Assignment-2 BEEE.

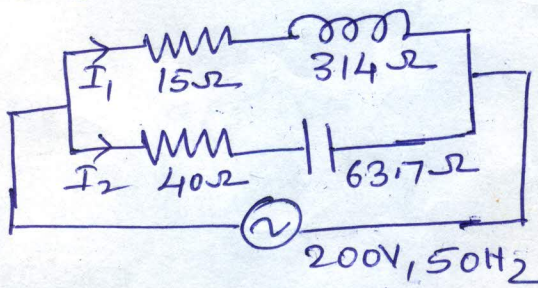
I

Q1 Define the equation for resonance frequency (f_r) in parallel resonance circuit- [2] Dec 12

Q2 A 100Ω resistor is connected in series with a choke coil. When a 400V, 50Hz supply is applied to this combination, the voltage across the resistance and the choke coil are 200V and 300V respectively. Find the power consumed by the choke coil. Also calculate the power factor of the choke coil and power factor of the circuit.
Ans: $P_{coil} = 150W$; $pf_{coil} = 0.25$ (lagging) $pf_{circuit} = 0.6875$ Lagging
marks [08] Dec 12

Q3 A voltage of 150V, 50Hz is applied to a coil of negligible resistance and inductance 0.2H. Write the time equation for voltage and current. Ans: $212.13 \sin(100\pi t) = v$
$i = 3.38 \sin(100\pi t - 90^\circ)$ [05] Dec 12

Q4 Calculate the branch current I_1 & I_2 for the circuit shown in fig.

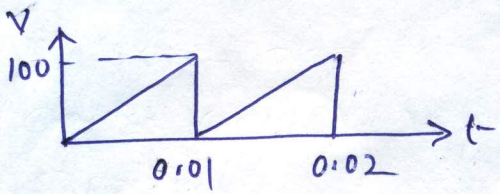


Ans: $I_1 = 5.75 \angle -64.47^\circ$ A.
$I_2 = 2.66 \angle 57.87^\circ$ A
[04] Dec 12

Q5 A resistor and capacitor are connected in series with a variable inductor. When the circuit is connected to a 230V, 50Hz supply, the maximum current obtained by varying the inductance is 2A. The voltage across the capacitor is 500V. Calculate the resistance, inductor and capacitor of the circuit Ans: $R = 115\Omega$; $C = 12.73\mu F$; $L = 0.795H$
[07] Dec 12

Q1 Determine the rms value of voltage waveform shown bellow. [03] May 13

Ans: $V_{rms} = 57.74V$



Q2 Give the comparison between series and parallel resonance circuits. [3] May 13

Q3 Two coils A & B are connected in series across 240V, 50Hz supply. The resistance of A is 5Ω and inductance of B is 0.015H. If the input from supply is 3kw and 2kVAR. Find inductance of A and resistance of B. Calculate voltage across each coil. [08] May 2013

Ans: $r_B = 8.3\Omega$; $L_A = 0.013H$; $V_A = 97.63V$

$V_B = 143.29V$.

Q4 A voltage drop across four series connected impedances are given

$V_1 = 60\sin(\omega t + \pi/6)$; $V_2 = 75\sin(\omega t - \frac{5\pi}{6})$

$V_3 = 100\cos(\omega t + \pi/4)$; $V_4 = V_{4m}\sin(\omega t + \phi_4)$

Calculate the values of V_{4m} & ϕ_4 if the voltage applied across series circuit is $140\sin(\omega t + \frac{3\pi}{5})$. Ans: $V_{4m} = 80.79V$

[05] May 2013.

$\phi_4 = 59.96°$

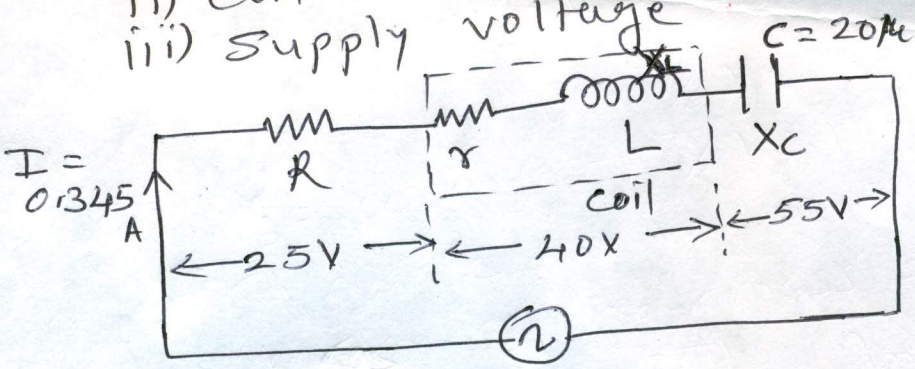
Q5 A 46mH inductor coil has a resistance of 10Ω i) How much current will it draw if connected across a 100V, 60Hz supply ii) What is the power factor of the coil? iii) Determine the value of capacitance that must be connected across the coil to make the power factor of overall circuit unity. Ans: i) $I \cong 5A$ ii) P.f. coil = 0.5 lag. iii) $C = 114.79\mu F$

[04] May 2013

An inductor having a resistance of 25Ω and Q_0 of 10 at resonant frequency of 10kHz is fed from $100\angle 0^\circ$ supply. Calculate i) Value of series capacitance required to produce resonance with the coil ii) The inductance of the coil iii) Q_0 using L/C ratio iv) Voltage across capacitor v) Voltage across coil. Ans: i) $C = 6.37 \times 10^{-8}$ F ii) L = 3.98 mH iii) $Q_0 = 10$ iv) $V_{C0} = V_{L0} = 1000$V. [07] May 2013 (3)

Q7 Derive the expression for the average value of a sinusoidally varying current in terms of Peak value. $I_{avg} = 0.637 I_m$ [08] Dec 13

Q8 For the circuit shown determine the [08] Dec 2013
i) Supply frequency (f)
ii) Coil resistance (r)
iii) Supply voltage



Q9 Two currents are ~~feed~~ represented by $I_1 = 15\sin(\omega t + \pi/3)$ and $I_2 = 25\sin(\omega t + \pi/4)$ These currents are feed into common conductor. Find the total current. If the conductor has resistance 50Ω, what will be energy loss in 10 hours. [05] Dec 2013

Q10 With proper phase diagrams, explain behaviour of a pure capacitor in an AC. circuit- [04] Dec 2013

11. An inductive coil of resistance 10Ω and inductance 0.1H is connected in parallel with 150μF capacitor to a variable frequency 200V supply. Find the resonance frequency at which the total current taken from supply is in phase with supply voltage. Also find value of this current. Draw the phasor diagram. [07] Dec 2013

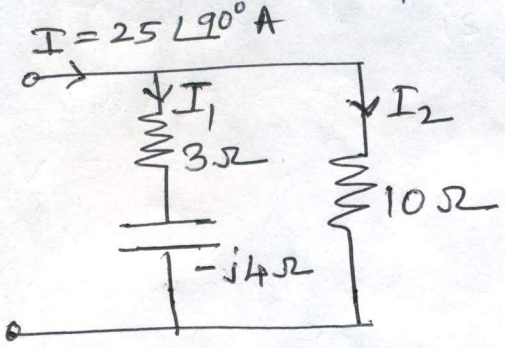
Q12. An alternating current takes 3.375 ms to reach 15A for the first time after becoming instantaneously zero. The frequency of the current is 40 hertz. Find the maximum value of the alternating current - [03] May 14;
$I_m = 20A$

Q13. Derive the equation for resonance freq. f_r in parallel resonance circuit. [03] May 2014

Q14. When a resistor and an inductor in series are connected to a 240V supply, a current of 3A flows lagging 37° behind the supply voltage, while voltage across inductor is 171 volt. Find the resistance of resistor and resistance and reactance of inductor. [08] May 14

Q15 A circuit consists of three parallel branches The branch currents are given as $i_1 = 10\sin\omega t$ $i_2 = 20\sin(\omega t + 60^\circ)$ and $i_3 = 75\sin(\omega t - 30^\circ)$. Find the resultant current and express it in the form $i = I_m \sin(\omega t + \phi)$ if the supply frequency is 50Hz. Calculate the resultant current when i) $t = 0$ ii) $t = 0.001$ sec [05] May 2014

.6 Find current I_1 & I_2 shown in fig



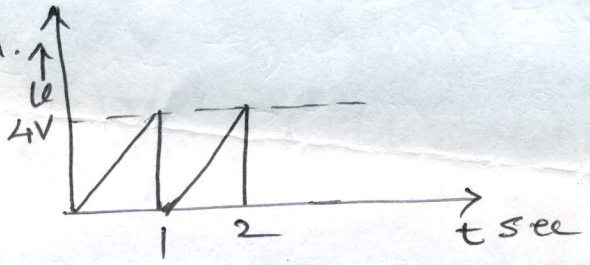
[04] May 2014

Q17. A coil of inductance 31.8mH with resistance of 12Ω is connected in parallel with a capacitor across 250 volts, 50Hz supply. Determine the value of capacitance if no reactive current is taken from the supply.

[07] May 2014

Q18 Find the average value of the following waveform.

[03] Dec 14



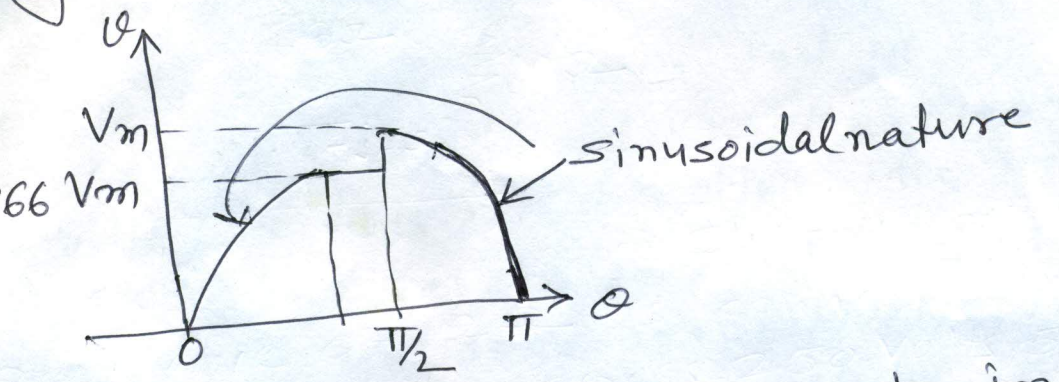
Q19 For a series RLC circuit having R=10Ω L=0.01H and C=100μF, find the resonant frequency, quality factor and bandwidth.

[03] Dec 14

Q20 Two coils are connected in series across a 200V, 50Hz a.c. supply. The power input to the circuit is 2kW and 1.15kVAR. If the resistance and the reactance of the first coil are 5Ω and 8Ω respectively, calculate the resistance and reactance of the second coil. Calculate the active power and reactive power for both the coils individually.

[08] Dec 14

Q21 Find the rms value for the given waveform. [05] Dec 14



Q22 The voltage and current in a circuit are given by $e = 100\sin(\omega t + 30^\circ)$ and $i = 50\sin(\omega t + 60^\circ)$ Determine the impedance of the circuit. Assuming the circuit to contain 2 elements in series find resistance, reactance, and power factor of the circuit. [04] Dec 14

Q23 An inductive coil having a resistance of 20Ω and inductance of 0.2H is connected in parallel with 20μF capacitor with variable frequency and 230V supply. Find the frequency at which the total current drawn from the supply is in phase with the supply voltage. Find the value of the current and the impedance of the circuit at this frequency. [07] Dec 14