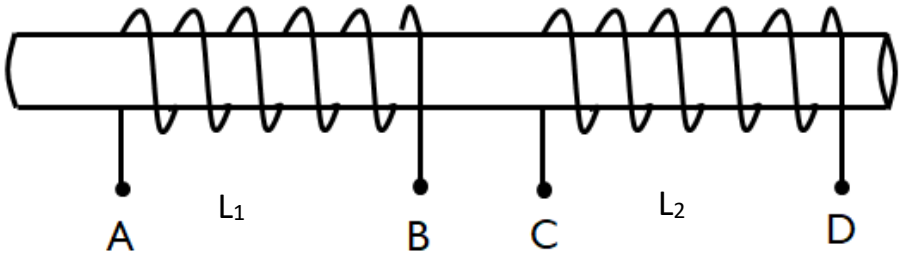
Q. No. 1 Magnetically coupled circuit shown in the figure has L_1 = 4.5 H, L_2 = 2 H, the coefficient of coupling 0.7 and the terminals B and D are connected. The equivalent inductance measured across A & C would be

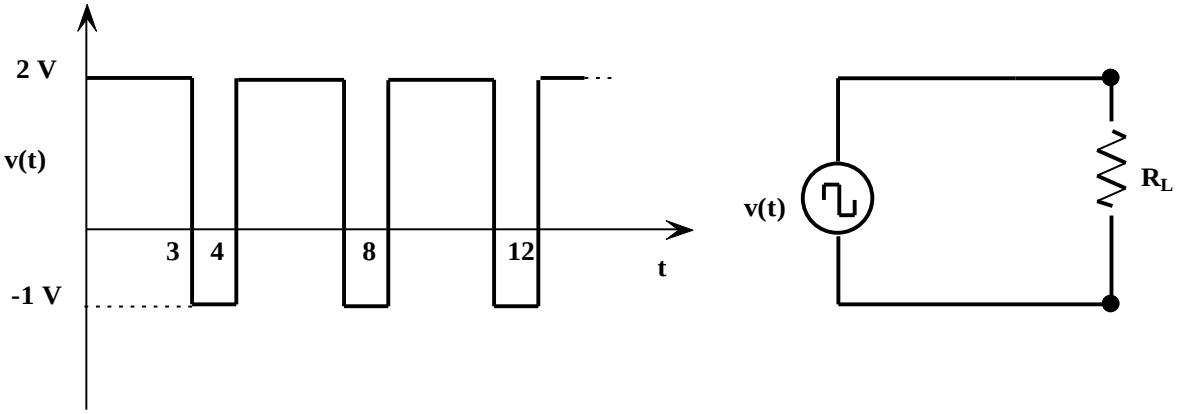


A) 10.7 H B) 8.6 H C) **2.3 H** D) 4.4 H

Q. No. 2 Given voltages $v1(t) = 339.4\ sin\ 314\ t$ and $v2(t) = 339.4\ cos\ 314\ t$. The RMS value of $v1(t) + v2(t)$ would be

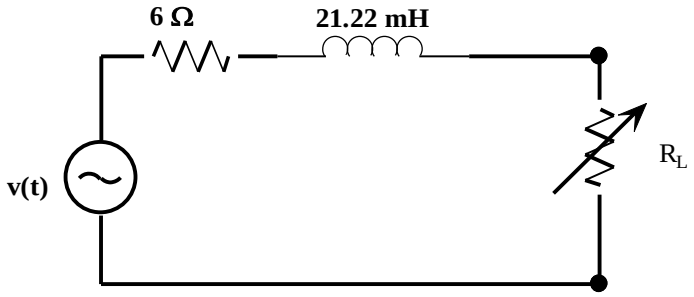
A) 479.98 V B) **339.4 V** C) 277.13 V D) 240 V

Q. No. 3 In the circuit given, find the value of the equivalent DC source voltage to produce the same heating effect in the load?



A) 1.5 V B) 1.732 V C) **1.8 V** D) 2.246 V

Q. No. 4 In the circuit given $v(t) = 339.4 \sin 377\ t$ and the load RL is variable; find the maximum power drawn by the load?



A) 2880 W B) 1440 W C) **1800 W** D) 3600 W

Q. No. 5 An R L series circuit with R = 5 Ω and L = 31.85mH is connected to an AC voltage source $v(t) = 339.4 \sin 377\ t$. Find the expresssion for the current in the circuit.

A) $\boldsymbol{i(t) = 26.11 \sin(377\ t - 67.38°)}$ C) $i(t) = 30.36 \sin(377\ t - 63.44°)$

B) $i(t) = 30.36 \sin(377\ t - 67.38°)$ D) $i(t) = 26.11 \sin(377\ t - 63.44°)$

Q. No. 6 Two loads S1 = 100 KVA at 0.8 pf lagging and S2 = 100 KW are operated together. What is the overall load power factor?

A) **0.949 (lagging)** B) 0.832 (lagging) C) 0.932 (lagging) D) 0.849 (lagging)

Q. No. 7 A series RLC circuit, connected to a variable frequency voltage source, behaves like an inductive circuit with source frequency, f. The circuit can be brought to resonance by

A) Increasing the supply frequency C) Increasing the value of Capacitance

B) Increasing the value of Inductance D) **Decreasing the supply frequency**

Q. No. 8 A parallel circuit with an RL series branch (R = 10 Ω and L = 50 mH) and an RC series branch (R = 10 Ω and C = 100 μF) are connected to a variable frequency voltage source. Find at what frequency the circuit resonates?

A) 447.21 Hz B) 223.61 Hz C) 142.35 Hz D) **71.18 Hz**

Q. No. 9 In a 3 phase, 4 wire, 415 V, 50 Hz, balanced, RYB system; if the phasor $\mathbf{V_{YB}} = 415\angle\ 0°$ the phasor $\mathbf{V_{RN}}$ will be

A) **$240\ \angle 90°$** B) $240\ \angle 120°$ C) $240\ \angle 60°$ D) $240\ \angle -90°$

Q. No. 10 In a 3 phase, 415 V, 50 Hz, balanced, RYB system; the instantaneous value of V_{RY} is measured as 586.9 V. Find the instantaneous value of V_{YB} at the same instant.

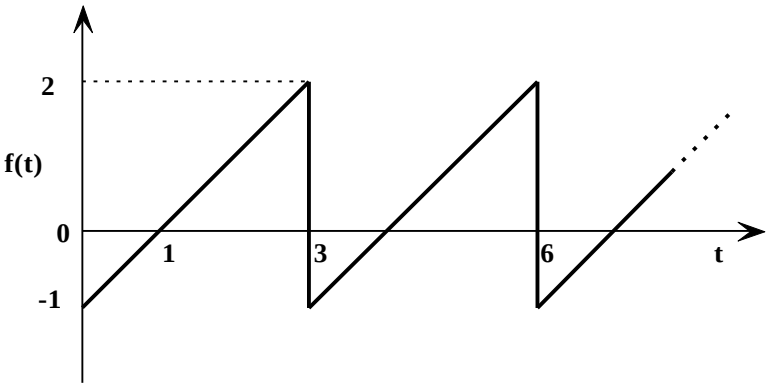
B) 293.45 V B) **-293.45 V** C) -508.27 V D) 508.27 V

Q. No. 11 Differentiate a *vector* and a *phasor*

Vector : it has magnitude & direction

Phasors: it's a representation of set of sinusoidally varying quantity of same frequency with its magnitude as RMS value & relative position as angle.

Q. No. 12 Find the average value and effective value (RMS) of the saw tooth wave form shown



RMS Value : 1.19 V ---------- 1 Mark

Avg. Value : 0.5 V ---------- 1 Mark

Q. No. 13 A 3 phase, 3 wire, 110 V, ABC system supplies a delta connected load of three equal impedances of $5\ \angle 45°\ \Omega$. Taking $\mathbf{V_{AB}}$ as reference, find the value of line currents $\mathbf{I_A, I_B, I_C}$

$I_{AB} = 22\angle -45°\text{A}$

$I_{BC} = 22\angle -165°\text{A}$

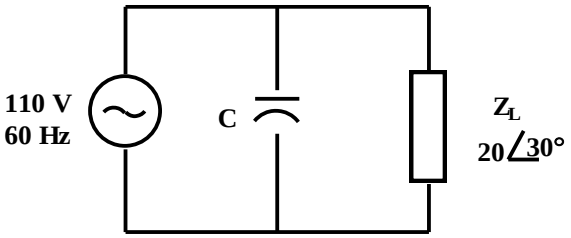
$I_{CA} = 22\angle 45°\text{A}$ **phase currents** ---------- 1 Mark

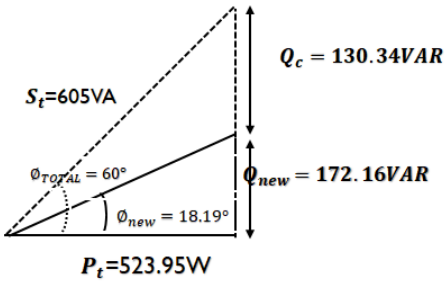
$I_A = 38.11\angle -75°\text{A}$

$I_B = 38.11\angle 165°\text{A}$

$I_C = 38.11\angle 45°\text{A}$ **line currents** ---------- 1 Mark

Q. No. 14 In the parallel circuit shown, Find the value of Capacitance C, necessary to correct the power factor to 0.95 lagging

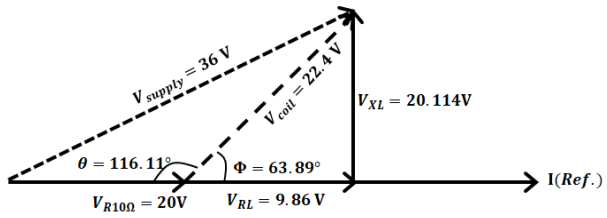




P=523.95 W
Q= 302.5 VAR
S=605 VA---------- 1 MARK

X_C = 92.84 Ω
C= 28.57 µF----------1 MARK

Q. No. 15 A coil of resistance R and inductance L is connected in series with a 10 Ω resistor and an AC sinusoidal voltage of 36 V, 60 Hz is applied across it. Find the value of R & L if the voltage across the 10 Ω resistor is 20 V and that across the coil is 22.4 V



$cos\theta = \frac{20^2+22.4^2-36^2}{2\times20\times22.4} = \mathbf{-0.44}$---------- 1 MARK

$\Phi = 180° - 116.11 = 63.89°$
$V_{RL} = 22.4\cos(63.89) = 9.86\text{ V} \Rightarrow \mathbf{RL = 4.93\Omega}$

$V_{XL} = 22.4\sin(63.89) = 20.114\text{ V} \Rightarrow \text{XL} = 10.06\Omega \Rightarrow \mathbf{L = 26.68mH}$
---------- 1 MARK