Physicsaholics

DPP – 2 (Capacitor)

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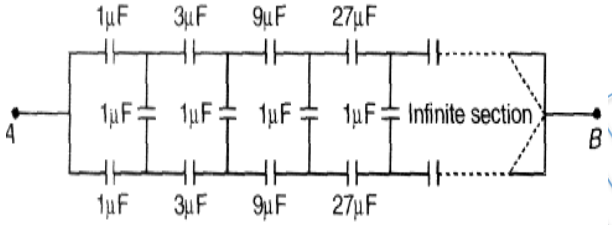
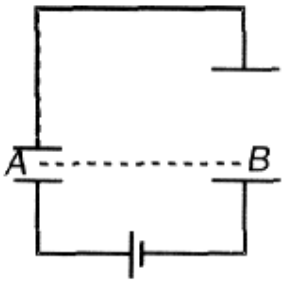
Q 1. What is equivalent capacitance of circuit between points A and B?



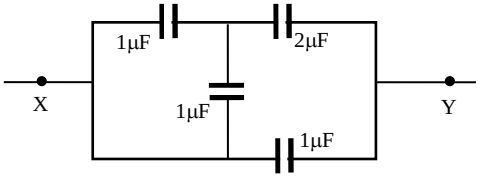
(a) 2/3 μF
(b) 4/3 μF
(c) Infinite
(d) $(1+\sqrt{3})\mu F$

Q 2. Two parallel plate capacitors with same area of cross-section but different distance between plates are connected as shown in figure.



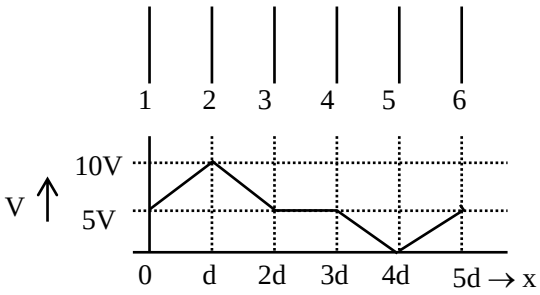
(a) $E_A > E_B$ (b) $E_A = E_B$
(c) $V_A > V_B$ (d) $V_A < V_B$

Q 3. The figure shows a circuit of four capacitors. The effective capacitance between X and Y is



(a) 2 μF (b) 1 μF
(c) 3 μF (d) 1.5 μF

Passage (Q.4 TO Q.6)
The V verses x plot for six identical metal plates of cross-sectioned area A is shown. The plates are placed with separation d



Q 4. Equivalent capacitance between 2 & 5 is-

(A) $\frac{2\varepsilon_0 A}{d}$ (B) $\frac{\varepsilon_0 A}{d}$

(C) $\frac{3\varepsilon_0 A}{d}$ (D) $\frac{4\varepsilon_0 A}{d}$

Q 5. Total charge on plate 2 is –

(a) $\frac{10\varepsilon_0 A}{d}$ (b) $\frac{5}{3}\frac{\varepsilon_0 A}{d}$

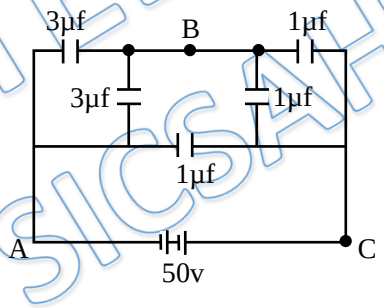
(c) $\frac{4}{3}\frac{\varepsilon_0 A}{d}$ (d) None of these

Q 6. Ratio of charge on plate 2 to plate 5 is $|Q_2 : Q_5|$ is -

(a) 2 : 1 (b) 3 : 1

(c) 1 : 1 (d) None of these

Q 7. In the circuit diagram shown below :



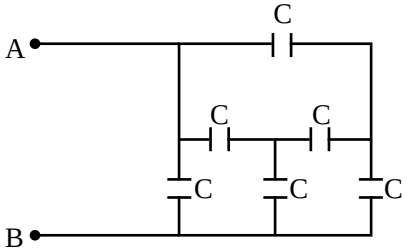
(a) The effective capacity between A and C is $\frac{3}{2}$μf

(b) The effective capacity between A and C is $\frac{5}{2}$μf

(c) The potential difference between A and B in steady state is $\frac{75}{2}$ volt

(d) The potential difference between B and C in steady state is $\frac{75}{2}$ volt

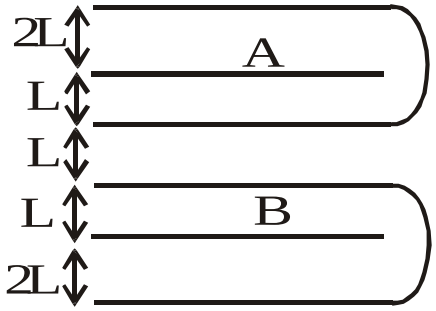
Q 8. The equivalent capacitance between point A and B is –



(a) C/4 (b) C/2

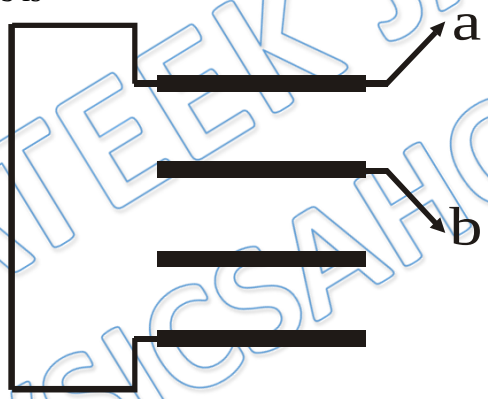
(c) C (d) 2C

Q 9. In the arrangement shown, all plates have equal area. The amount of spacing between plates is mentioned. Find the equivalent capacitance of the system between A and B if $C = \frac{\varepsilon_0 A}{L}$



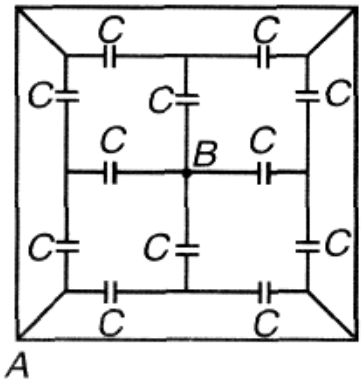
(A) 5C/7
(B) 3C/7
(C) C/7
(D) None of the above

Q 10. Four metallic plates each with a surface area of one side A are placed at a distance d from each other. The plates are connected as shown in the circuit diagram. Then the capacitance of the system between a and b is



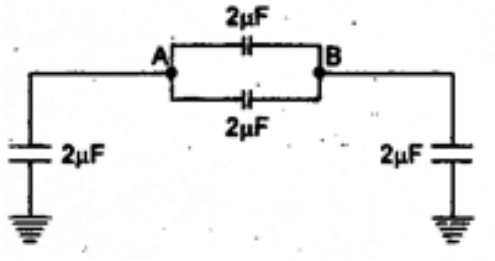
(a) $\frac{3\varepsilon_0 A}{d}$
(b) $\frac{2\varepsilon_0 A}{d}$
(c) $\frac{2\varepsilon_0 A}{3d}$
(d) $\frac{3\varepsilon_0 A}{2d}$

Q 11. Equivalent capacitance between A and B is



(a) 4C/3
(b) 8C/3
(c) 12C
(d) 5C/12

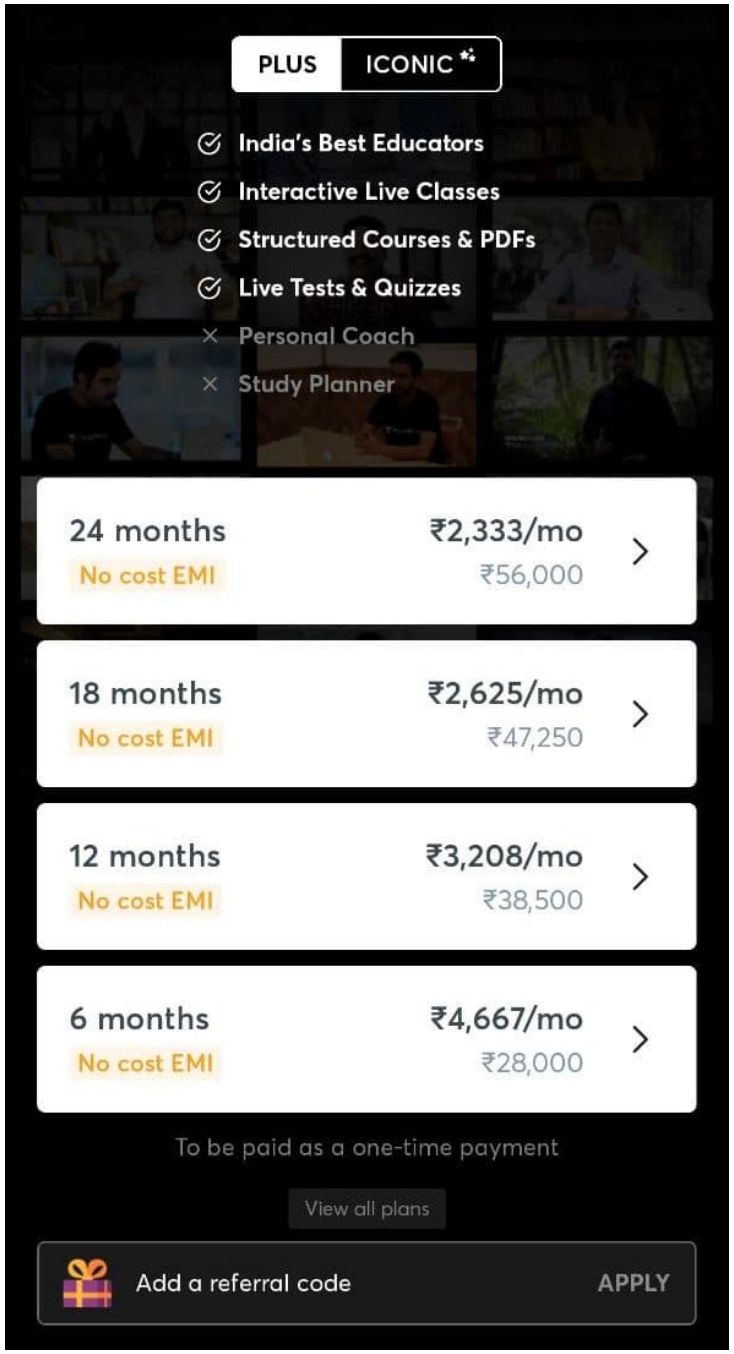
Q 12. Find equivalent capacitance between A and B



(a) 5 μF (b) 4 μF (c) 3 μF (d) 2μF

Answer Key

Q.1 b	**Q.2 b, c**	**Q.3 a**	**Q.4 b**	**Q.5 a**
Q.6 c	**Q.7 b, d**	**Q.8 d**	**Q.9 b**	**Q.10 d**
Q.11 b	**Q.12 a**			



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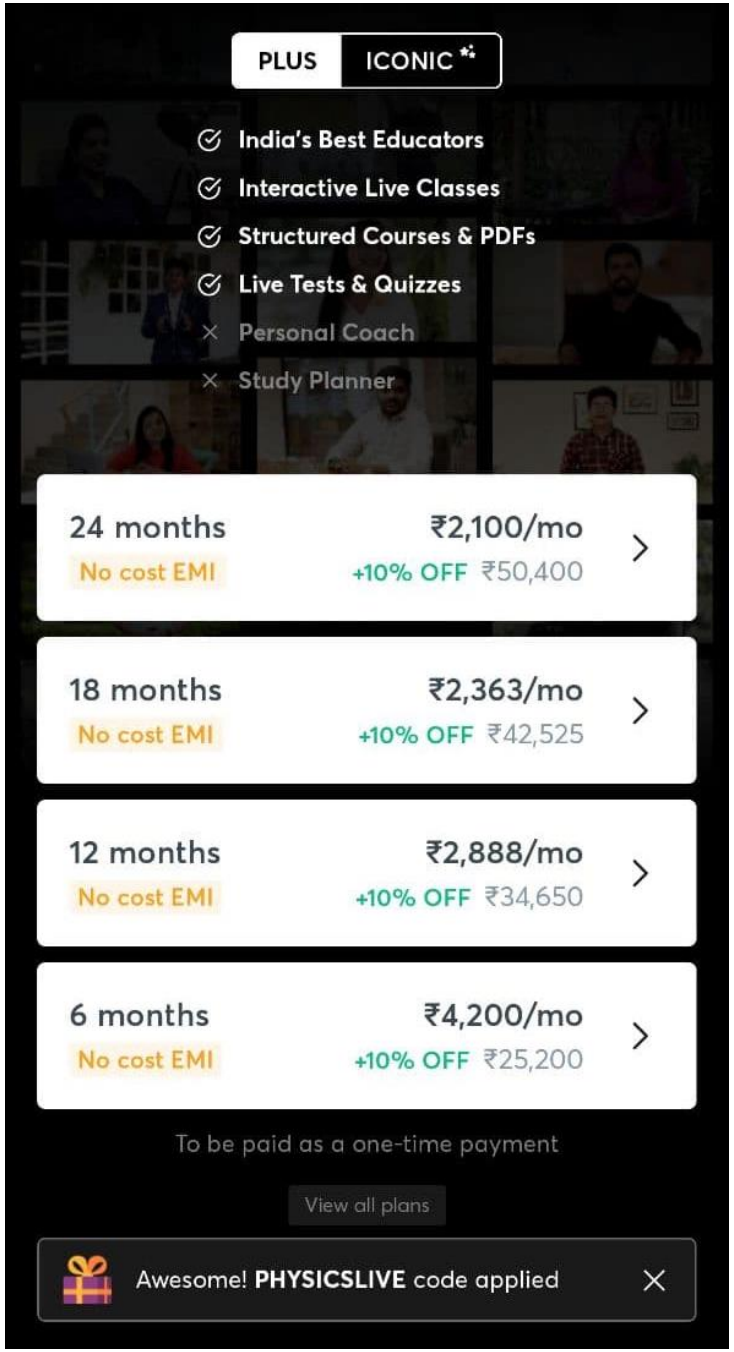
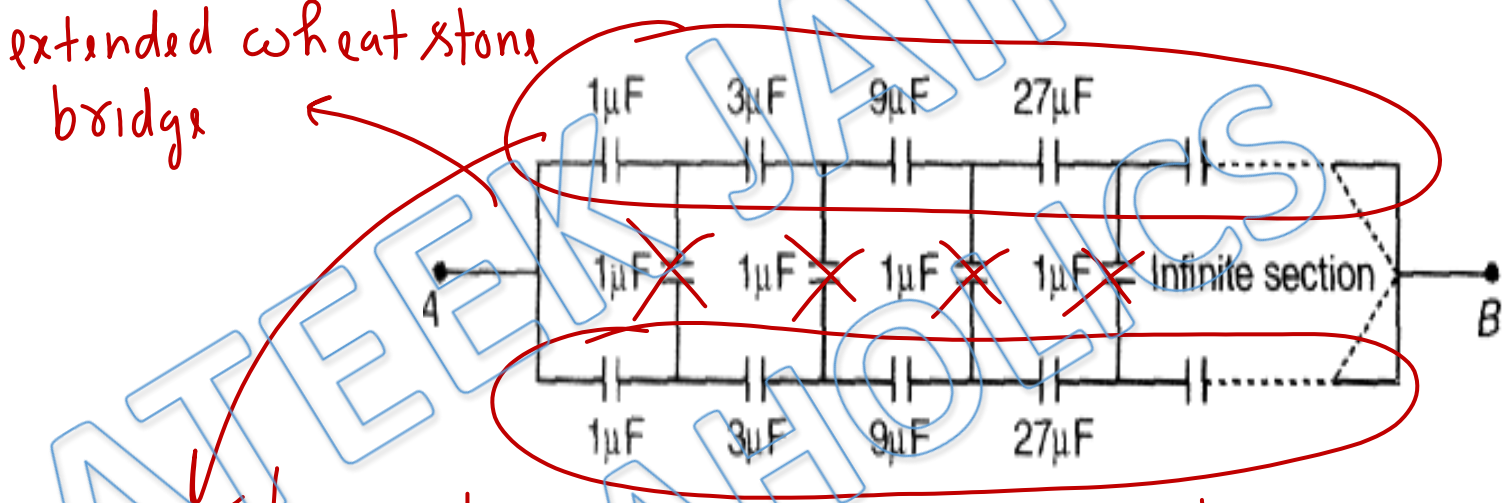


Written Solution

DPP 2 – Capacitor : Combination of Series and Parallel Capacitor, Wheat Stone Bridge

By Physicsaholics Team

(Q.1) What is equivalent capacitance of circuit between points A and B?



(a) 2/3 μF

(b) ~~4/3 μF~~

(c) Infinite

(d) $(1+\sqrt{3})\mu F$

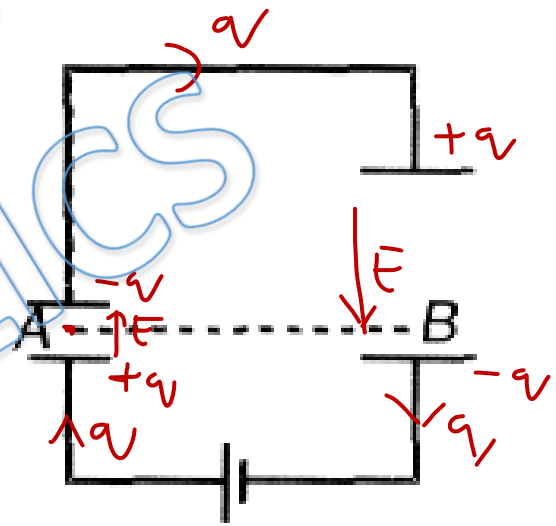
$\frac{1}{C} = \frac{1}{1} + \frac{1}{3} + \frac{1}{9} + \cdots = \frac{1}{1-1/3} = 3/2.$

$C = 2/3\ \mu F$

$C_{fff} = C + C = 4/3\ \mu F$

(Q.2) Two parallel plate capacitors with same area of cross-section but different distance between plates are connected as shown in figure.

$$E = \frac{q}{A\epsilon_0} \Rightarrow E_A = E_B$$



(a) $E_A > E_B$

(b) $E_A = E_B$

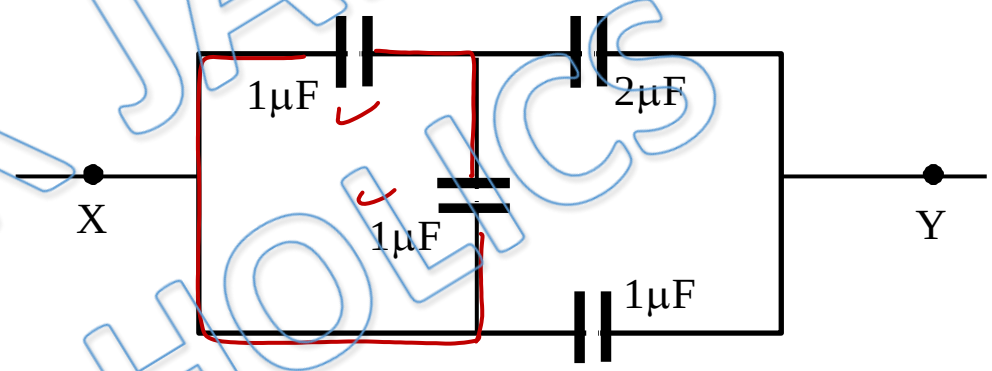
(c) $V_A > V_B$

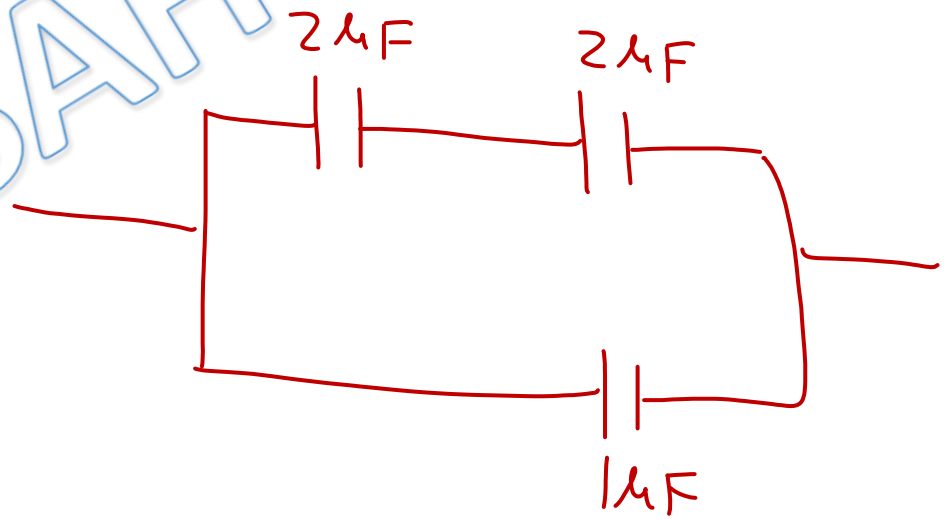
(d) $V_A < V_B$

(Q.3) The figure shows a circuit of four capacitors. The effective capacitance between X and Y is

(a) 2 μF (b) 1 μF

(c) 3 μF (d) 1.5 μF

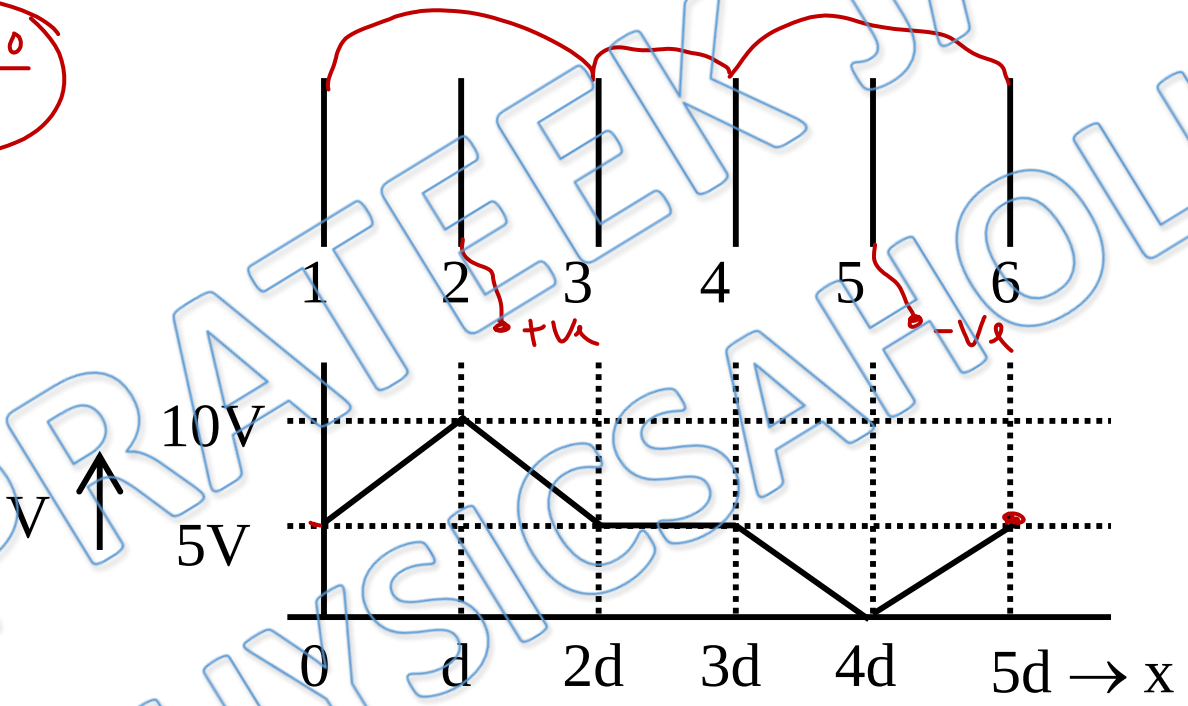




Passage(Q.4 TO Q.6)

The V verses x plot for six identical metal plates of cross-sectioned area A is shown. The plates are placed with separation d

$C = \frac{A\epsilon_0}{d}$



(Q.4) Equivalent capacitance between 2 & 5is-

(A) $\frac{2\varepsilon_0 A}{d}$

(B) $\frac{\varepsilon_0 A}{d}$

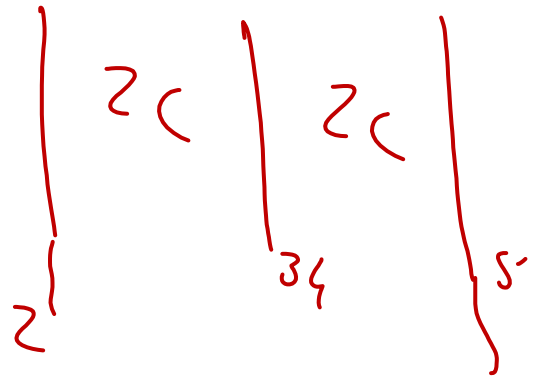
(C) $\frac{3\varepsilon_0 A}{d}$

(D) $\frac{4\varepsilon_0 A}{d}$

C_{12} is parallel to C_{23}

C_{45} " " " C_{56}

$C_{eff} = C = \frac{A\epsilon_0}{d}$



(Q.5) Total charge on plate 2 is -

$q = CV$

$= \frac{A\epsilon_0}{d} \times 10$

(a) $\frac{10\varepsilon_0 A}{d}$

(b) $\frac{5}{3}\frac{\varepsilon_0 A}{d}$

(c) $\frac{4}{3}\frac{\varepsilon_0 A}{d}$

(d) None of these

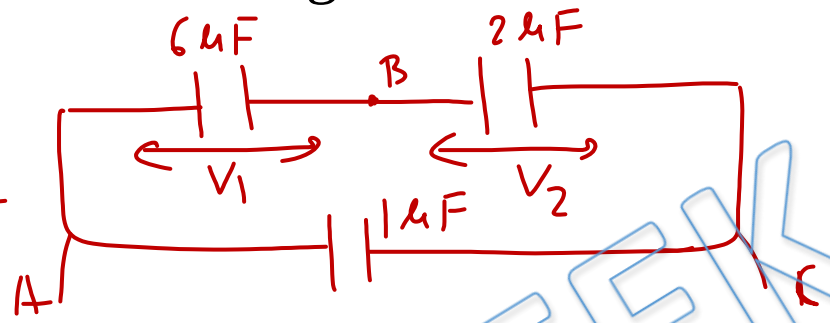
(Q.6) Ratio of charge on plate 2 to plate 5 is | $Q_2 : Q_5$ | is -

(a) 2 : 1 (b) 3 : 1

(c) 1 : 1 (d) None of these

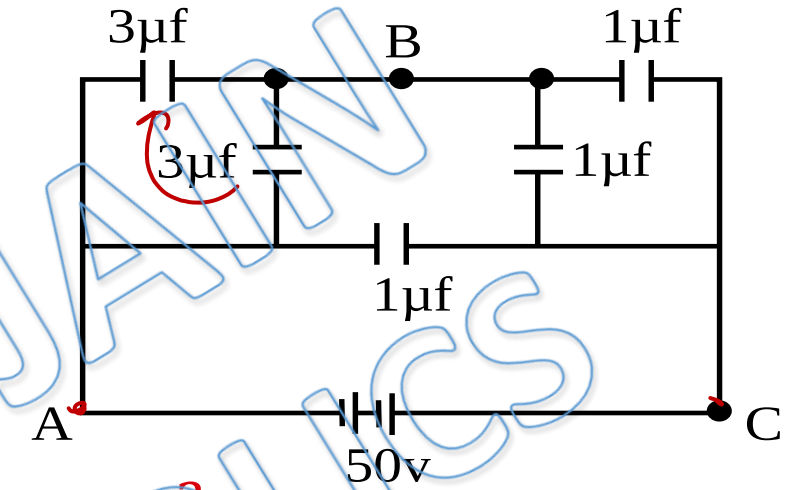
$\frac{6\times2}{8} = \frac{3}{2}\mu F$

(Q.7) In the circuit diagram shown below :



$C_{(+C} = \frac{3}{2} + 1$

$= \frac{5}{2}\mu F$



(a) The effective capacity between A and C is $\frac{3}{2}\mu f$

(b) The effective capacity between A and C is $\frac{5}{2}\mu f$

(c) The potential difference between A and B in steady state is $\frac{75}{2}$ volt

(d) The potential difference between B and C in steady state is $\frac{75}{2}$ volt

$\frac{V_1}{V_2} = \frac{2}{6} = 1/3.$

$V_1 + V_2 = 50$

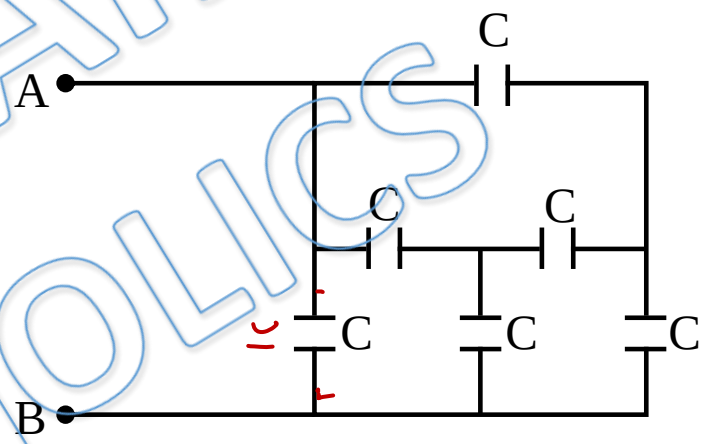
$V_2 = \frac{3}{4} \times 50^{25}.$

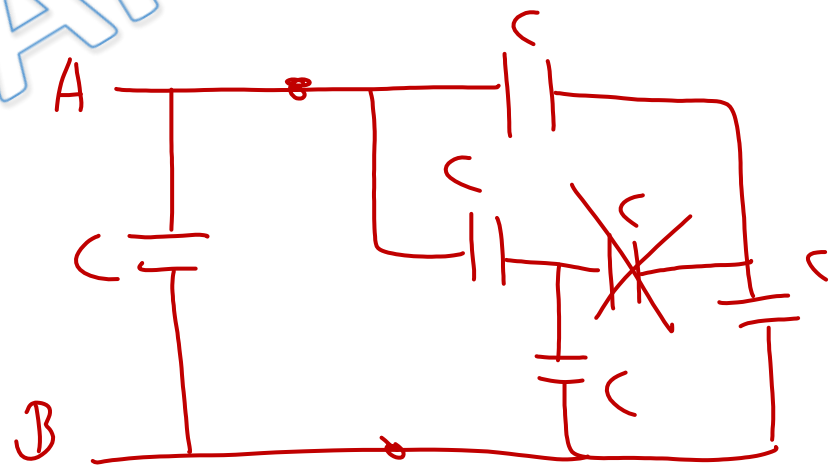
$= 75/2\ V$

(Q.8) The equivalent capacitance between point A and B is –

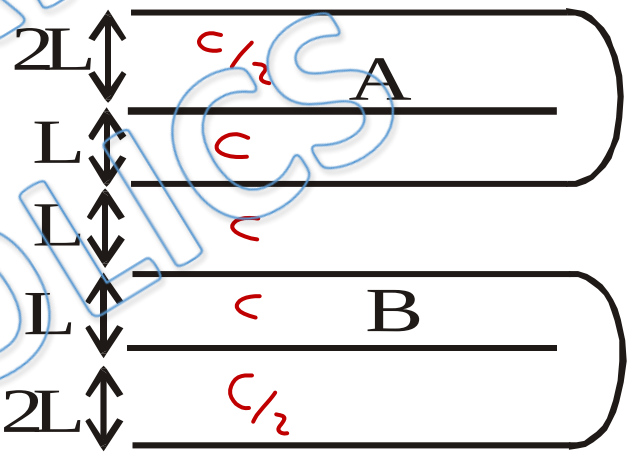
(a) C/4 (b) C/2

(c) C (d) 2C





(Q.9) In the arrangement shown, all plates have equal area. The amount of spacing between plates is mentioned. Find the equivalent capacitance of the system between A and B if $C = \frac{\varepsilon_0 A}{L}$

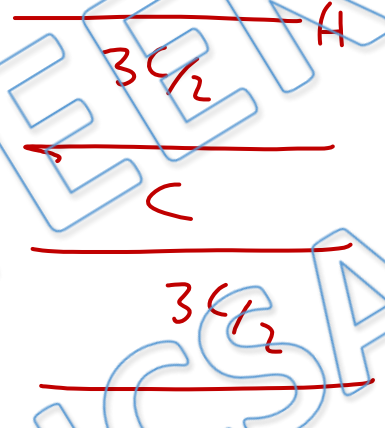


(a) 5C/7

(b) 3C/7

(c) C/7

(d) None of the above



$$\frac{1}{C_{eff}} = \frac{1}{C} + \frac{2}{3C} + \frac{2}{3C} = \frac{3+2+2}{3C} = \frac{7}{3C}$$

$$C_{eff} = \frac{3C}{7}$$

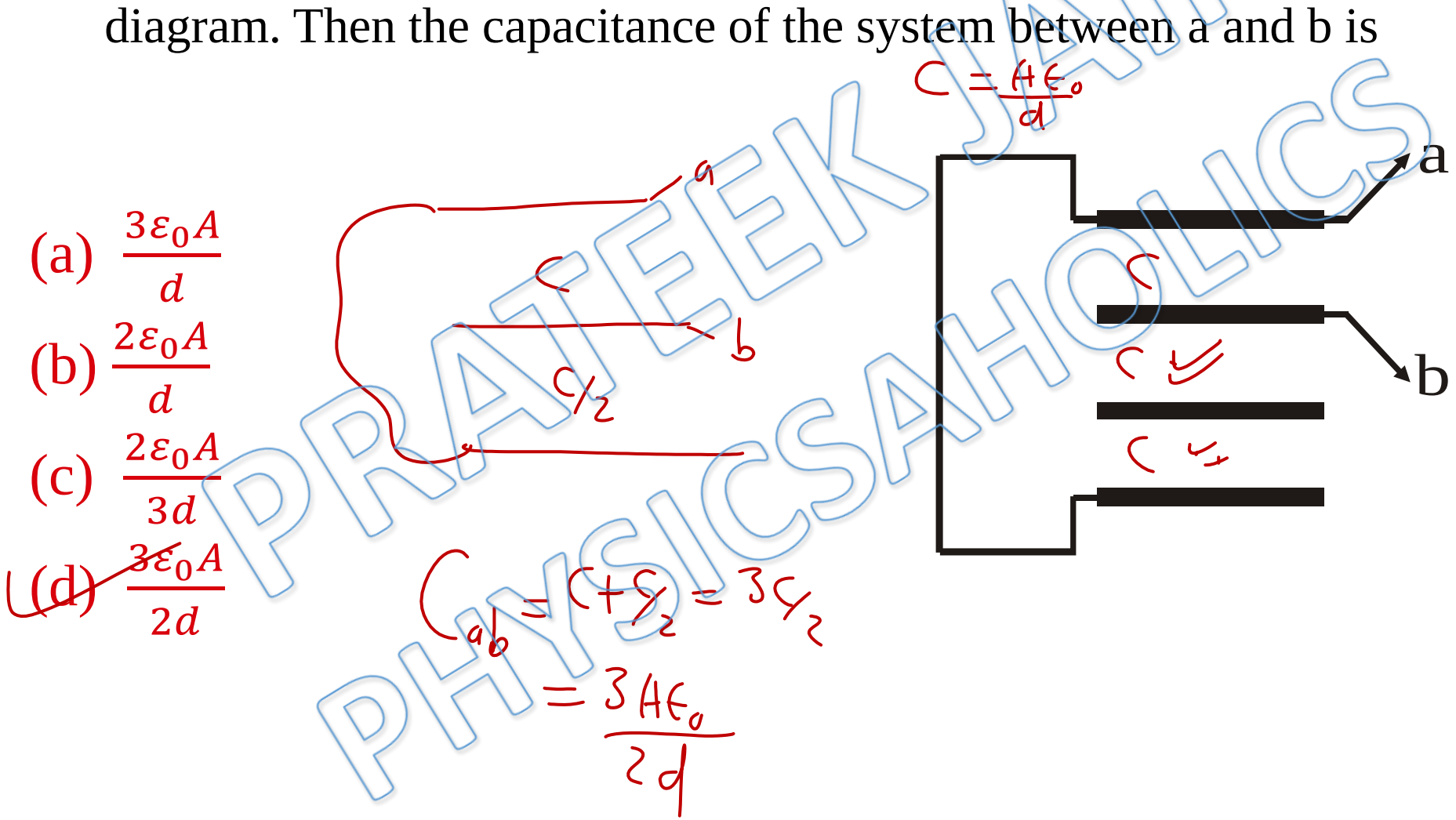
(Q.10) Four metallic plates each with a surface area of one side A are placed at a distance d from each other. The plates are connected as shown in the circuit diagram. Then the capacitance of the system between a and b is

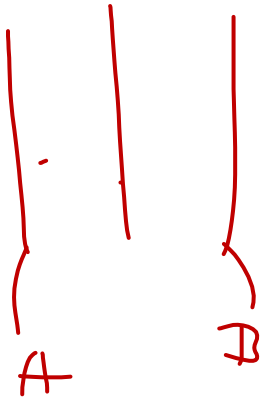
(a) $\frac{3\varepsilon_0 A}{d}$

(b) $\frac{2\varepsilon_0 A}{d}$

(c) $\frac{2\varepsilon_0 A}{3d}$

(d) ~~$\frac{3\varepsilon_0 A}{2d}$~~





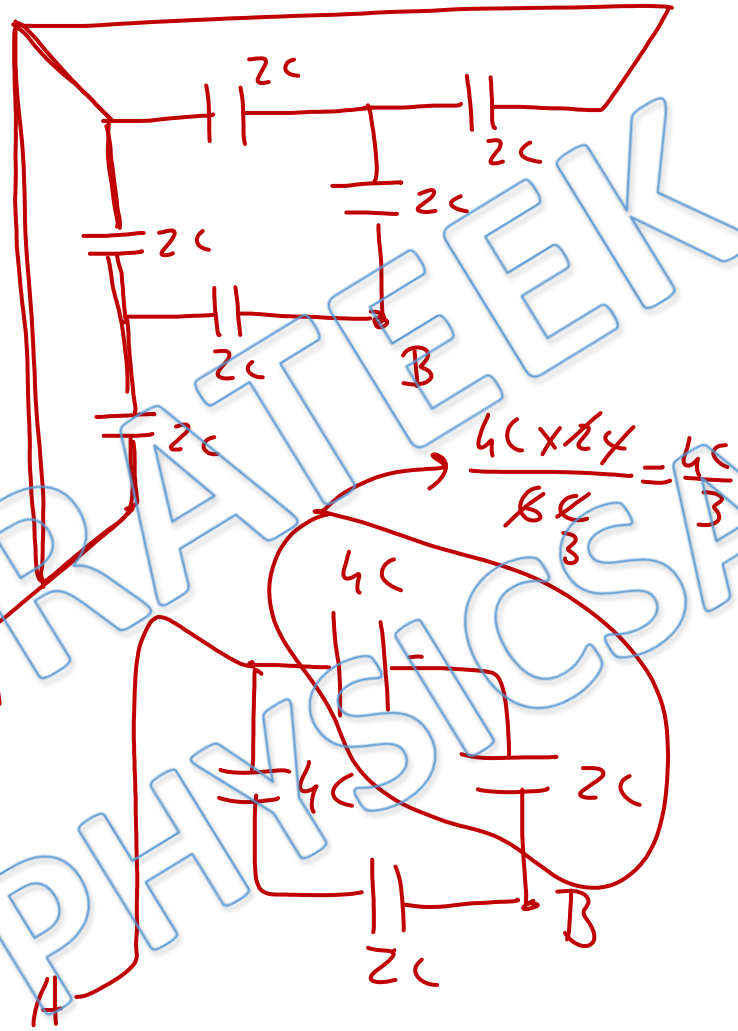
(Q.11) Equivalent capacitance between A and B is

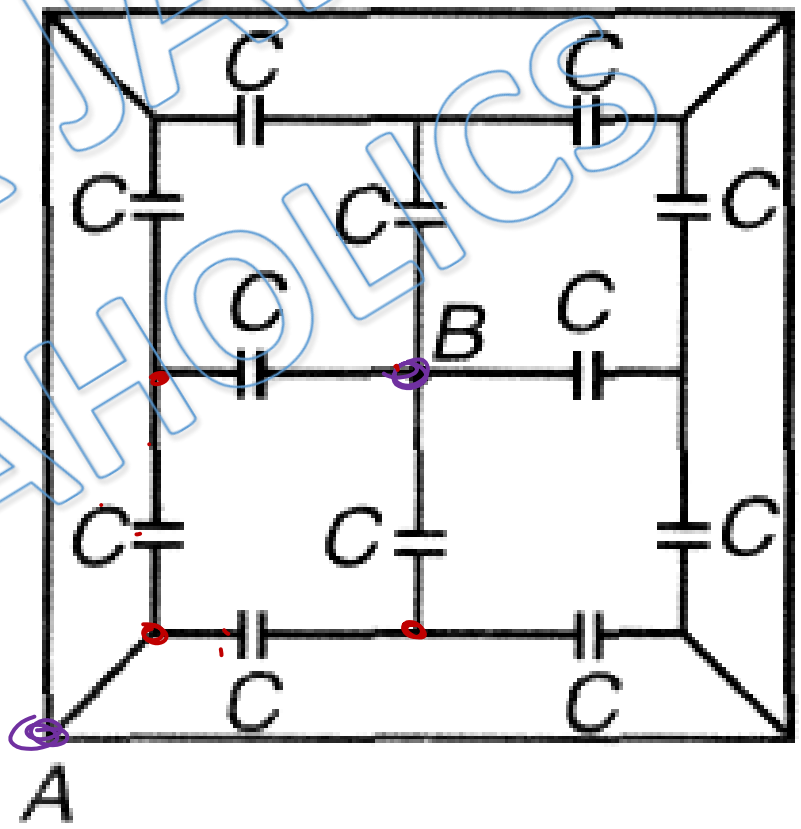
(a) 4C/3

(b) ~~8C/3~~

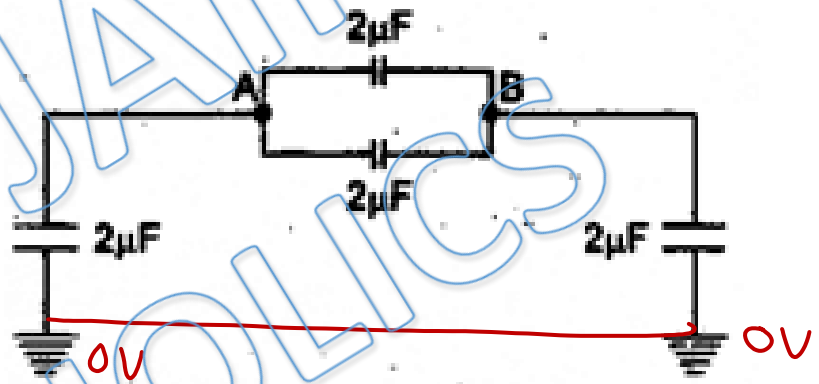
(c) 12C

(d) 5C/12

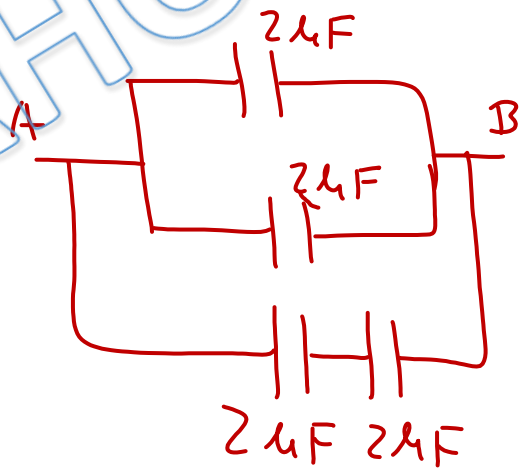




(Q.12) Find equivalent capacitance between A and B



(a) 5 μF
(b) 4 μF
(c) 3 μF
(d) 2μF



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