

Prayas JEE (2025)

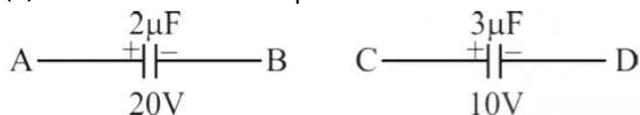
Physics

Capacitor

DPP: 5

Q1 Find out the following if A is connected with C and B is connected with D .

- (i) How much charge flows in the circuit.
- (ii) How much heat is produced in the circuit.

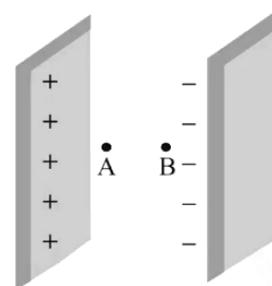


- Q2** In a charged capacitor, the energy resides
- (A) The positive charges
 - (B) Both the positive and negatives charges
 - (C) In the field between the plates
 - (D) Around the edge of the capacitor plates

- Q3** 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) $64q$

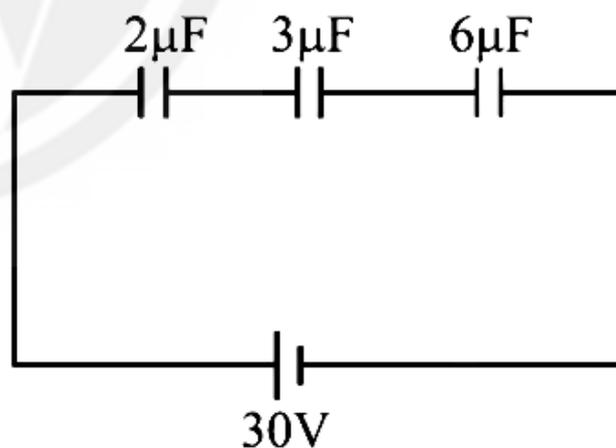
- Q4** Force of attraction between the plates of parallel plate capacitor is
- (A) $\frac{q^2}{2\epsilon_0 AK}$
 - (B) $\frac{q^2}{\epsilon_0 AK}$
 - (C) $\frac{q}{2\epsilon_0 A}$
 - (D) $\frac{q^2}{2\epsilon_0 A^2 K}$

- Q5** Two protons A and B are placed in space between plates of a parallel capacitor charged upto V volts. Forces on protons are F_A and F_B , then



- (A) $F_A > F_B$
- (B) $F_A < F_B$
- (C) $F_A = F_B$
- (D) Nothing can be said

- Q6** Three initially uncharged capacitors are connected in series as shown in circuit with a battery of emf 30 V . Find out following
- (i) Charge flow through the battery
 - (ii) Potential energy in $3\mu\text{F}$ capacitor
 - (iii) U_{total} in capacitors



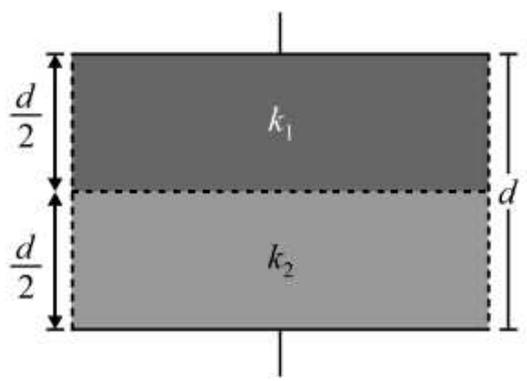
- Q7** Two dielectric slabs of constant k_1 and k_2 have been filled in between the plates of a capacitor as shown below. What will be the capacitance of the capacitor:



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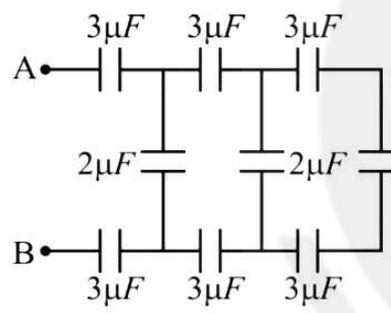
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- (A) $\frac{2\epsilon_0 A}{d} (k_1 + k_2)$
- (B) $\frac{2\epsilon_0 A}{d} \left(\frac{k_1 + k_2}{k_1 \times k_2} \right)$
- (C) $\frac{4\epsilon_0 A}{d} \left(\frac{k_1 \times k_2}{k_1 + k_2} \right)$
- (D) $\frac{2\epsilon_0 A}{d} \left(\frac{k_1 \times k_2}{k_1 + k_2} \right)$

Q8 The resultant capacitance between A and B in the following figure is equal to



- (A) $1 \mu F$
- (B) $3 \mu F$
- (C) $2 \mu F$
- (D) $1.5 \mu F$

Q9 A parallel plate capacitor has plates of area 4 m^2 separated by distance of 0.5 mm . The capacitor is connected across a cell of emf 100 V .

- (a) Find the capacitance, charge and energy stored in the capacitor.
- (b) A dielectric slab of thickness 0.5 mm is inserted inside this capacitor after it has been disconnected from the cell. Find the answer to part (a) if $k = 3$.

Q10 If a dielectric slab of thickness t and area A is inserted in between the plates of a parallel

plates capacitor of plate area A and distance between the plates $d (d > t)$ then find out capacitance of system. What do you predict about the dependence of capacitance on location of slab?



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Answer Key

Q1 (i) 12 uC
(ii) 60 uJ

Q2 C

Q3 D

Q4 A

Q5 C

Q6 (i) $30 \mu\text{C}$ (ii) $150 \mu\text{J}$ (iii) $450 \mu\text{J}$

Q7 D

Q8 A

Q9 (a) $C = 7.08 \times 10^{-8} \text{ F}$, $Q = 7.08 \times 10^{-6} \text{ C}$, $U = 3.54 \times 10^{-4} \text{ J}$

(b) $C = 2.124 \times 10^{-7} \text{ F}$, $Q = 7.08 \times 10^{-6} \text{ C}$, $U = 118 \times 10^{-6} \text{ J}$

Q10
$$\frac{\epsilon_0 A}{d - t \left(1 - \frac{1}{k}\right)}$$



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