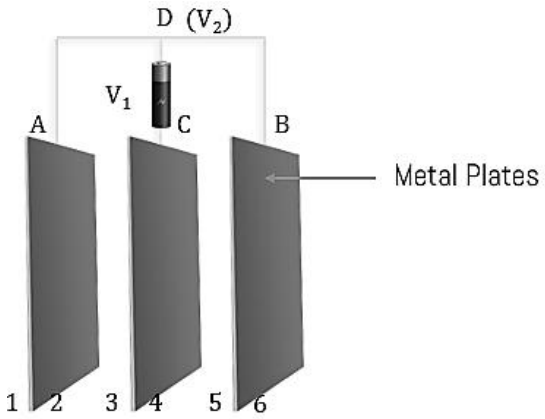
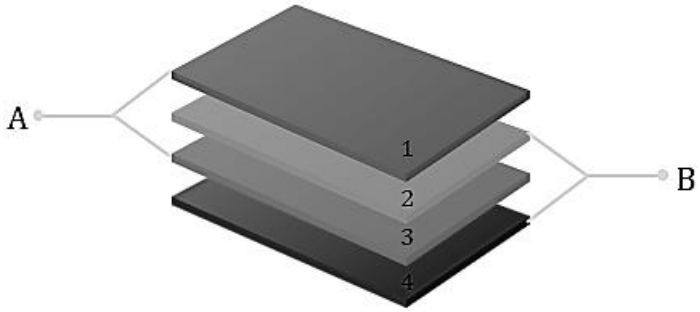
Q.1 Each of the three plates shown in the figure has area of 400 cm^2 on one side and the gap between the adjacent plates is 8.85 mm. The equivalent capacitance of the system is

(A)70.8 pF **(B)**80 pF **(C)** 160 pF **(D)**40 pF



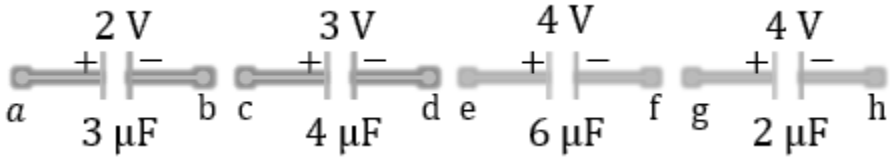
Q.2 Four metal plates numbered 1, 2, 3 and 4 are arranged as shown below. The area of each plate is A and separation between adjacent plates is d. The capacitance of the arrangement is

(A)$\frac{\varepsilon_0 A}{d}$ **(B)**$\frac{2\varepsilon_0 A}{d}$ **(C)**$\frac{3\varepsilon_0 A}{d}$ **(D)**$\frac{4\varepsilon_0 A}{d}$



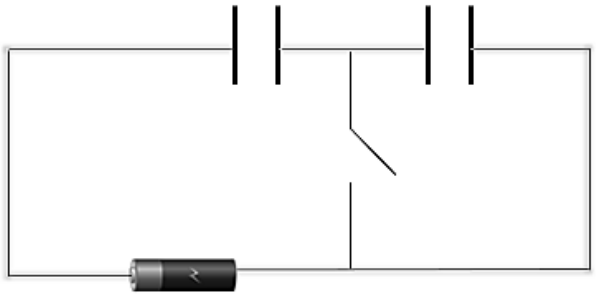
Q.3 Four capacitors C_1, C_2, $C_3$and$C_4$of capacitance 3 μF, 4 μF, 6 μF and 2 μF are charged up to a potential difference of 2 V, 3 V, 4 V and 4 V respectively, if terminal a is connected with f, terminal d is connected with g, terminal e is connected to h and b is connected c, then find the charge flows in the circuit?

(A)26 μC **(B)**18 μC **(C)** $\frac{156}{16}$ μC **(D)**$\frac{156}{15}$ μC



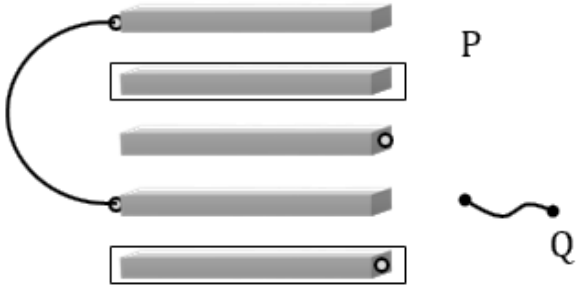
Q.4 Consider the situation shown in figure, the switch S open for a long time and then closed. Then work done by the battery will be:

(A)$\frac{CE^2}{2}$ **(B)**$\frac{CE^2}{4}$ **(C)**$2CE^2$ **(D)**$\frac{CE^2}{8}$



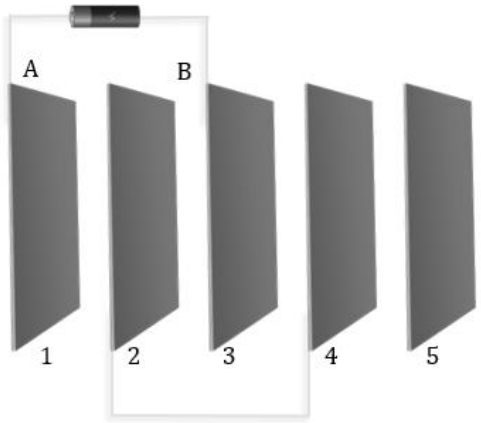
Q.5 The following arrangement consists of five identical metal plates parallel to each other. Area of each plate is A and separation between the successive plates is d. The capacitance between P and Q is

(A) $\frac{5\epsilon_0 A}{d}$ **(B)** $\frac{7}{3}\frac{\epsilon_0 A}{d}$ **(C)** $\frac{4}{3}\frac{\epsilon_0 A}{d}$ **(D)** $\frac{5}{3}\frac{\epsilon_0 A}{d}$



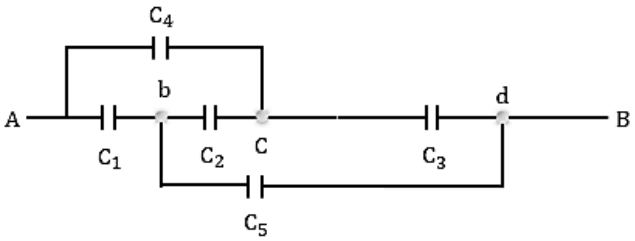
Q.6 Five conducting parallel plates having area A and separation between them d are placed as shown in figure. Plate number 2 and 4 are connected and between points A and B a cell of emf E is connected. The charge flow through the cell is

(A) $\frac{3}{4}\frac{\epsilon_0 AE}{d}$ **(B)** $\frac{2}{3}\frac{\epsilon_0 AE}{d}$ **(C)** $\frac{4\epsilon_0 AE}{d}$ **(D)** $\frac{\epsilon_0 AE}{d}$



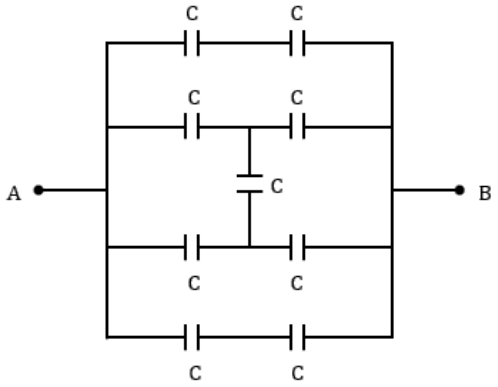
Q.7 If the two terminals of a battery of 21 V is connected across A and B, the charge flown through the battery will beGiven: $C_1 = 2$ pF; $C_2 = 13$ pF; $C_3 = 6$ pF; $C_4 = 1$ pF; and$C_5 = 12$ pF

(A) 5.4×10^{-12} C **(B)** 5.4×10^{-13} C **(C)** 5.4×10^{-10} C **(D)** 5.4×10^{-11} C



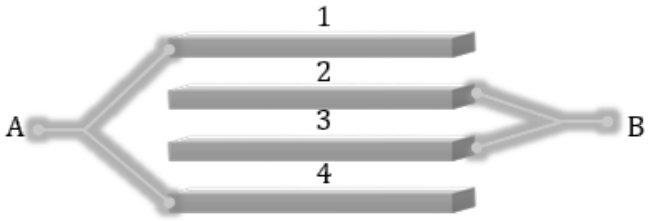
Q.8 The net capacity between the points A and B in the following circuit will be

(A) C **(B)** $\frac{C}{2}$ **(C)** 2C **(D)** 4C



Q.9 Four metal plates numbered 1,2,3 and 4 are arranged as shown below. The area of each plate is A and separation between adjacent plates is d. The capacitance of the arrangement is

(A) $\frac{\varepsilon_o A}{d}$ **(B)** $\frac{2\varepsilon_o A}{d}$ **(C)** $\frac{3\varepsilon_o A}{d}$ **(D)** $\frac{4\varepsilon_o A}{d}$



Q.10 Five similar condenser plates, each of area A are placed at equal distance d apart and are connected to source voltage V as shown in the following diagram. The charge on plates 1 and 4 will be:

(A) $\frac{\epsilon_o A}{d}, \frac{-2\epsilon_o A}{d}$ **(B)** $\frac{\epsilon_o AV}{d}, \frac{-2\epsilon_o AV}{d}$ **(C)** $\frac{-\epsilon_o AV}{d}, \frac{-3\epsilon_o AV}{d}$ **(D)** $\frac{\epsilon_o AV}{d}, \frac{-4\epsilon_o AV}{d}$

WORKSHEET

Ideal Gas Equation

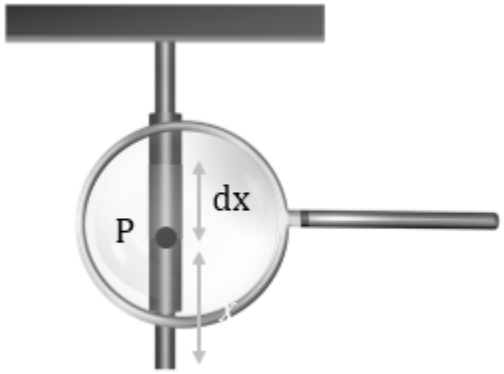
Q.1 12 gHe and 4 g H_2 filled in a container of volume 20 L maintained at temperature300 K. The pressure of the mixture is nearly

(A)3.225 atm **(B)**225 atm **(C)**6.225 atm **(D)**1.225 atm

Young's Modulus of Elasticity

Q.2 The extension in a uniform rod of lengthl, massm, cross sectional area A and young's modulus Y when it is suspended vertically at one end is

(A)$\frac{mgl}{AY}$ **(B)**$\frac{mgl}{2AY}$ **(C)** $\frac{2mgl}{AY}$ **(D)**$\frac{mgl}{4AY}$



Root Mean Square Speed

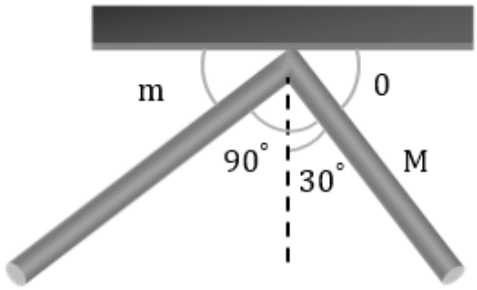
Q.3 At what temperature root means square velocity of hydrogen becomes double of its value at S. T. P, keeping pressure constant?

(A)273°C **(B)**514°C **(C)** 819°C **(D)**1012°C

Equilibrium

Q.4 Two uniform rods of equal length but of different masses are rigidly combined to form a L − shaped body, which is then pivoted about O as shown in figure. If combination is in equilibrium then ratio M/m will be

(A)2 **(B)**3 **(C)** $\sqrt{2}$ **(D)**$\sqrt{3}$



Excess Pressure in Bubbles

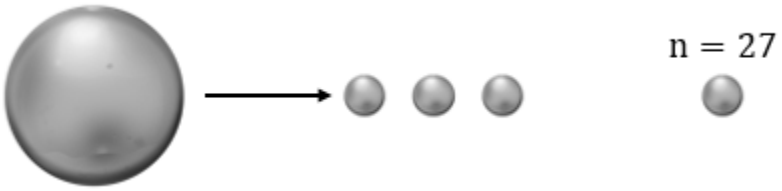
Q.5 A water droplet splits into 27 identical small droplets. The pressure difference between the inner and outer surface of the big droplet will be

(A) Same as that of smaller droplet

(B)1/3rd of the pressure difference for a smaller droplet.

(C) 1/4th of the pressure difference for a smaller droplet.

(D) None of these

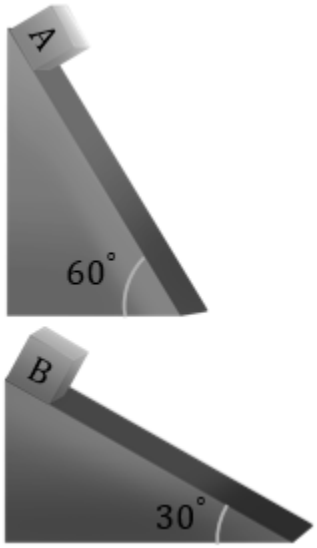


Relative Motion

Q.6 Two fixed frictionless inclined planes making the angles 30° and 60° with the horizontal are shown in the figure. Two blocks A and B are placed on the two planes. What is the relative vertical acceleration of A with respect of B?

(A) 4.9 ms^{-2} in vertical direction **(B)** 9.8 ms^{-2} in vertical direction

(C) Zero **(D)** 9.8 ms^{-2} in vertical direction



Superposition of Electric Fields

Q.7 Three charges2q, −q and −q are located at the vertices of an equilateral triangle. At the center of the triangle,

(A) The field is zero but potential is non-zero **(B)** The field is non-zero but potential is zero

(C) Both field and potential are zero **(D)** both field and potential are non-zero

Relative Motion

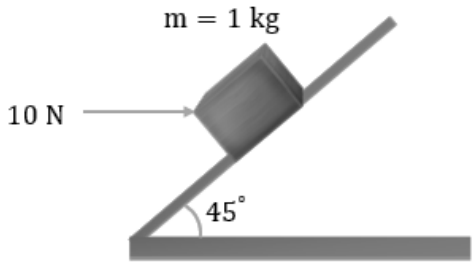
Q.8 A man can row a boat at 4 km/hr in still water. If he is travelling in a river where the current is 2 km/hr, how long will it take him to row 6 km upstream and then back to his starting point ?

(A) 0.5 hr **(B)** 1 hr **(C)** 2 hr **(D)** 4 hr

Equilibrium

Q.9 A body of mass 1 kg lies on a smooth inclined plane. A horizontal force F = 10 N is applied on the block of mass 1 kg as shown in figure. If the block remains at rest, then the magnitude of normal reaction on the block is (Take g = 10 m/s^2)

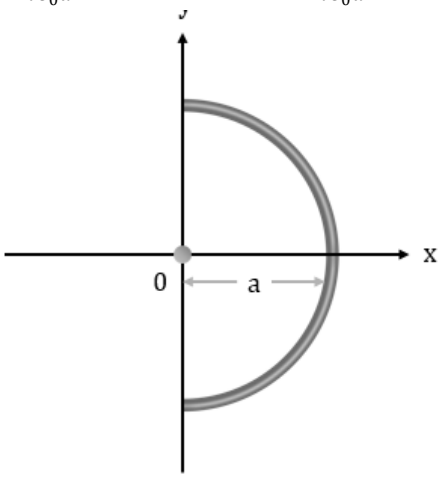
(A) $10\sqrt{2}$ N **(B)** $\frac{10}{\sqrt{2}}$ N **(C)** 10 N **(D)** None of these



Electric Field Due to an Arc at the Centre

Q.10 Half ring of radius a is uniformly charged with linear charge densityλ. Find out electric field intensity at pointO.

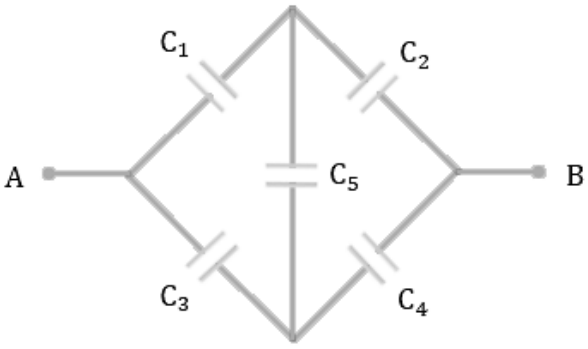
(A) $\frac{\lambda}{2\pi\epsilon_0 a}(-\hat{\imath})$ **(B)** $\frac{\lambda}{4\pi\epsilon_0 a}(+\hat{\imath})$ **(C)** $\frac{\lambda}{2\pi\epsilon_0 a}(+\hat{\imath})$ **(D)** $\frac{\lambda}{4\pi\varepsilon_0 a}(-\hat{\imath})$



Parallel and Series Combination of Capacitors

Q.11 Find the equivalent capacitance between A and B of the circuit shown in the figure.
Given: C1 = 5 μF, C2 = 20 μF, C3 = 10 μF, C4 = 40 μF, C5 = 30 μF

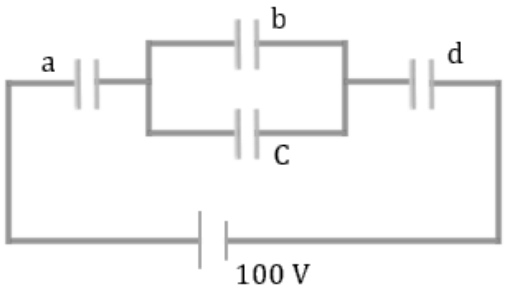
(A)12 μF **(B)**24 μF **(C)** 6 μF **(D)**21 μ



Energy of a Capacitor

Q.12 Each capacitor in the figure has a capacitance of 10 μF. The emf of the battery is 100 V. Find the ratio of the energy stored in b to a.

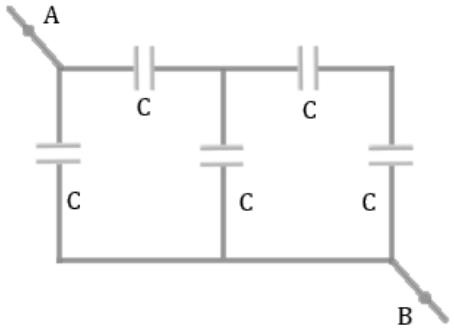
(A)0.25 **(B)**4 **(C)** 25 **(D)**0.4



Parallel and Series Combination of Capacitors

Q.13 What is the equivalent capacitance of the system of capacitors between A and B

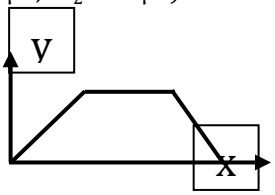
(A) $\frac{7}{6}$C **(B)** 1.6C **(C)** C **(D)** None



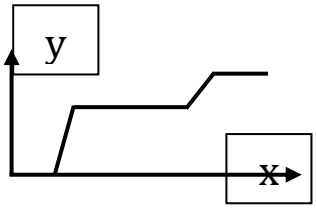
Potential Difference

Q.14 Figure shows two capacitors connected with a battery in a circuit. On moving from left to right on the branch containing the capacitors, the correct graph representing potential (V) vs distance (x) will be: ($C_1 = 3$ μF; $C_2 = 1$ μF)

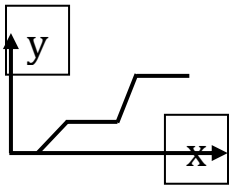
(A)



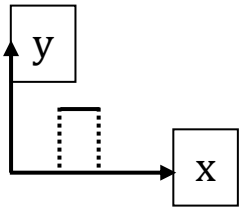
(B)

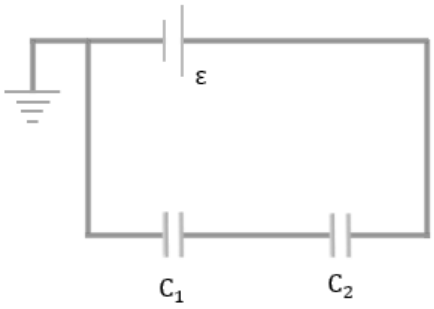


(C)



(D)

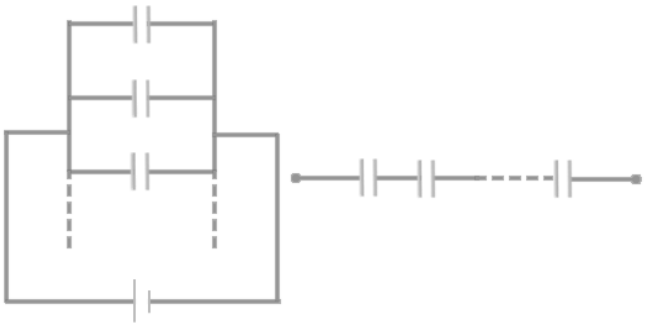




Parallel and Series Combination of Capacitors

Q.15 There are n identical capacitors which are connected in parallel to a potential difference V. these capacitors are then reconnected in series. The potential difference between the extreme ends is

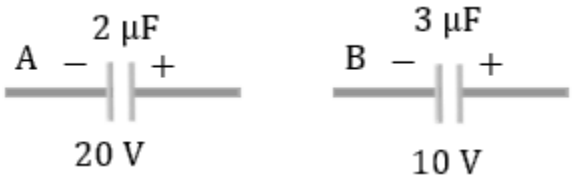
(A)0 **(B)**nV **(C)** $(n-1)V$ **(D)**$(n-2)V$



Parallel and Series Combination of Capacitors

Q.16 Two parallel plate capacitors A and B having capacitances 2 μF and3 μFare charged separately up to 20 Vand10 V respectively. Now, the positive plate of A is connected to the positive plate of B and negative plate of A is connected with negative plate of B. Find how much charge flows in the circuit ?

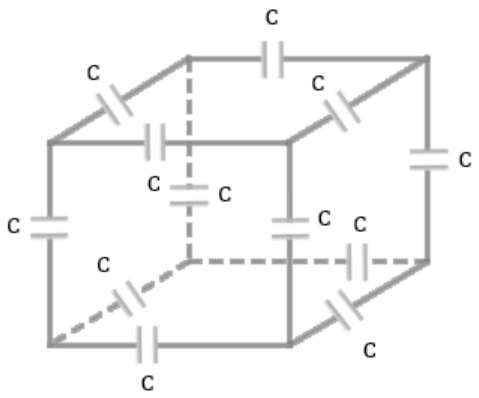
(A)28 μC **(B)**42 μC **(C)** 12 μC **(D)**12 μC



Parallel and Series Combination of Capacitors

Q.17 Twelve capacitors each having a capacitanceC, are connected to form a cube. Find the equivalent capacitance of the cube along its body diagonal? [TakeC = 15 μF]

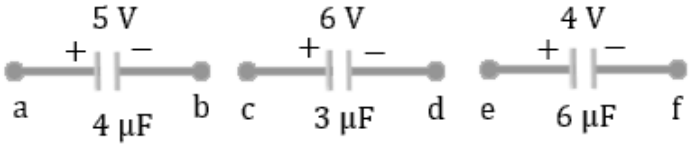
(A)18 μF **(B)**12 μF **(C)** $\frac{6}{5}$ μF **(D)**$\frac{5}{6}$ μF



Energy of a Capacitor

Q.18 Three capacitors C_1, C_2 and C_3 of capacitance4 μF, 3 μF and 6 μF are charged up to a potential difference of 5 V, 6 V and 4 V respectively. If terminal a is connected withf, terminal e is connected with d and b is connected withc, then find the amount of heat produced in the circuit?

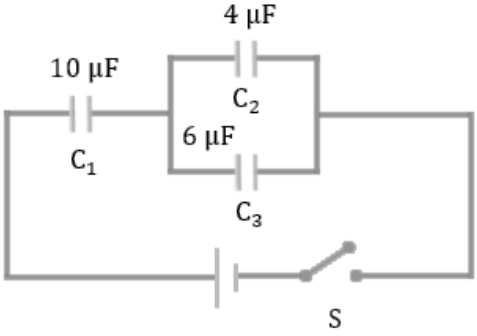
(A)20 μJ **(B)**2 μJ **(C)** 152 μJ **(D)**150 μJ



Energy of a Capacitor

Q.19 If att = 0, switch S is closed, at steady state find heat generated (H) in the given circuit having a battery of 16 volts.

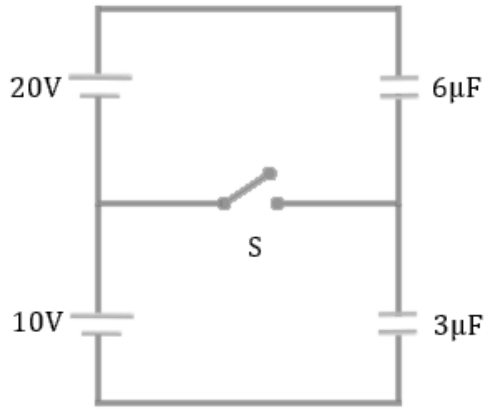
(A)1280 μJ **(B)**640 μJ **(C)** 320 μJ **(D)**192 μJ



Energy of a Capacitor

Q.20 Initially, the switch *S* is open in the circuit for a long time. After the switch is closed, the heat generated in the circuit will be:

(A)600 μJ **(B)**750 μJ **(C)** 350 μJ **(D)**450 μJ



ANSWER KEY

Q.	1	2	3	4	5	6	7	8	9	10
Sol.	(B)	(C)	(D)	(A)	(D)	(B)	(D)	(C)	(B)	(B)
WORK SHEET										
Q.	1	2	3	4	5	6	7	8	9	10
Sol.	(C)	(B)	(C)	(D)	(B)	(A)	(B)	(D)	(A)	(A)
Q.	11	12	13	14	15	16	17	18	19	20
Sol.	(A)	(A)	(B)	(C)	(B)	(C)	(A)	(D)	(B)	(D)