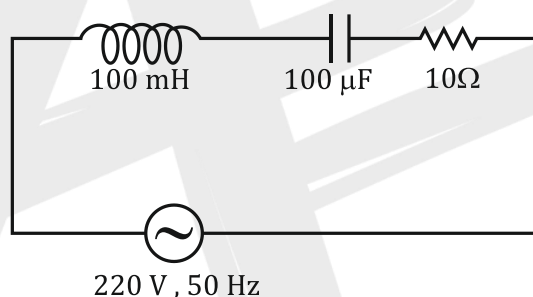
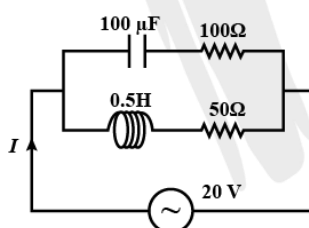


DPP - 03

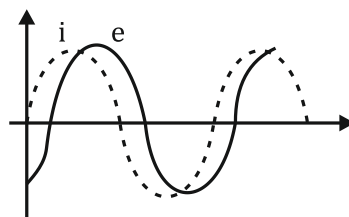
- Q.1** A transmitting station releases waves of wavelength 960 m. A capacitor of  $2.56\mu\text{F}$  is used in the resonant circuit. The self inductance of coil necessary for resonance is  $2x \times 10^{-8}\text{H}$ . then the value of  $x$  is.
- Q.2** A series LCR circuit of  $R = 5\Omega$ ,  $L = 20\text{mH}$  and  $C = 0.5\mu\text{F}$  is connected across an AC supply of 250 V, having variable frequency. The power dissipated at resonance condition is  $5^\alpha \times 10^2\text{ W}$ . then the value of  $\alpha^2$  is.
- Q.3** In an LCR series circuit, an inductor  $30\text{mH}$  and a resistor  $1\Omega$  are connected to an AC source of angular frequency  $300\text{rads}^{-1}$ . The value of capacitance for which, the current leads the voltage by  $45^\circ$  is  $\frac{1}{x} \times 10^{-3}\text{ F}$ . Then the value of  $x$  is
- Q.4** In a series LCR circuit, the inductance, capacitance and resistance are  $L = 100\text{mH}$ ,  $C = 100\mu\text{F}$  and  $R = 10\Omega$  respectively. They are connected to an AC source of voltage 220 V and frequency of 50 Hz. The approximate value of current in the circuit will be \_\_\_\_\_ A.



- Q.5** In the given circuit, the AC source has  $\omega = 100\text{rad/s}$ . Considering the inductor and capacitor to be ideal, the correct choice(s) is/are



- (A) the current through the circuit,  $I$  is 0.3 A.
- (B) the current through the circuit,  $I$  is  $0.3\sqrt{2}\text{ A}$ .
- (C) the voltage across  $100\Omega$  resistor =  $10\sqrt{2}\text{ V}$ .
- (D) the voltage across  $50\Omega$  resistor = 10 V.
- Q.6** When an AC source of emf  $\varepsilon = E_0 \sin(100t)$  is connected across a circuit, the phase difference between the emf  $e$  and the current  $i$  in the circuit is observed to be  $\pi/4$ , as shown in the diagram. If the circuit consists possibly only of  $R - C$  or  $R - L$  or  $L - C$  in series, find the relationship between the two elements.



(A)  $R = 1\text{k}\Omega, C = 10\mu\text{F}$

(B)  $R = 1\text{k}\Omega, C = 1\mu\text{F}$

(C)  $R = 1\text{k}\Omega, L = 10\text{H}$

(D)  $R = 1\text{k}\Omega, L = 1\text{H}$

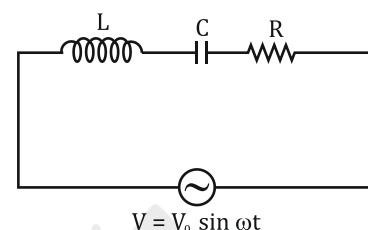
**Q.7** For the LCR circuit, shown here, the current is observed to lead the applied voltage. An additional capacitor  $C'$ , when joined with the capacitor  $C$  present in the circuit, makes the power factor of the circuit unity. The capacitor  $C'$ , must have been connected in

(A) series with  $C$  and has a magnitude  $\frac{1-\omega^2 LC}{\omega^2 L}$

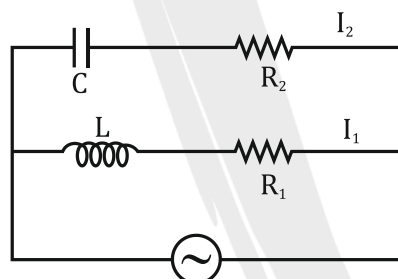
(B) series with  $C$  and has a magnitude  $\frac{C}{(\omega^2 LC - 1)}$

(C) parallel with  $C$  and has a magnitude  $\frac{C}{(\omega^2 LC - 1)}$

(D) parallel with  $C$  and has a magnitude  $\frac{1-\omega^2 LC}{\omega^2 L}$ .



**Q.8** In the given circuit,  $C = \frac{\sqrt{3}}{2}\mu\text{F}$ ,  $R_2 = 20\Omega$ , and  $R_1 = 10\Omega$ . Current in  $L - R_1$  path is  $I_1$  and in  $C - R_2$  path it is  $I_2$ . The voltage of A.C source is given by,  $V = 200\sqrt{2}\sin(100t)$  volts. The phase difference between  $I_1$  and  $I_2$  is



(A)  $0$

(B)  $30^\circ$

(C)  $90^\circ$

(D)  $60^\circ$

(E) none of these is correct.

**Q.9** An AC circuit has  $R = 100\Omega$ ,  $C = 2\mu\text{F}$  and  $L = 80\text{mH}$  connected in series. The quality factor of the circuit is

(A)  $2$

(B)  $0.5$

(C)  $20$

(D)  $400$

**Q.10** In a series LR circuit  $X_L = R$  and power factor of the circuit is  $P_1$ . When capacitor with capacitance  $C$  such that  $X_L = X_C$  is put in series, the power factor becomes  $P_2$ . The ratio  $\frac{P_1}{P_2}$  is

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

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

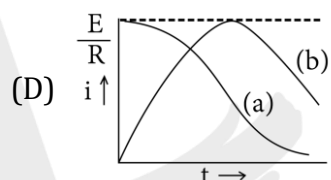
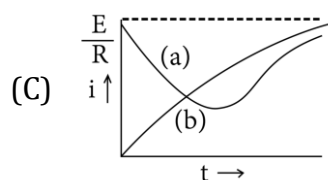
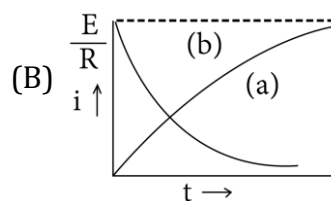
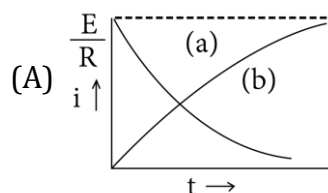
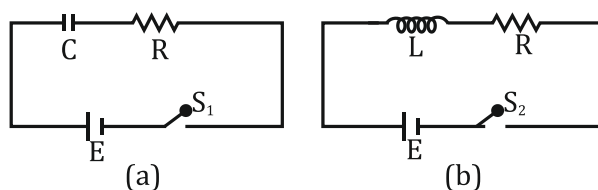
(C)  $\frac{\sqrt{3}}{\sqrt{2}}$

(D)  $2 : 1$

(Physics)

ALTERNATING CURRENT

**Q.11** In the circuit (a) and (b) switches  $S_1$  and  $S_2$  are closed at  $t = 0$  and are kept closed for a long time. The variation of currents in the two circuits for  $t \geq 0$  are roughly shown by (figures are schematic and not drawn to scale).



## ANSWER KEY

1. 5    2. 9    3. 3    4. 22    5. (A,C)    6. (A)    7. (D)  
8. (E)    9. (A)    10. (B)    11. (A)

## Home Work

Ex. 1	Q. Complete Exercise except 6,7,8
Ex. 2	Q Complete exercise
Ex.3	Q.3,4,5,6,10,11,12,13,14,15,16,17,18,19,20,
Ex.4	Q5,7,8,9,10,
Ex.5	Q. 2,3,4,5,6,7,8,9,10,11,