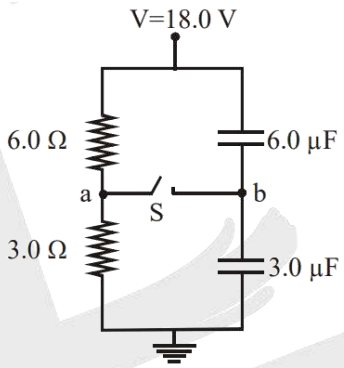
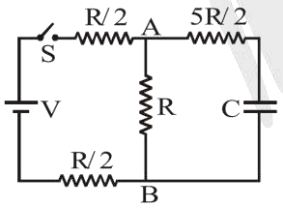
DPP 7

Q.1 Study the following circuit diagram in figure , The potential of point a with respect to point b when switch S is open is $-k_1$ V and The charge flows through switch S when it is closed is k_2μC. Then value of $k_1 + k_2$ is equal to

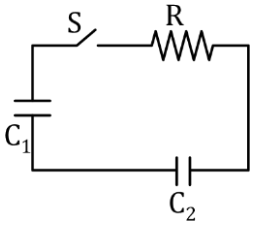


Q2. In the circuit shown in figure, the battery is an ideal one with emf V. The capacitor is initially uncharged. The switch S is closed at time t = 0. The charge Q on the capacitor at time t is $\frac{CV}{2}\left(1 - e^{-\frac{t}{NRC}}\right)$. value of N is ____

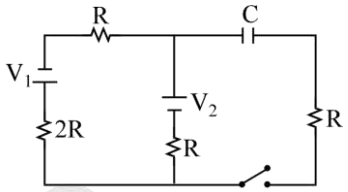


Q.3 In the above question the current in AB at time t is $\frac{V}{2R}\left(1 - \frac{e^{-\frac{t}{3RC}}}{2^k - 2}\right)$. Value of k is____

Q.4 Two capacitors C_1(6μF & initial charge $q_0 = \left(\frac{30e}{e-1}\right)\mu C$) & C_2(4μF & initial uncharged) are joined in series with resistance R(80Ω) as shown in figure. Switch S is closed at t = 0. Find charge on C_2(in μC) at t = 192μs.

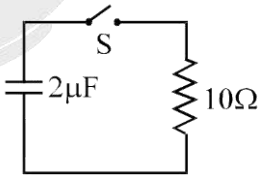


Q.5 In the transient circuit shown the time constant of the circuit is :



(A) $\frac{5}{3}$RC (B) $\frac{5}{2}$RC (C) $\frac{7}{4}$RC (D) $\frac{7}{3}$RC

Q.6 In the R − C circuit shown in the figure the total energy of 3.6×10^{-3} J is dissipated in the 10Ω resistor when the switch S is closed. The initial charge on the capacitor is

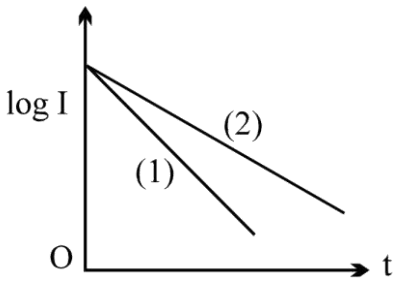


(A) 60μC (B) 120μC (C) $60\sqrt{2}$μC (D) $\frac{60}{\sqrt{2}}$μc

Q.7 A capacitor of capacitance C is charged by a battery whose internal resistance is R. The time after which potential difference across resistor becomes n times to that across capacitor is

(A) RCln$\left(\frac{1+n}{n}\right)$ (B) RCln$\left(\frac{n}{1+n}\right)$ (C) RCln$\left(\frac{n}{n-1}\right)$ (D) RCln(1 + n)

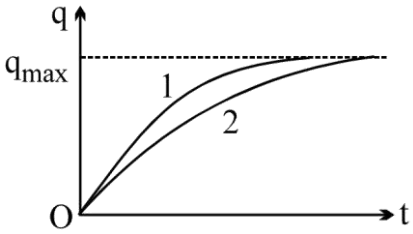
Q.8 A capacitor of capacity C is charged to a steady potential difference V and connected in series with an open key and a pure resistor ' R '. At time t = 0, the key is closed. If I = current at time t, a plot of log I against ' t ' is as shown in (1) in the graph. Later one of the parameters i.e. V, R or C is changed keeping the other two constant, and the graph (2) is recorded. Then



(A) C is reduced (B) C is increased (C) R is reduced (D) R is increased

Paragraph for Q. No. 10 to 11

The charge across the capacitor in two different RC circuits 1 and 2 are plotted as shown in figure.



Q.9 Choose the correct statement(s) related to the two circuits.

(A) Both the capacitors are charged to the same charge.

(B) The emf's of cells in both the circuit are equal.

(C) The emf's of the cells may be different.

(D) The emf E_1 is more than E_2

Q.10 Identify the correct statement(s) related to the R_1, R_2, C_1 and C_2 of the two RC circuits.

(A) $R_1 > R_2$ if $E_1 = E_2$ (B) $C_1 < C_2$ if $E_1 = E_2$

(C) $R_1C_1 > R_2C_2$ (D) $\frac{R_1}{R_2} < \frac{C_2}{C_1}$

ANSWER KEY

1.	60	**2.**	3	**3.**	(3)	**4.**	(012)	**5.**	(C)	**6.**	(B)
7.	(A)	**8.**	(B)	**9.**	(AC)	**10.**	(D)				