mm. What will be the charge on the plates if a potential difference of 100V is applied?

(a)  $1.78 \times 10^{-8} C$  (b)  $1.78 \times 10^{-5} C$  (c)  $4.3 \times 10^{4} C$  (d)  $2 \times 10^{-9} C$ Ans. : (a)  $1.78 \times 10^{-8} C$ 

6. What is the value of capacitance if the very thin metallic plate is introduced between two parallel plates of area *A* and separated at distance *d*?

(a)  $\varepsilon_0 A/d$  (b)  $\frac{2\varepsilon_0 A}{d}$  (c)  $\frac{4\varepsilon_0 A}{d}$  (d)  $\frac{\varepsilon_0 A}{2d}$ Ans. : (a)  $\varepsilon_0 A/d$ 

- 7. The plates of a parallel plate capacitor are not exactly parallel. The surface charge density
  - (a) is lower at the closer end.
    (b) will not uniform
    (c) each plate will have the same potential at every point
    (d) Both (b) and (c).

8. The graph shows the variation of voltage V across the plates of two capacitors A and B versus increase of charge Q stored in them. Which of the capacitors has higher capacitance?



(a) Capacitor A(b) Capacitor B(c) Both (a) and (b)(d) None of theseAns. : (a) Capacitor A

9. A parallel plate air capacitor has a capacitance  $18 \,\mu$  F. If the distance between the plates is tripled and a dielectric medium is introduced, the capacitance becomes  $72 \,\mu$  F. The dielectric constant of the medium is

(a) 4 (b) 9 (c) 12 (d) 2

Ans. : (c) 12

- 10. Three capacitors each of capacity  $4\mu$ F are to the connected in such a way that the effective capacitance is  $6\mu$ F. This can be done by
  - (a) connecting two in series and one in parallel
  - (b) connecting two in parallel and one in series
  - (c) connecting all of them in series
  - (d) connecting all of them in parallel

Ans. : (a) connecting two in series and one in parallel.

11. In the circuit shown in the figure, the potential difference across the 4.5  $\mu$ F capacitor is



Ans. : (d) 8 V

- 12. Three capacitors each of capacitance 9 pF are connected in series. What is the potential difference across each capacitor, if the combination is connected to a 120V supply?
  - (a) 40V
     (b) 60V
     (c) 80V
     (d) 50V

     Ans. : (a) 40V

13. A parallel plate capacitor is filled with two dielectrics as shown in the Fig. Its capacity has ratio with capacity without dielectris as



Ans. : (b)  $\frac{K_1 + K_2}{2}$ 

14. Two condensers  $C_1$  and  $C_2$  in a circuit are joined as shown in the Fig. The potential of point A is  $V_1$  and that of B is  $V_2$ . The potential of point D will be



- 15. A800  $\mu$  F capacitor is charged at the steady rate of 50  $\mu$  Cs<sup>-1</sup>. How long will it take to raise its potential to 10V?
  - (a) 160s (b) 50s (c) 10s (d) 500s
  - Ans. : (a) 160s

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