JEE

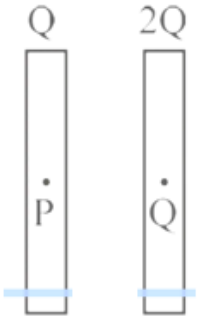
Prayas JEE (2025)

Physics

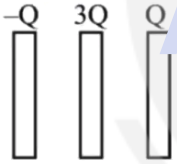
Capacitor

DPP: 1

Q1 Two large parallel conducting sheets (placed at finite distance) are given charges Q and $2Q$ respectively. Find out charges appearing on all the surfaces.



Q2 Figure shows three larges metallic plates with charges $-\mathrm{Q}, 3\mathrm{Q}$ and Q respectively. Determine the final charges on all the surfaces.



Q3 The energy of a charged capacitor resides in
(A) The electric field only
(B) The magnetic field only
(C) Both the electric and magnetic field
(D) Neither in electric nor magnetic field

Q4 The energy of a charged capacitor is given by the expression (q = charge on the conductor and C = its capacity)
(A) $\frac{\mathrm{q}^2}{2\mathrm{C}}$ (B) $\frac{\mathrm{q}^2}{\mathrm{C}}$
(C) $2\mathrm{qC}$ (D) $\frac{\mathrm{q}}{2\mathrm{C}^2}$

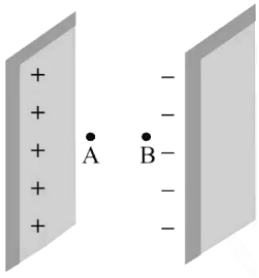
Q5 The energy stored in a condenser of capacitor C which was been raised to a potential V is given by
(A) $\frac{1}{2}\mathrm{CV}$ (B) $\frac{1}{2}\mathrm{CV}^2$
(C) CV (D) $\frac{1}{2\ \mathrm{VC}}$

Q6 64 drops each having the capacity C and potential V are combined to form a big drop. If the charge on the small drop is q, then the charge on the big drop will be
(A) 2q (B) 4q
(C) 16q (D) 64q

Q7 Force of attraction between the plates of parallel plate capacitor is
(A) $\frac{q^2}{2\varepsilon_0 AK}$
(B) $\frac{q^2}{\varepsilon_0 AK}$
(C) $\frac{q}{2\varepsilon_0 A}$
(D) $\frac{q^2}{2\varepsilon_0 A^2 K}$

Q8 The force between the plates of a parallel plates capacitor of capacitance C and distance of separation of the plates d with a potential difference V between the plates, is
(A) $\frac{CV^2}{2d}$
(B) $\frac{C^2V^2}{2d^2}$
(C) $\frac{C^2V^2}{d^2}$
(D) $\frac{V^2d}{C}$

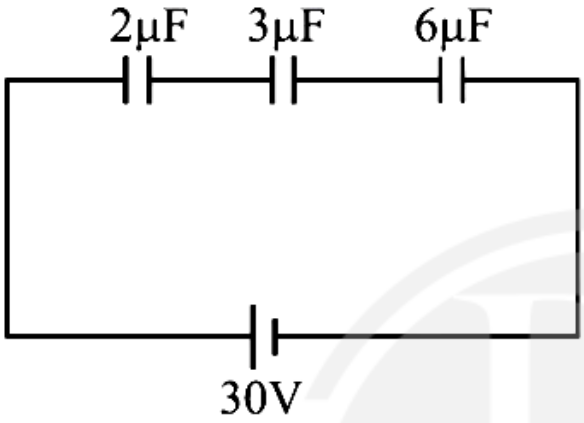
Q9 Two protons A and B are placed in space between plates of a parallel capacitor charged upto V volts. Forces on protons are $\mathrm{F_A}$ and $\mathrm{F_B}$, then



(A) $\mathrm{F_A} > \mathrm{F_B}$

(B) $\mathrm{F_A} < \mathrm{F_B}$
(C) $\mathrm{F_A} = \mathrm{F_B}$
(D) Nothing can be said

Q10 Three initially uncharged capacitors are connected in series as shown in circuit with a battery of emf $30\ \mathrm{V}$. Find out following
(i) Charge flow through the battery
(ii) Potential energy in $3\mu\mathrm{F}$ capacitor
(iii) $\mathrm{U_{total}}$ in capacitors



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Answer Key

Q1 $\left(+\frac{3Q}{2}, -\frac{Q}{2}; +\frac{Q}{2}, +\frac{3Q}{2}\right)$

Q2 $\left(+\frac{3Q}{2}, -\frac{5Q}{2}; +\frac{5Q}{2}, +\frac{Q}{2}; -\frac{Q}{2}, +\frac{3Q}{2}\right)$

Q3 (A)

Q4 (A)

Q5 (B)

Q6 (D)

Q7 (A)

Q8 (A)

Q9 (C)

Q10 $(i)\ 30\ \mu C\ (ii)\ 150\ \mu J\ (iii)\ 450\ \mu J$