

India's Number 1 Education App

# **PHYSICS**

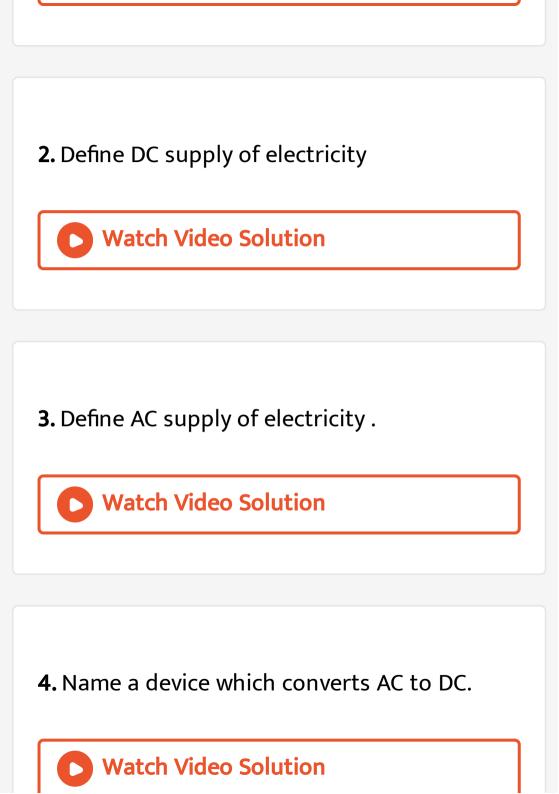
# **BOOKS - CHETANA PUBLICATION**

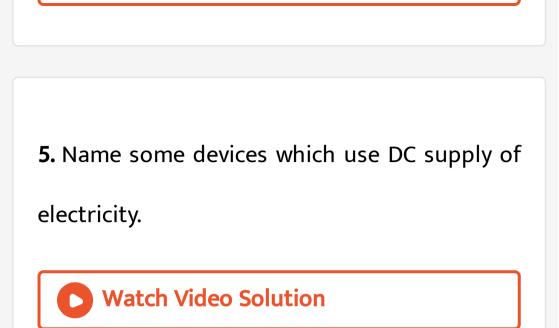
# **AC CIRCUITS**



**1.** Which are the two types of supplies of electricity?







#### 6. Name domestic appliances which run on AC

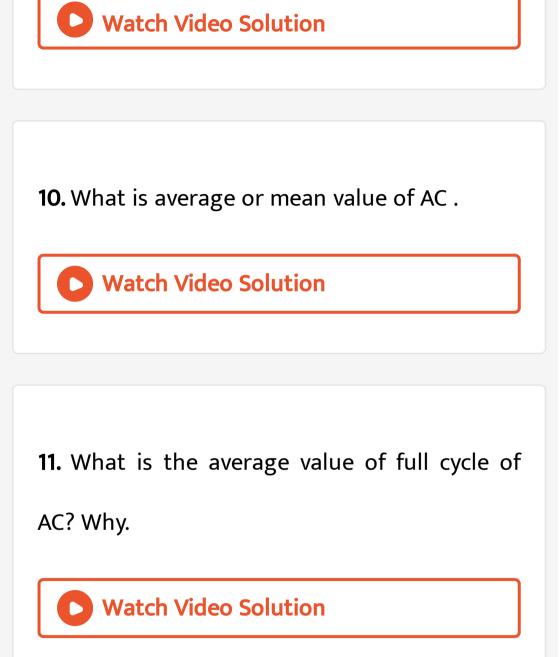
supply of electricity.

7. State the expression for emf of an AC source.
Watch Video Solution
8. State the expression for current of AC

source.



**9.** What is peak value of AC.



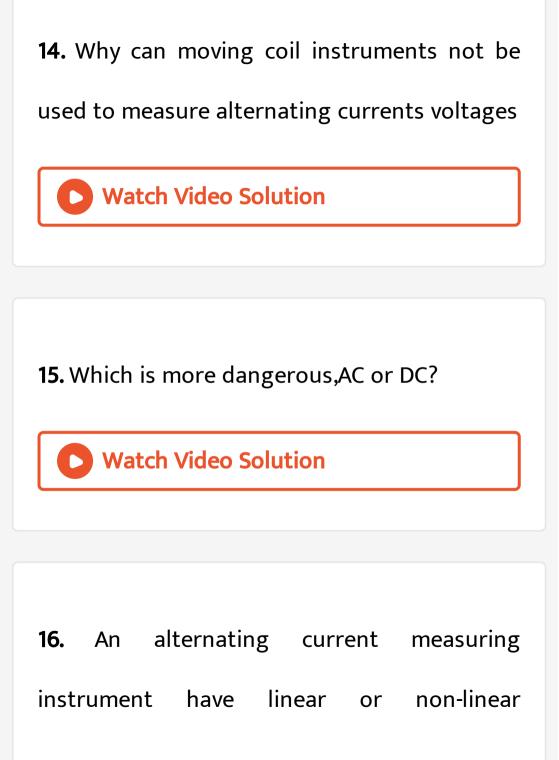
12. What is the relation between peak value

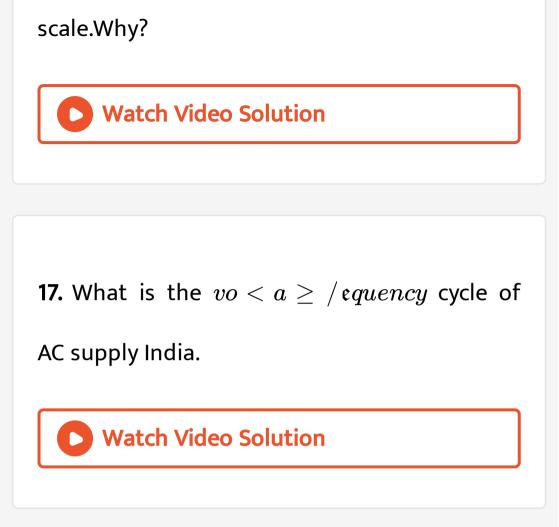
and average value of AC .

Watch Video Solution

13. What does an ammeter or voltmeter

measure? Average value or peak value.





**18.** What is peak value and r.m.s. value of alternating current?



**19.** What is peak value and r.m.s. value of alternating e.m.f.in the electric circuit?



#### 20. Derive expression for heat produced by the

AC source in time t.

**21.** An alternating voltage is given by e=6 sin

314t.Find:- the peak value

Watch Video Solution

22. An alternating voltage is given by e=6 sin

314t.Find:- frequency

23. An alternating voltage is given by e=6 sin

314t.Find:- time period and

Watch Video Solution

24. An alternating voltage is given by e=6 sin

314t.Find:-instantaneous value at time t=2ms

25. An alternating voltage given by e=140 sin

3142t is connected across a pure resistor of

 $50\Omega$ .Find:- the frequency of the source



**26.** An alternating voltage given by e=140 sin 3142t is connected across a pure resistor of  $50\Omega$ .Find:- the rms current through the resistor.

**27.** An alternating e.m.f. is given by 100 sin 100  $\pi$ t o a pure resistance of 50 $\Omega$ . calculate:- peak value of e.m.f



28. An alternating e.m.f. is given by 100 sin

 $100\pi t$  to a pure resistance of  $50\Omega$ . calculate:-

frequency

**29.** An alternating e.m.f. is given by 100 sin  $100\pi$ t to a pure resistance of 50 $\Omega$ . calculate:-r.m.s current through the circuit.



# **30.** The r.m.s. value of current $is(2)\sqrt{2}$

A.Calcutate its peak value of current.



**31.** An e.m.f. of peak value 100 V and frequency 60 r.p.s is supplied to the bulb.Write down the

equation of supplied voltage.



**32.** The A.C. current passing through  $60\Omega$  resistor causes a power loss of 6000 W. Find the r.m.s current and its maximum value . What are maximum value and r.m.s value of

D.C? What is the value of D.C.current that produces same power loss as the A.C. current? Watch Video Solution

**33.** If the effective current in a 50 cycle AC circuit is 5A, what is the peak value of current? What is the current 1/600sec.after it was Zero?

**34.** A light bulb is rated 100 W for 220V ACsupply of 50 Hz.Calculate:-resistance of the bulb.

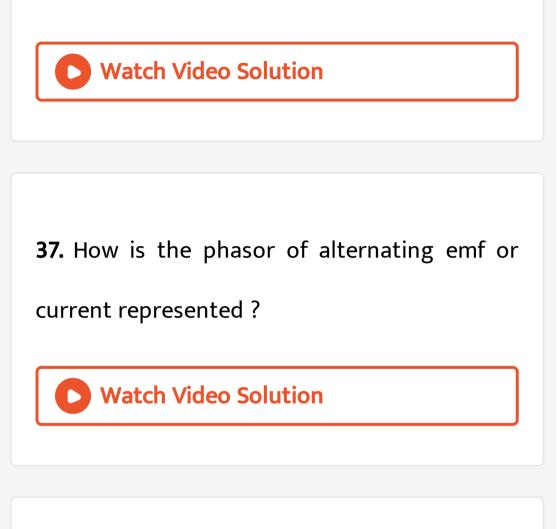


**35.** A light bulb is rated 100 W for 220V ACsupply of 50 Hz.Calculate:-the rms current

through the bulb.



**36.** What is a phasor ?What is phasor diagram?



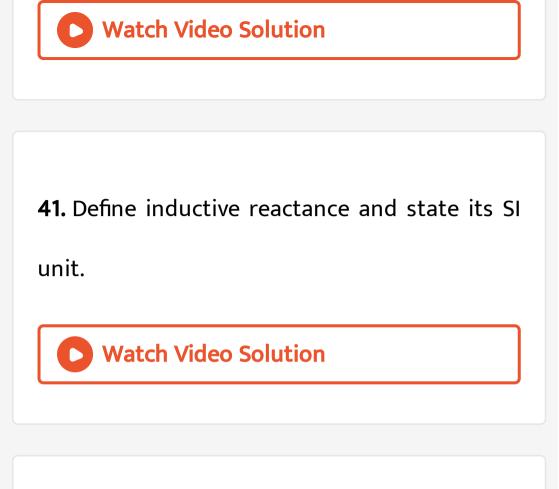
**38.** Explain the theory of an A.C.circuit with resistor. Draw the phasor diagram for it.



**39.** An alternating e.m.f. is applied to a circuit containing resistance. Discuss the behaviour of current in the circuit. Also discuss the phase diagram for it.

Watch Video Solution

**40.** Explain the theory of A.C. circuit with pure inductor .Draw the phasor digram for voltage and current in the circuit.



42. How does inductive reactance vary with

frequency f and inductance L?

**43.** Show graphically the variation of  $X_L$  with frequency f. Watch Video Solution **44.** What is SI unit and dimension of  $X_L$ . Watch Video Solution **45.** Why does a pure inductor pass DC and

block AC of high frequency



**46.** An inductor of inductance 200 mH is connected to an AC source of peak emf 210 V and frequency 50 Hz.Calculate the peak current. What is the instantaneous voltage of the source when the current is at its peak value?



**47.** An AC circuit consists of only an inductor of inductance 2 H. If the current is represented by a sine wave of amplitude 0.25 A and frequency 60Hz,calculate the effective potential difference across the inductor

**Watch Video Solution** 

**48.** Alternating emf of e=220 sin 100  $\pi t$  is applied to a circuit containing an inductance of  $\left(\frac{1}{\pi}\right)$  henry. Write an equation for

instantaneous current through the circuit. What will be the reading of the AC galvenometer connected in the circuit?

Watch Video Solution

**49.** Find the reactantance of a coil of inductance 100mH at a frequency 50 Hz and 1000 Hz.

50. An inductor of 500 mH is connected across

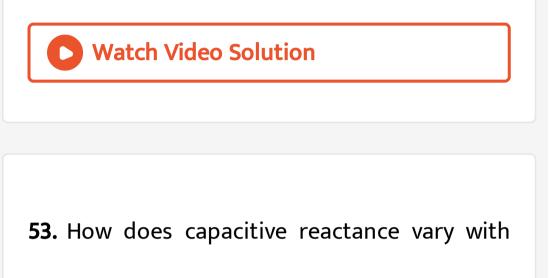
a 100 V,50 Hz suppy. Calculate its reactance.

#### Watch Video Solution

**51.** Explain the theory of an A.C. circuit in a purely capacitive circuit. Draw the Phasor diagram for voltage and current in it



**52.** Define capacitive reactane  $X_C$ .



frequency and capacitance?

Watch Video Solution

**54.** A device Y is connected across an AC source of emf e = $e_o \sin \omega t$ .the current through

y is given as i = $i_o \sin\left(\omega t + \left(\frac{\pi}{2}\right)\right)$ :-Identify the device Y and write the expression for its

reactance.

Watch Video Solution

**55.** A device Y is connected across an AC source of emf e = $e_o \sin \omega t$ .the current through y is given as i = $i_o \sin \left( \omega t + \left( \frac{\pi}{2} \right) \right)$ :-Draw graphs showinh variation of emf and current with time over one cycle of AC for Y.

**56.** A device Y is connected across an AC source of emf e = $e_o \sin \omega t$ .the current through y is given as i = $i_o \sin \left( \omega t + \left( \frac{\pi}{2} \right) \right)$ :-How does the reactance of the device Y vary with the frequency of the AC? Show graphically.

Watch Video Solution

57. A device Y is connected across an AC source

of emf e = $e_o \sin \omega t$ .the current through y is

given as i =
$$i_o \sin \Bigl( \omega t + \Bigl( rac{\pi}{2} \Bigr) \Bigr)$$
:-Draw the

phasor diagram for the device Y.



58. Draw the graph of capacitive reactance

against frequency of a.c. source. Hence discuss

its conclusion.



**59.** State SI unit and dimensions of  $X_c$ .

**60.** A capacitor of  $2\mu F$  is connected to an AC source of emf e = 250 sin  $100\pi t$ . Write an equation for instantaneous current through the circuit and give reading of AC ammeter connected in the circuit.



**61.** A capacitor draws 20 A current at 240 V, 50 Hz. Findthe capacitive reactance and the capacitance of the capacitor.



**62.** A  $100\mu$ F capacitor is charged with a 50 V source supply. Then source supply is removed and the capacitor is connected across an inductance of reactance  $10\Omega$ , as a result of which 5A current flows through the

inductance.



**63.** A  $15.0\mu F$  capacitor is connected to a 220 V 50 Hz source. Find the capacitive reactance and the current (rms and peak) in the circuit. If the frequency is doubled, what will happen to the capacitive reactance and the current?

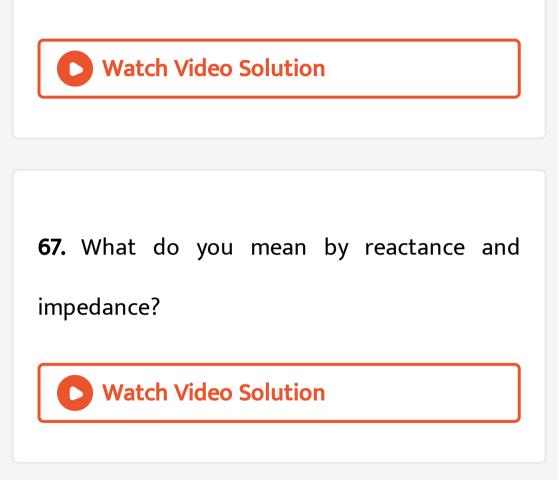


**64.** Obtain an expression for impedance of resistor, pure inductor and capacitor connected in series across alternating e.m.f. State formula for phase difference.

Watch Video Solution

**65.** Define impedance. State its SI unit.

66. State SI unit and dimensions of impedance.



68. Define admittance, State its SI unit.

### **69.** What happens in LCR circuit when` X\_L=X\_C

,X\_L>X\_C,X\_L



#### 70. Draw and explain impedance triangle.



**71.** A 100 mH incftictor,  $a25\mu F$  capacitor and a  $15\Omega$  resistor is connected in series to a 120 V, 50 Hz. AC source. Calculate:-impedance of the circuit at resonance

**Watch Video Solution** 

**72.** A 100 mH incftictor, a 25 pF capacitor and a 15 Q resistor is connected in series to a 120 V, 50 Hz. AC source. Calculate:-current at

resonance





73. A 100 mH incftictor, a 25 pF capacitor and a
15 Q resistor is connected in series to a 120 V,
50 Hz. AC source. Calculate:-Resonant
frequency

Watch Video Solution

**74.** A coil of 0.01 H inductance and  $I\Omega$  resistance is connected to 200 V, 50 Hz AC supply. Find the impedance of the circuit and

time lag between maximum alternating

voltage and current.

# Watch Video Solution

**75.** In LCR circuit, inductance  $L = \frac{2}{\pi}H$ , capacitance  $C = \frac{10}{\pi}$  F and resistance 10 Omega are connected in series to A.C. source of frequency = 50 Hz. Find:-inductive reactance

**76.** In LCR circuit, inductance $L = \frac{2}{\pi}H$ , capacitance $C = \frac{10}{\pi}$  F and resistance 10 Omega are connected in series to A.C. source of frequency = 50 Hz. Find:-capacitive reactance

77. In LCR circuit, inductance 
$$L = \frac{2}{\pi}H$$
,  
capacitance  $C = \frac{10}{\pi}$  F and resistance 10  
Omega are connected in series to A.C. source

of frequency = 50 Hz. Find:-impedance of the

circuit.



**78.** When 100 V D.C. is applied across a coil, a current of 1A flows through it. When 100 V A.C. of frequency 50 Hz is applied to the same coil only 0.5 A current flows through it. Calculate resistance, and self inductance of the coil



**79.** A capacitor of  $20\mu F$  is connected in series with a  $25\Omega$  resistance to peak e.m.f. 240 V, 50 Hz A.C. Calculate:-the capacitive reactance of the coil

Watch Video Solution

**80.** A capacitor of  $20\mu F$  is connected in series

with a  $25\Omega$  resistance to peak e.m.f. 240 V, 50

Hz A.C. Calculate:-impedance of the circuit

**81.** A  $100\Omega$  resistor is connected to a 220 V, 50 Hz supply:-What is the rms value of current in

the circuit?



**82.** An alternating e.m.f. of peak value 110 V andfrequency 50 Hz is connected across LCR series circuit with R =  $100\Omega$ , L = 10 mH, C =  $25\mu F$ . Calculate the inductive reactance, capacitive reactance and impedance.



**83.** A capacitor of  $25\mu F$ , inductor of 0.1 H and resistor of resistance  $25\Omega$  are connected in series with an A.C. source of e.m.f., e = 310 sin (314 t) volt. What is the :-reactance

Watch Video Solution

**84.** A capacitor of  $25\mu F$ , inductor of 0.1 H and resistor of resistance  $25\Omega$  are connected in series with an A.C. source of e.m.f., e = 310 sin (314 t) volt. What is the:- impedance and

current of the circuit



**85.** A capacitor of  $25\mu F$ , inductor of 0.1 H and resistor of resistance  $25\Omega$  are connected in series with an A.C. source of e.m.f., e = 310 sin (314 t) volt. What is the:-phase angle between current and applied e.m.f.



**86.** A capacitor of  $25\mu F$ , inductor of 0.1 H and resistor of resistance  $25\Omega$  are connected in series with an A.C. source of e.m.f., e = 310 sin (314 t) volt. What is the :-reactance

**Watch Video Solution** 

**87.** An A.C. supply of frequency 50 Hz is supplied to a series combination of  $25\mu F$  condenser, 0.1H inductor and  $24\Omega$  resistor. Calculate inductive and capacitive reactance. Also find impedance of the circuit.



# **88.** A capacitor of $100\mu F$ , a coil of resistance $50\Omega$ and an inductance 0.5 H are connected in series with a 110 V-50 HZ source. Calculate the mis value of current in the circuit.



**89.** A  $10\mu F$  capacitor is charged to a 25 volt of potential.The battery is disconnected and a

pure 100 mH coil is connected across the capacitor so that LC oscillations are set up. Calculate the maximum current in the coil.

Watch Video Solution

**90.** An electric lamp is connected in series with a capacitor and an AC source is glowing with a certain brightness. How does the brightness of the lamp change on increasing the capacitance? **91.** The total impedance of a circuit decreases when a capacitor is added in series with L and

R. Explain why?

Watch Video Solution

92. For very high frequency AC supply, a

capacitor behaves like a pure conductor. Why?

**93.** A  $25\mu F$  capacitor, a 0.10 H inductor and a  $25\Omega$  resistor are connected in series with a AC source whose emf is given by e = 310 sin 314 t (volt). What is the frequency, reactance, impedance, current and phase angle of the circuit?

**O** Watch Video Solution

94. Derive an expression for the average power

associated with resistance in AC circuit.

**95.** A  $100\Omega$  resistor is connected to a 220 V, 50 Hz supply:-What is the rms value of current in the circuit?

**Watch Video Solution** 

**96.** A  $100\Omega$  resistor is connected to a 220 V, 50

Hz supply:- What is the net power consumed

over a full cycle?

97. Show that average power over a complete

cycle of AC through an ideal inductor is zero.

Watch Video Solution

**98.** Show that the average power supplied to an ideal capacitor by the source over a complete cycle is zero.

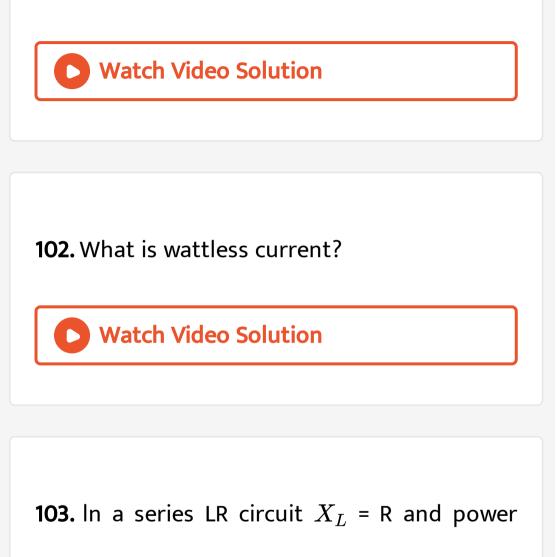
**99.** Find the capacity of a capacitor which when put in series with a  $10\Omega$  resistor makes the power factor equal to 0.5. Assume an 80 V -100 Hz AC supply.

**Watch Video Solution** 

**100.** Obtain an expression for power consumed in a LCR series circuit. Hence obtain

an expression for power factor of the circuit.

101. Define power factor



factor of the circuit is $P_1$ . When capacitor with

capacitance C such that  $X_L = X_C$  is p ut in

series the power factor becomes P\_2. Calculate

 $P_1 / P_2.$ 

# Watch Video Solution

**104.** A sinusoidal voltage of peak value 283V and frequency 50 Hz is applied to a series LCR circuit in which R =  $3\Omega$ , L = 25.48 mH and C =

 $796 \mu f$ . Find:-The impedance of the circuit

**105.** A sinusoidal voltage of peak value 283V and frequency 50 Hz is applied to a series LCR circuit in which R =  $3\Omega$ , L = 25.48 mH and C =  $796\mu f$ . Find:-The phase difference between the voltage across source and the currents

**Watch Video Solution** 

**106.** A sinusoidal voltage of peak value 283V and frequency 50 Hz is applied to a series LCR

circuit in which R =  $3\Omega$ , L = 25.48 mH and C =

 $796 \mu f$ . Find:-The power factor



**107.** A sinusoidal voltage of peak value 283V and frequency 50 Hz is applied to a series LCR circuit in which R =  $3\Omega$ , L = 25.48 mH and C =  $796\mu f$ . Find:-The power dissipated in the surface.



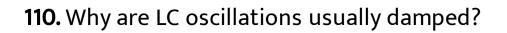
**108.** An alternating voltage of 240V, 50 Hz is applied to 20H inductance coil and resistance  $300\Omega$ . Calculate, inductive reactance power

factor and power absorbed.

Watch Video Solution

109. How oscillations are produced usingan

inductor and a capacitor?



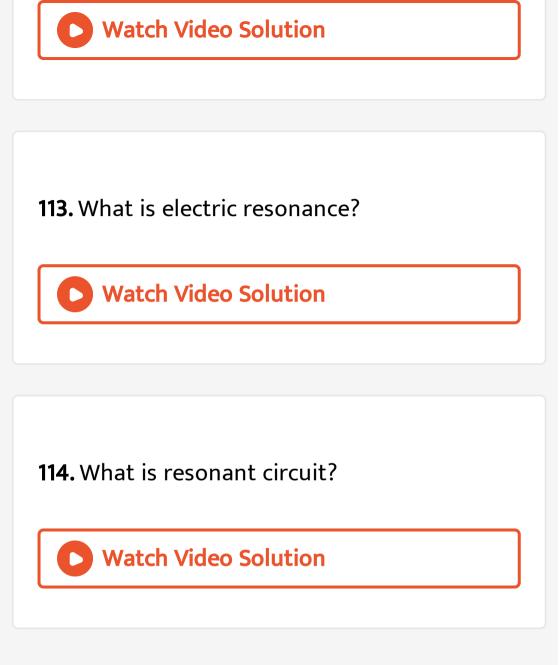


**111.** Calculate the value of capacity in picofarad, which will make 101.4 micro henry inductance to oscillate with frequency of one megahertz.

Watch Video Solution

112. What is natural frequency of oscillation of

a system?



115. Which are the different types of electric

resonance circuits?

Watch Video Solution

**116.** Explain series resonance in LCR circuit.

Watch Video Solution

117. Define series resonant frequency.

118. State the applications of series resonant

circuit.



### 119. State the condition for series resonance.

Obtain an expression for resonant frequency.



120. Draw series resonance curve and discuss

its importance.

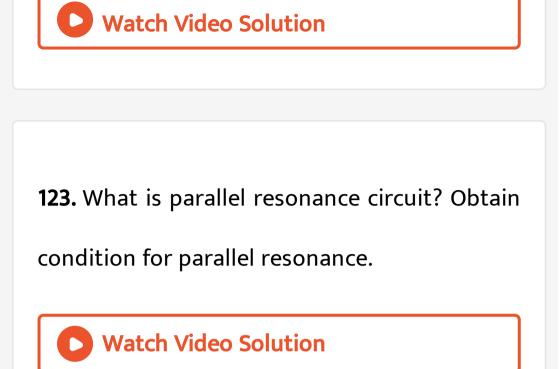


### 121. State the characteristics of series

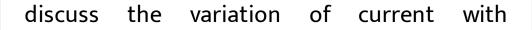
resonance circuit.



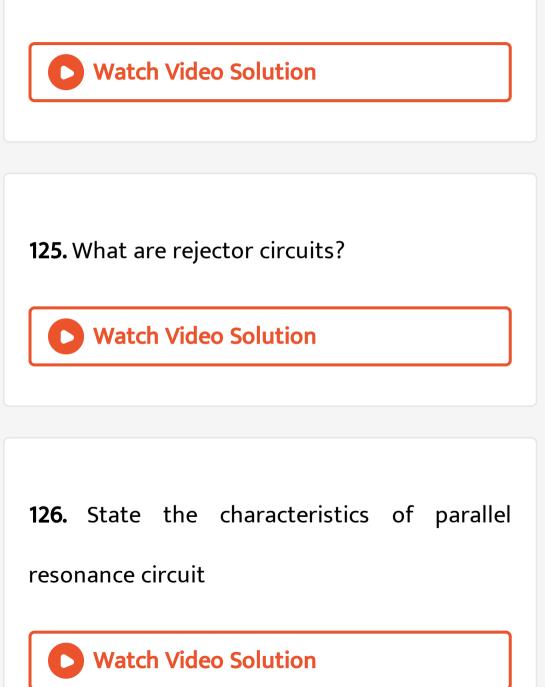
122. What are acceptor circuits?



**124.** Define resonance frequency in parallel resonance. Obtain an expression for resonance frequency in parallel LC circuit. Also



frequency.



**127.** An A.C. voltage is applied to parallel combination of inductance 2 mH and a capacitor  $3.2\mu F$ . Calculate the resonant frequency.

**Watch Video Solution** 

**128.** A series LCR circuit has capacitor of  $0.2 \mu F$ and inductor of 8 mH. Find its resonant

frequeiucy.



**129.** In series LCR circuit, the inductor of inductance . 100 mH, a resistor of  $10\Omega$ , and a variable. capacitor are connected across 20 V, 50 Hz supply. At what capacitance will resonance occur? Find the corresponding current.



**130.** An A.C. voltage of r.m.s. value 1 V is applied to a parallel combination of inductor L = 10 mH, and capacitor  $4\mu F$ . Calculate the resonant frequency and current through each branch and resonance.

Watch Video Solution

**131.** A coil of resistance  $5\mu$  and self inductance 0.2 H is connected in series with a variable capacitor across 30 V, 50 Hz supply. At what

value of capacitor resonance will occur? Find

the corresponding current.



**132.** In a resonant circuit, inductance of the coil is 3 mH and resonant frequency is 1000 kHz. What is the value of capacitor in the circuit?

**133.** An A.C. circuit consists of a resistor of  $5\Omega$ and inductor of 10 mH connected in series with 50 V, 50 Hz supply. What capacitance should be connected in series with the circuit to obtain maximum current? What will be the maximum current?

Watch Video Solution

**134.** In LCR series combination R =  $10\Omega$ , L = 1

mH, C =  $2\mu F$ . Determine :- resonant frequency,



**135.** In LCR series combination  $R = 10\Omega$ , L = 1 mH,  $C = 2\mu F$ . Determine :- the current in the circuit when an alternating voltage of 10 mV operating at the resonant frequency is applied to the series combination.

Watch Video Solution

**136.** An A.C. circuit consists of inductor of inductance 125 mH connected in parallel with

a capacitor of capacity  $50\mu F$ . Determine the

resonant frequency.



**137.** The LCR series circuit has an inductance 50 mH and a capacitor  $0.1 \times 10^{-6}F$  and a resistance 200 $\Omega$ . Find the impedance at resonance and resonant frequency

138. What is half power frequency in series LCR

circuit.

Watch Video Solution

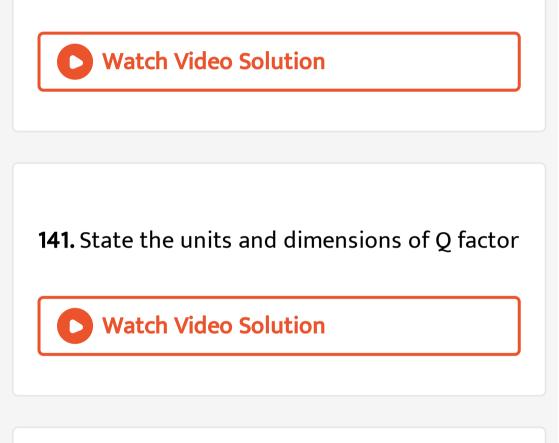
139. Define Q factor of series resonant circuit

and state formula



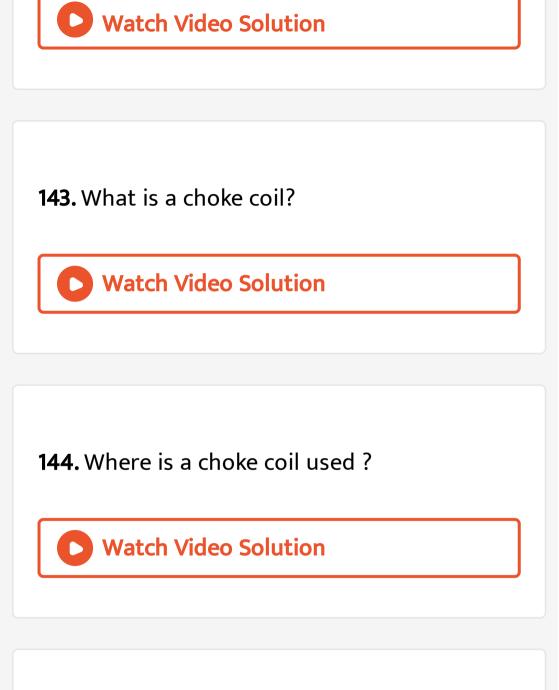


series LCR circuit to explain the Q-factor.

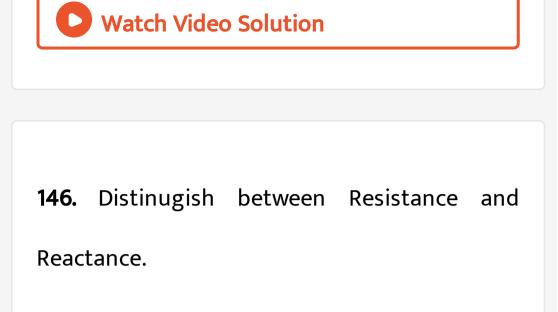


142. What happens if Q factor of LCR circuit is

large.



145. Write a short note on choke coil.



Watch Video Solution

147. Differences between series and parallel

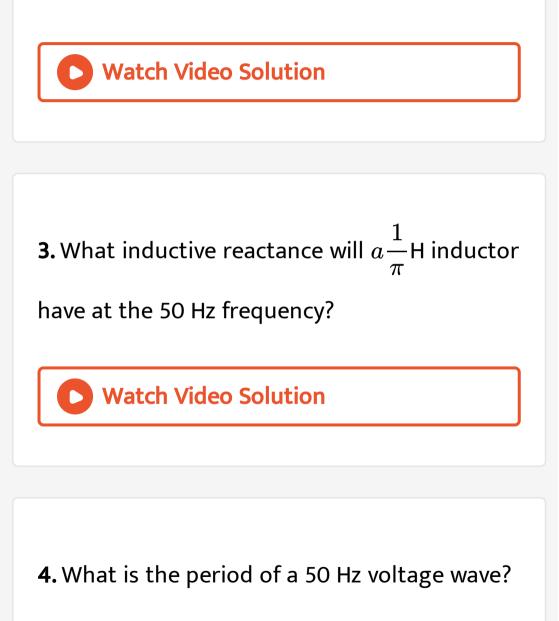
resonance.

**1.** A LCR series circuit has the impedance of 240 ohm. If R =  $120\Omega$ , find the power factor of the circuit.

Watch Video Solution

**2.** In LCR series circuit a voltmeter is connected in turn acrosstheendsof R,LandC, and the voltages are found to be 192 V, 200V and 56 V respectively. Find the phase angle and hence

the power factor of the circuit





5. An inductor draws 5A of current at 230 V, 50

Hz. Find the value of inductive reactance and

the inductance.

Watch Video Solution

6. A capacitor draws 10 Aof current at 230 V, 50

Hz. Find the capacitive reactance and the

capacitance of the capacitor.

7. A circuit connected to a 200 V supply takes a

current of 4.8 A. If the angle of lag is  $25^{\,\circ}$  , find

the power absorbed.

Watch Video Solution

**8.** A voltage e =  $50\sqrt{2}$ sin 314.0 t volt is applied

across a 10 ohm resistor. Find:- peak value of

emf

**9.** A voltage e =  $50\sqrt{2}$ sin 314.0 t volt is applied

across a 10 ohm resistor. Find:-frequency

# Watch Video Solution

## **10.** A voltage e = $50\sqrt{2}$ sin 314.0 t volt is applied

across a 10 ohm resistor. Find:-rms current (i.e.

an ac ammeter reading) through the circuit.



**11.** A 2H inductor of negligible resistance is connected to a 50 V, 50 Hz power line:- What is the inductive reactance?



**12.** A 2H inductor of negligible resistance is connected to a 50 V, 50 Hz power line:- What

isthe current in the coil?

**13.** A peak value of alternating voltage is 494.97 V. Find reading on voltmeter used to measure it?

Watch Video Solution

**14.** In a purely inductive ac circuit L = 25 mH and peak voltage of ac supply is150 V. Find inductive reactance and maximum current if the frequency is 50 Hz.



15. An inductor has a reactance of  $125.6\Omega$  at

200 Hz. What is the inductance?

Watch Video Solution

16. An alternating e.m.f. given by e = 50 sin 314tis applied to a pure resistance of 100 ohm.Find:-peak value of e.m.f.

17. An alternating e.m.f. given by e = 50 sin 314tis applied to a pure resistance of 100 ohm.Find:-frequency



18. An alternating e.m.f. given by e = 50 sin 314t

is applied to a pure resistance of 100 ohm.

Find:-r.m.s. current through the circuit



19. An alternating e.m.f. given by e = 50 sin 314t is applied to a pure resistance of 100 ohm. Find:- power dissipated in the circuit.

Watch Video Solution

**20.** A 60 watt lamp is connected to an alternating e.m.f. of peak value 230 volt. Find the peak value of current flowing through the lamp.

**21.** When an a.c. current passes through a  $14\Omega$  resistor, the power loss is 224 W. Find the r.m.s. values of current and voltage. Also find the maximum values of current and voltage. Find the steady value of current which when passed through this resistor will produce the same power loss as the a.c. current.

22. Calculate the reactance of a 2H inductance

in an a.c. circuit of frequency 50 Hz.



capacitance in an a.c. circuit of frequency 50

Hz.

24. A coil has an inductance of 0.5H. Calculate:-

its inductive reactance when connected to 240

V (peak), 50 Hz A.C.



## 25. A coil has an inductance of 0.5H. Calculate:-

its impedance if the resistance of the circuit is

 $50\Omega$ and



**26.** A coil has an inductance of 0.5H and a resistance of 100 ohm are connected in series to 240v, 50 Hz supply. Calculate:- the maximum current in the circuit.



**27.** An a.c. e.m.f. of peak value 240 V and frequency 50 Hz is connected to a circuit with  $R = 12\Omega$ , L = 2.5 H and a capacitor all in series. Find the capacitance for the current in the

circuit to be maximum. Find the maximum

current.



**28.** Find the current in a circuit consisting of a coil and a capacitor in series with an A.C. source of 110 V (r.m.s.), 60 Hz. The inductance of the coil is 0.80 H and its resistance is  $50\Omega$ . The capacitance of the capacitor is  $8\mu F$ .



**29.** In a series LCR circuit, R =  $20\Omega$ , C =  $10\mu F$ 

and L = 25 mH.The frequency of applied a.c.

e.m.f. of 240 volt (peak) is 50 Hz. Calculate :-

impedance of the circuit

Watch Video Solution

**30.** In a series LCR circuit, R =  $20\Omega$ , C =  $10\mu F$ 

and L = 25 mH.The frequency of applied a.c.

e.m.f. of 240 volt (peak) is 50 Hz. Calculate :-

maximum current



**31.** In a series LCR circuit,  $R = 20\Omega$ ,  $C = 10\mu F$ and L = 25 mH.The frequency of applied a.c. e.m.f. of 240 volt (peak) is 50 Hz. Calculate :phase angle between the current and the voltage

Watch Video Solution

**32.** In a series LCR circuit, R =  $20\Omega$ , C =  $10\mu F$ and L = 25 mH.The frequency of applied a.c. e.m.f. of 240 volt (peak) is 50 Hz. Calculate :-

maximum current



**33.** In a series LCR circuit, R =  $20\Omega$ , C =  $10\mu F$ 

and L = 25 mH.The frequency of applied a.c.

e.m.f. of 240 volt (peak) is 50 Hz. Calculate :-

average power delivered to the circuit.

**34.** In a series resonant circuit, the inductance coil is of 0.2 H and the resistance coil is of  $50\Omega$ . What is the value of capacitance in the circuit for resonance to occur at a frequency of 1500 kHz? The source has an e.m.f. of 100 V r.m.s.?



35. Find the reactance of a 0.8Hinductance call

on an A.C. line of frequency 50 Hz.

**36.** Find the impedance of a LR circuit with R =  $50\Omega$  in series with an inductive reactance of  $30\Omega$ .



**37.** An A.C. circuit of maximum e.m.f. 100 volt and of frequency 50 Hz contains an inductance of 0.2 mH. What is the inductive reactance of the circuit? What is the maximum current in the circuit?



**38.** An A.C.source of r.m.s. value85V and frequency 50Hz is connected in series with an inductance of 2H and a resistance of  $10\Omega$ . Find the maximum current in the circuit.

Watch Video Solution

**39.** A resistance of  $160\Omega$  is used in series with an inductance L and an a.c. of 230 V, 50 Hz. If

the current in the circuit is 0.25A, find L.

### Watch Video Solution

**40.** An A.C. e.m.f. of peak 220 V, 50 Hz is connected to an inductance of 253 mH and a resistance of  $9\Omega$  series calculate the impedance of the circuit and the r.m.s. current in the circuit.

**41.** A circuit has a resistance and a reactance each equal to  $100\Omega$ . Find its power factor. If the circuit draws a current of 1.5 A for an applied voltage of 200 V, what is the average power consumed in the circuit?



42. An A.C. circuit of peak e.m.f. 200 V and of

frequency 50 Hz contains an inductive of 0.1 H

and resistance  $10\Omega$  in series. Find the power

factor and the power consumed in the circuit



**43.** Find the capacitive reactance of a  $100 \mu F$ 

capacitor used on a A.C.source of 50 Hz.

Watch Video Solution

**44.** A capacitance of  $0.4\mu F$  is connected to an alternating e.m.f. of frequency 100 Hz. What is



Watch Video Solution

**45.** A capacitor of  $50\mu F$  is connected across a 100 V, 50 Hz a.c. supply. Find the reactance and the r.m.s. current.

Watch Video Solution

**46.** An a.c. series circuit has a source of maximum e.m.f. 220 V at a frequency of 50 Hz

connected to a capacitor of 8pF, an inductor of

0.8 H and a non-inductive resistor of  $50\Omega$ .

What is the maximum current in the circuit?

## Watch Video Solution

**47.** The resonant frequency of a parallel LC circuit is 1000 kHz. If L = 3mH, find the capacitance used.

**48.** Find the capacitance to be connected in parallel with a 100 mH inductance to achieve a resonance frequency of 50 Hz.



**49.** An A.C. voltage of r.m.s. value IV is applied to a parallel combination of inductor L = 10mH and capacitor C =  $4\mu F$ . Calculate the resonant frequency and current through each branch at resonance.



**50.** A capacitor is used with an A.C. source of 110 V and frequency 50 Hz. If the maximum current in the circuit is 4.89 A, calculate the capacitance

Watch Video Solution

**51.** An a.c. consists of a resistor of 10W, inductor of 0.1 H and capacitor of 50 mF in

series across a 50 V, 50 Hz supply. Determine

power factor of the circuit.



**52.** An A.C. circuit consists of inductor of inductance 125 mH connected in parallel with a capacitor of capacity  $50\mu F$ . Determine the resonant frequency.

**53.** In an ac circuit, V and I are given by V =  $100\sin(100t)$  volts,I = $100\sin\left(100t + \frac{\pi}{3}\right)$ mA.The power dissipated in circuit is

A.  $10^4 wa$ 

B. 10 watt

C. 2.5 watt

D. 5 watt

#### Answer:



54. The frequency of ac mainsin India is

A. 30c/s or Hz

B.50c/s or Hz

C.60c/s or Hz

D. 120c/s or Hz

Answer:

55. The peak value of 220 volts of ac mainsis

A. 155.6 volts

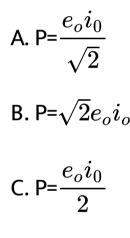
B. 220.0 volts

C. 311.0 volts

D. 440 volts

Answer:

**56.** If a current I given by  $I_o \sin\left(\omega - \frac{\pi}{2}\right)$ flows in an ac circuit across which an potential of  $e = e_0 \sin \omega t$  has been applied, then the power consumption P in the circuit will be.



D. P=0

Answer:



#### 

**57.** In an ac circuit, the current is given by I =  $5\sin\left(100t - \frac{\pi}{2}\right)$  and the ac potential is V=200sin(100)volt.Thenthepower consumption

is

A. 20 watts

B. 40 watts

C. 1000 watts

D. 0 watts



**58.** The frequency of an alternating voltage is 50 cycles//sec and its amplitude is 120V. Then the r.m.s. value of voltage is

A. 101.3 V

B. 84.8 V

C. 70.7V

D. 56.5 V



**59.** The ratio of peak value and r.m.s. value of an alternating current is

A. 1 B.  $\frac{1}{2}$ C.  $\sqrt{2}$ D.  $\frac{1}{\sqrt{2}}$ 





# **60.** The power factor of LCR circuit at resonance is

A. 0.707

B. 1

C. zero

D. 0.5



## **61.** Power delivered by the source of the circuit becomes maximum, when

A. 
$$\omega L - \omega C$$

B. 
$$\omega L = rac{1}{\omega} C$$
  
C.  $\omega L = -\left(rac{1}{\omega C}
ight)^2$ 

D.  $\omega L = \sqrt{\omega} C$ 



**62.** In a circuit containing an inductance of zero resistance, the e.m.f. of the applied ac voltage leads the current by

A.  $90^{\,\circ}$ 

- B.  $45^{\circ}$
- C.  $30^{\circ}$

D.  $0^{\circ}$ 



**63.** An alternating e.m.f. is applied to purely capacitive circuit. The phase relation between e.m.f. and current flowing in the circuit is

A. e.m.f. is ahead of current by  $\frac{\pi}{2}$ 

B. current is ahead of e.m.f.  $by \frac{\pi}{2}$ 

C. current is ahead of e.m.f. by  $\pi$ 

D. current is ahead of e.m.f. by  $\pi$ 



**64.** An alternating current of frequency 'f isflowing in a circuit containing a resistance R and a choke L in series. The impedance of this circuit is

A. 
$$R+2\pi fL$$

B. 
$$\sqrt{R^2+4\pi^2 f^2 L^2}$$

C. 
$$\sqrt{R^2+L^2}$$

D.  $\sqrt{R^2+2\pi fL}$ 

Watch Video Solution

**65.** The average power dissipation in a pure capacitance in ac circuit is

A. 
$$rac{1}{2}CV^2$$

B.  $CV^2$ 

$$\mathsf{C}.\,\frac{1}{4}CV^2$$

#### D. Zero

#### Answer:

### Watch Video Solution

**66.** An alternating voltage e =  $200\sqrt{2}$  sin (100 t) is connected to a 1microfarad capacitor through an ac ammeter. The reading of the ammetershall be

#### A. 10mA

B. 20 mA

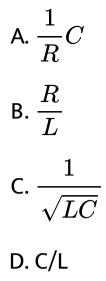
C. 40 mA

D. 80 mA

#### Answer:

Watch Video Solution

**67.** L, C and R denote inductance, capacitance and resistance respectively. Pick out the combination which does not have the dimensions of frequency





**68.** What will be the phase difference between

virtual voltage and virtual current, when the

current in the circuit is wattless

A.  $90^{\,\circ}$ 

B.  $45^{\,\circ}$ 

C.  $180^{\circ}$ 

D.  $60^{\circ}$ 

#### Answer:

Watch Video Solution

69. Power factor is maximum in an LCR circuit

when

A. 
$$X_L = X_C$$

#### B. R=0

$$\mathsf{C}.\,X_L=0$$

D. 
$$X_C=0$$

#### **Answer:**



70. The capacity of a pure capacitor is1Farad.

In DC circuits, its effective resistance will be

A. zero

#### B. infinite

C.1ohm

D. 
$$\frac{1}{2}ohm$$

#### Answer:



71. A 220 V, 50 Hz as source is connected to an

inductance of 0.2 H and a resistance of 20 ohm

in series. What is the current in the circuit.

A. 10 A

#### B. 5 A

C. 33.3 A

D. 3.33 A

#### Answer:

Watch Video Solution

72. For high frequency, a capacitor offers

A. More reactance

B. Less reactance

C. Zero reactance

D. Infinite reactance

#### Answer:

Watch Video Solution

**73.** In LCR circuit the pd between the terminals of the inductance is 60 V, between the terminals of the capacitor is 30 V and that

between the terminals of resistance is 40 V.

The supply voltage will be equal to

A. 50V

B. 70V

C. 130V

D. 10 V



**74.** In a LCR circuit capacitance is changed from C to 2C. For the resonant frequency to remain unchanged, the inductance should be changed from L to

A. 4 L

B. 2L

 $\mathsf{C.}\,L\,/\,2$ 

D. L/4





**75.** An oscillator circuit consists of an inductance of 0.5 mH and a capacitor of  $20\mu F$ . The resonant frequency of the circuit is nearly

A. 15.92 Hz

B. 159.2 Hz

C. 1592 Hz

D. 15910 Hz



## 76. Which of the following components of an

LCR circuit with ac supply, dissipates energy

A. L

B. R

C. C

D. All of these

#### Answer:

Watch Video Solution

**77.** The phase difference between the ac and emf is  $\frac{\pi}{2}$ . Which of the following cannot be the constituent of the circuit

A. LC

B. L alone

C. R alone

D. R,L





78. In an A.C. circuit the current

- A. Always leads the voltage
- B. Always lags behind the voltage
- C. It is alwaysin phase with the voltage
- D. May lead or lag behind or be in phase

with the voltage

#### Answer:

Watch Video Solution

**79.** Acoil of inductive reactance  $31\Omega$ has a resistance of  $8\Omega$ . It is placed in series with a condenser of capadtative reactance  $25\Omega$ . The combination is connected to an a.c.source of 110 volt. The power factor of the circuit is

A. 0.8

B. 0.33

C. 0.56

D. 0.64



**80.** A light bulb is rated 100 W for a 220 V supply. The resistance of the bulb and the peak voltage of the source respectively are

A.  $242\Omega$  and 311V

B.  $484\Omega$  and 311V

C.  $484\Omega$  and 440 V

D.  $242\Omega$  and 440 V



**81.** A 50 volt a.c. is applied across an RC (series) network. The rms voltage across the resistance is 40 volt, then the potential across the capadtance would be

A. 10 V

B. 20 V

C. 30 V

#### D. 40 V

#### Answer:

### Watch Video Solution

**82.** Apure inductor of 25 mHis conneded to a source of 220 V. Given the frequency of the source as 50 Hz, the rms current in the circuit is

#### A. 7 A

B. 14 A

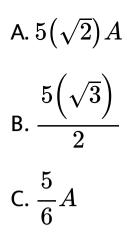
C. 28 A

D. 42A

#### Answer:

Watch Video Solution

**83.** If the rms current in a 50 Hz AC rircuit is 5A the value of the current  $\frac{1}{300}$  seconds after its value becomes zero is



D. 5/(sqrt2)A

#### **Answer:**



**84.** A resistor of  $500\Omega$  and an indudance of 0.5

H are in series with an AC source which is

given by V =  $100\sqrt{2}$  sin (1000 t). The power

fador of the combination is

A. 
$$rac{1}{\sqrt{2}}$$
  
B.  $rac{1}{s}qtr3$ 

D. 0.6



85. Thedisplacement currentisgivenby the

#### expression

A. 
$$\mu_o \left(1 + \varepsilon_o \frac{d\phi_E}{dt}\right)$$
  
B.  $\varepsilon_o \frac{d\phi_E}{dt}$   
C.  $\mu_o \varepsilon_o \frac{d\phi_E}{dt}$ 

D. 
$$\mu_o \mathcal{E}_o$$

#### Answer:

## Watch Video Solution

**86.** An alternating e.m.f. is given by e = 100 sin

314 t, the time within which the e.m.f. will half

of its maximum value is

A. 0.16 sec.

B. 0.016 sec.

C. 0.0016 sec.

D. 1.6 sec.

Answer:

Watch Video Solution

**87.** A sinusoidal voltage e = 200 sin (100 t) is applied acrossaresistance of  $100\Omega$  then current measured by D.C. ammeter is

A. 2 A

B. 2.828 A

C. 0.2 A

D. 0



**88.** Relation between  $e_rms$  and  $e_o$  is

A. 
$$rac{e_{rms}}{e_o}=rac{1}{\sqrt{2}}$$

B. 
$$e_{rms}=e_o\sqrt{2}$$

$$\mathsf{C.}\,e_{rms}=2e_o$$

D. 
$$e_o = e_{rms} \sqrt{2}$$

#### **Answer:**

## **Vatch Video Solution**

**89.** A6 $\Omega$  resistance and 8 $\Omega$  inductance are connected in series then power factor of the circuit is

A. 0.06

B. 0.6

C. 0.8

D. 
$$\frac{1}{8}$$



90. A current that does not perform any work

is

A. peak current

B. r.m.s. current

C. ideal current

D. eddy currents

#### **Answer:**

Watch Video Solution

# 91. In LCR series drcuit apparent power is

A. 
$$e_{r.m.s.} \cdot i_{r.m.s.}$$
  
B.  $\frac{e_{r.m.s.}}{i_{r.m.s.}}$   
C.  $\frac{i_{r.m.s.}}{e_{r.m.s.}}$ 

D. 
$$(e_{r.m.s.})^2 (i_{r.m.s.})$$

#### **Answer:**



**92.** Seled true statement for purely inductive circuit

A. current and voltage are in phase

B. current lags behind the e.m.f. by phase

of 
$$\frac{\pi}{2}rad$$

C. e.m.f. lags behind the current by phase

$$\mathsf{of}rac{\pi}{2}rad$$

D. current lags behind the e.m.f. by phase

of  $\pi rad$ 



# **93.** Resonance frequency for parallel LC circuit is given by

A. 
$$\left(L\frac{C}{2\pi}\right)$$

B. `1/(2pisqrt(LC)

C. 
$$\frac{2\pi}{LC}$$
  
D.  $\frac{\sqrt{LC}}{2\pi}$ 



**94.** In LCR series drcuit, at resonance the applied e.m.f. and current

A. out of phase

B. differ by  $\pi$  radians

C. in phase

D. differ by
$$rac{\pi}{2}rad$$



# **95.** In series LCR circuit, at resonance impedance

A. maximum

B. minimum

C. zero

D. infinite



## **96.** In series LCR circuit R = $4\Omega$ , L = 0.2 H and C =

## 0.1 F, at resonance impedance is

A.  $4\Omega$ 

 $\mathsf{B}.\,15.99\Omega$ 

 $\mathrm{C.}\,0.2\Omega$ 

D. 19



# 97. The impedance of LCR circuit increases with

## frequency when

- A. L > C
- $\mathrm{B.}\, C>L$
- C.  $X_L > X_C$

D.  $X_C > X_L$ 



# **98.** Which of the following depends upon frequency?

A. inductance

B. capacitance

C. resistance

D. C and B



# **99.** In an R.C. circuit resistance = 4 Omega and $XC = 3\Omega$ , then power factor is

A. 0.8

B. 8

C. 0

D. 1



**100.** In a circuit L,Cand R are connected in series with an alternating voltage of frequency f the current leads the voltage by 45<sup>(a)</sup>. The value of C is

A. 
$$rac{1}{\pi f(2fL-R)}$$
  
B.  $rac{1}{2\pi f(2\pi fL-R)}$   
C.  $rac{1}{\pi f(2\pi fL-R)}$ 

D.  $\frac{1}{2\pi f(2\pi fL + R)}$ 

Watch Video Solution

**101.** In an AC circuit, e and i are given by e = 150 sin 150 t V and i = 150 sin  $\left(150t + \frac{\pi}{3}\right)$  A. The 1 power dissipated in the circuit is

A. 106 W

B. 150 W

C. 5625 W

D. zero

#### **Answer:**



### 102. In a series LCR circuit the phase difference

between the v oltage and the current is  $45^{\,\circ}$  .

Then the power factor will be

A. 0.607

B. 0.707

C. 0.808

D. 1

#### Answer:

Watch Video Solution

**103.** Select and write the most appropriate answer. The instantaneous current in an A.C. circuit is given by I = 2 sin  $(\omega t + \theta)$  ampere. The r.m.s. value of the current is

### A. 2 ampere

- B. 2sqrt2 ampere
- C. sqrt2 ampere
- D. 1/sqrt2 ampere

#### **Answer:**



**104.** An L- C - R series circuit is joined to a source of alternating e.m.f. If R =  $9\Omega$ ,  $X_L$  =  $28\Omega$ 

, X\_c = 16 W, then the impedance of the circuit

### will be

A.  $10\Omega$ 

 $\mathsf{B}.\,15\Omega$ 

 $\mathsf{C.}\,20\Omega$ 

D.  $30\Omega$ 

#### Answer:



**105.** In an A.C. circuit I =10 cos (100t) ampere and V = 20 sin (100t). The power loss in the circuit will be

A. 20 watt

B. 200watt

C. 0 watt

D. 50 watt

#### **Answer:**

**106.** An alternating e.m.f. is applied to a series L - C - R circuit. It the frequency of the applied e.m.f. is more than the resonant frequency of the circuit then the circuit will act as

A. a resistive circuit

B. an inductive circuit

C. a capacitive circuit

D. an oscillatory circuit

#### Answer:



power factor for a purely resistive circuit?



108. State the condition for series resonance.

Obtain an expression for resonant frequency.

**109.** What is the phase difference between current and e.m.f. in a purely capacitive circuit?

# Watch Video Solution

**110.** A alternating e.m.f.  $e = 200 \sin (100\pi t)$  is connected across a resistor of resistance  $10\Omega$ . Calculate the r.m.s. current flowing through the circuit.



**111.** Define: inductive reactance capacitive.



112. Define peak and r.m.s. value of alternating

signal.

**Watch Video Solution** 

**113.** Distinugish between Resistance and Reactance.



**114.** A radio can tune over a frequency range 400 kHz to 600 kHz of the medium wave band. If the L - C tuner circuit has an effective inductance of 0.2 mH, what must be the range of its variable capacitance of the capacitor?

Watch Video Solution

**115.** Distinguish between acceptor circuit and rejector circuit.

**116.** An A.C. circuit consists of a resistor of  $5\Omega$  and inductor of 10 mH connected in series with 50 V, 50 Hz supply. What capacitance should be connected in series with the circuit to obtain maximum current? What will be the maximum current?

**117.** Attempt the following . What is a series LCR resonant circuit?State the condition forseriesresonance and obtain an expression for the resonant frequency of the circuit.

Watch Video Solution

**118.** A capacitor of  $25\mu F$ , inductor of 0.1 H and resistor of resistance  $25\Omega$  are connected in series with an A.C. source of e.m.f., e = 310 sin (314 t) volt. What is the :-reactance



**119.** A  $25\mu F$  capacitor, 0.1 H inductor and 25W resistor are connected in series with an ac source of emf e = 310 sin 314 t volt. What is :- impedance

Watch Video Solution

**120.** A  $25\mu F$  capacitor, 0.1 H inductor and 25W

resistor are connected in series with an ac

source of emf e = 310 sin 314 t volt. What is:-

current in the circuit



**121.** A capacitor of  $25\mu F$ , inductor of 0.1 H and resistor of resistance  $25\Omega$  are connected in series with an A.C. source of e.m.f., e = 310 sin (314 t) volt. What is the:-phase angle between current and applied e.m.f.



**122.** A  $25\mu F$  capacitor, 0.1 H inductor and 25W resistor are connected in series with an ac source of emf e = 310 sin 314 t volt. What is:-

current in the circuit