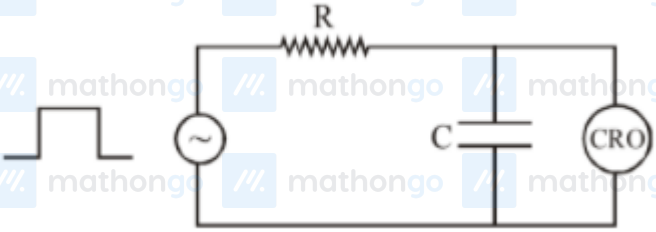
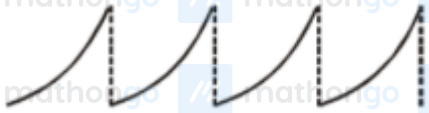
Q1: 16 March (Shift 1) - Single Correct

An RC circuit as shown in the figure is driven by a AC source generating a square wave. The output wave pattern monitored by CRO would look close to :



(1) 

(2) 

(3) 

(4) 

Q2: 16 March (Shift 1) - Numerical

A sinusoidal voltage of peak value 250 V is applied to a series LCR circuit, in which $R = 8\Omega, L = 24mH$ and $C = 60\mu F$. The value of power dissipated at resonant condition is 'x' kW. The value of x to the nearest integer is ____

Q3: 17 March (Shift 1) - Single Correct

An AC current is given by $I = I_1 \sin \omega t + I_2 \cos \omega t$.

A hot wire ammeter will give a reading :

(1) $\sqrt{\frac{I_1^2 - I_2^2}{2}}$

(2) $\sqrt{\frac{I_1^2+I_2^2}{2}}$

(3) $\frac{I_1+I_2}{\sqrt{2}}$

(4) $\frac{I_1+I_2}{2\sqrt{2}}$

Q4: 17 March (Shift 2) - Single Correct

Match List-I with List-II

List-I	List-II
(a) Phase difference between current and voltage in a purely resistive AC circuit	(i) $\frac{\pi}{2}$: current leads voltage
(b) Phase difference between current and voltage in a pure inductive AC circuit	(ii) zero
(c) Phase difference between current and voltage in a pure capacitive AC circuit	(iii) $\frac{\pi}{2}$; current lags voltage
(d) Phase difference between current and voltage in an LCR series circuit	(iv) $\tan^{-1}\left(\frac{X_C-X_L}{R}\right)$

(1) (a) – (i), (b) – (iii), (c) – (iv), (d) – (ii)

(2) (a) – (ii), (b) – (iv), (c) – (iii), (d) – (i)

(3) (a) – (ii), (b) – (iii), (c) – (iv), (d) – (i)

(4) (a) – (ii), (b) – (iii), (c) – (i), (d) – (iv)

Q5: 17 March (Shift 2) - Single Correct

What happens to the inductive reactance and the current in a purely inductive circuit if the frequency is halved?

(1) Both, inductive reactance and current will be halved.

(2) Inductive reactance will be halved and current will be doubled.

(3) Inductive reactance will be doubled and current will be halved.

(4) Both, inducting reactance and current will be doubled.

Q6: 18 March (Shift 1) - Single Correct

In a scries LCR resonance circuit, if we change the resistance only, from a lower to higher value:

(1) The bandwidth of resonance circuit will increase.

(2) The resonance frequency will increase.

(3) The quality factor will increase.

(4) The quality factor and the resonance frequency will remain constant.

Q7: 18 March (Shift 1) - Single Correct

An AC source rated 220 V, 50 Hz is connected to a resistor. The time taken by the current to change from its maximum to the rms value is:

(1) 2.5 ms

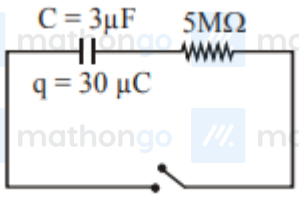
(2) 25 ms

(3) 2.5 s

(4) 0.25 ms

Q8: 18 March (Shift 1) - Numerical

The circuit shown in the figure consists of a charged capacitor of capacity $3\mu F$ and a charge of $30\mu C$. At time $t = 0$, when the key is closed, the value of current flowing through the $5M\Omega$ resistor is ' $x'\mu - A$. The value of 'x to the nearest integer is ___



Q9: 18 March (Shift 2) - Single Correct

In a series LCR circuit, the inductive reactance (X_L) is 10Ω and the capacitive reactance (X_C) is 4Ω. The resistance (R) in the circuit is 6Ω. The power factor of the circuit is:

(1) $\frac{1}{2}$

(2) $\frac{1}{2\sqrt{2}}$

(3) $\frac{1}{\sqrt{2}}$

(4) $\frac{\sqrt{3}}{2}$

Answer Key

Q1 (3) **Q2** (4) **Q3** (2) **Q4** (4)

Q5 (2) **Q6** (1) **Q7** (1) **Q8** (2)

Q9 (3)