

ELECTROSTATICS POTENTIAL AND CAPACITANCE

Q 1. A hollow metal sphere of radius 5 cm is charged such that the potential on its surface is 10 V. The potential at the centre of the sphere is

(a) zero (b) 10 V (c) the same as that at a point 5 cm away from the surface (d) the same as that at a point 25 cm away from the surface

Q 2. Two equal negative charges $-q$ are fixed at points $(0, a)$ and $(0, -a)$ on the y -axis. A positive charge Q is released from rest at a point $(2a, 0)$ on the x -axis. The charge Q will

(a) execute simple harmonic motion about the origin (b) move to the origin and remain at rest there. (c) move to infinity (d) execute oscillatory but not simple harmonic motion.

Q 3. Four capacitors, each of capacitance $50 \mu\text{F}$ are connected as shown in Fig. If the voltmeter reads 100 V, the charge on each capacitor is.

(a) $2 \times 10^{-3} \text{ C}$ (b) $5 \times 10^{-3} \text{ C}$ (c) 0.2 C (d) 0.5 C

Q 4. Three point charges $4q$, Q and q are placed in a straight line of length l at points distant $l/2$ and l respectively. The net force on charge q is zero. The value of Q is

(a) $-q$ (b) $-2q$ (c) $1/2 q$ (d) $4q$

Q 5. Two positive point charges of 12 and 8 microcoulombs respectively are placed 10 cm apart in air. The work done to bring them 4 cm closer is

(a) zero. (b) 3.8 J (c) 4.8 J (d) 5.8 J

6. _____ field is associated with the capacitor.

- A. Electric
- B. Magnetic
- C. Both (a) and (b)
- D. None of the above

7. In a cable capacitor, voltage gradient is maximum at the surface of the

- A. earth
- B. conduction
- C. sheath
- D. insulator

8. The time constant of an R-C circuit is defined as the time during which capacitor charging voltage actually rises to _____ percent of its value.

- A. 37, initial
- B. 62, initial

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- C. 62, final
- D. 37, final

9. "The surface integral of the normal component of the electric displacement D over any closed surface equals the charge enclosed by the surface". The above statement is associated with

- A. Gauss's law
- B. Kirchhoff's law
- C. Faraday's law
- D. Lenz's law

10. "The total electric flux through any closed surface surrounding charges is equal to the amount of charge enclosed". The above statement is associated with

- A. Coulomb's square law
- B. Gauss's law
- C. Maxwell's first law
- D. Maxwell's second law

11. 1 volt/meter is same as

- A. 1 meter/coulomb
- B. 1 newton meter
- C. 1 newton/meter
- D. 1 joule/coulomb

12. A capacitance is a circuit component that opposes the change in circuit

- A. current
- B. voltage
- C. impedance
- D. none of the above

13. A capacitance of 100 fF is connected in series with a resistance of 8000 Ω . The time constant of the circuit is

- A. 0.2 s
- B. 0.4 s
- C. 0.6 s
- D. 0.8 s

14. A capacitor charged to 200 V has 2000 μC of charge. The value of capacitance will be

- A. 10 F
- B. 10 μF
- C. 100 nF
- D. 1000 μF

15. A capacitor consists of

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- A. two insulators separated by a conductor
- B. two conductors separated by an insulator
- C. two insulators only
- D. two conductors only

16. A capacitor consists of two

- A. ceramic plates and one mica disc
- B. insulators separated by a dielectric
- C. silver-coated insulators
- D. conductors separated by an insulator

17. A capacitor having capacitance of 5 μF is charged to a potential difference of 10,000 V. The energy stored in the capacitor is

- A. 50 joules
- B. 150 joules
- C. 200 joules
- D. 250 joules

18. A capacitor in a circuit became hot and ultimately exploded due to wrong connections, which type of capacitor it could be?

- A. Paper capacitor
- B. Ceramic capacitor
- C. Electrolytic capacitor
- D. Any-of the above

19. A capacitor stores 0.24 coulombs at 10 volts. Its capacitance is

- A. 0.024 F
- B. 0.12 F
- C. 0.6 F
- D. 0.8 F

20. A condenser suitable for D.C. only is

- A. metallic plate variable gang condenser
- B. metallic paper capacitor
- C. oil impregnated paper condenser
- D. poled aluminium electrolytic condenser

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ANSWERS-

1.(b) 2. (d) 3. (b) 4. (a) 5. (d) 6.(A) 7.(B) 8.(B) 9.(A) 10.(B) 11.(C) 12.(C) 13.(D)
14.(B) 15.(B) 16.(D) 17.(D) 18.(C) 19.(A) 20.(D)