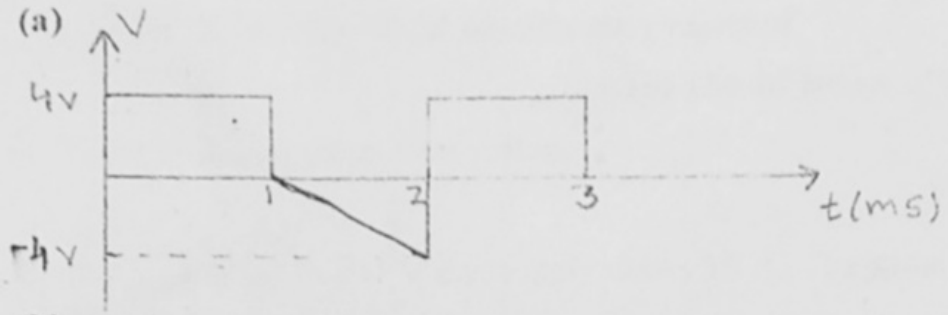
Q1. The equation of an alternating current is $i = 42.42 \sin 628t$. Determine:

(a) Its maximum value
(b) Frequency
(c) Rms value
(d) Average value
(e) Form factor
(f) Peak factor

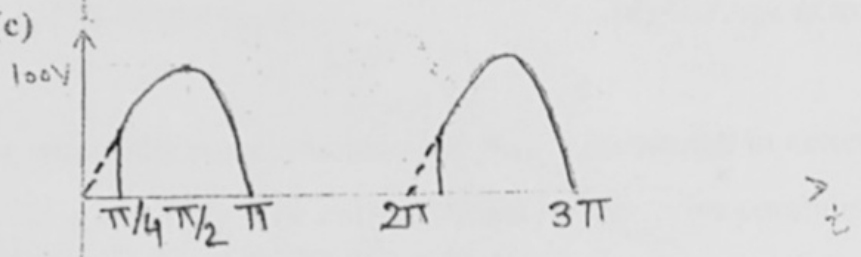
Q2. Find the average value, Rms value, form factor and crest factor of waveforms:

(a)

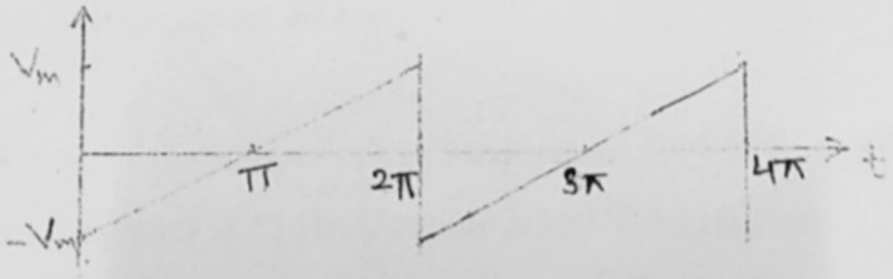



(b)


(c)




(d)




Q3. An alternating voltage is given by $V = 141.4 \sin 314t$ find:

(a) Frequency
(b) Rms value
(c) Average value
(d) Instantaneous value of voltage when t is 3 m sec
(e) Time taken for the voltage to reach 100 V for the first time after passing through Zero value

4. Three sinusoidal voltages acting in Series are given by $V_1 = 10 \sin 440t$.

$V_2$ 105 sin $(440t - 45^0)$, $V_3 = 20 \cos 440t$ find:

(a) An expression for resultant voltage (b) The frequency and Rms value of the resultant voltage

Q5. The instantaneous values of two alternating voltages are represented by $V_1 = 60 \sin \theta$ and

$V_2$ 40 sin $(\theta - \pi/3)$

Derive the expression for the instantaneous values of

(a) The Sum (b) The difference of these voltages

(c) Rms value.of the resultant voltage

Q6. A coil connected to 100 V d.c. supply draws 10 A. The same coil when connected to 100 V a.c. voltage of frequency 50 Hz draws 5 A calculate the parameters of the coil & P.F?

Q7. A coil of resistance 8Ω and inductance 0.12 H is connected in series with a capacitance of 140 μF across a 230 V, 50 Hz supply. Determine:

(a) Impedance of the entire circuit (b) Current flowing through the capacitor

(c) P.F. of the circuit (d) Voltage across capacitor

Q8. A non-inductance resistance of 10Ω is connected in series with an inductance coil across 200 V, 50 Hz a.c. supply. The current drawn by the series combination is 10 ampere. The resistance of the coil is 2Ω. Determine:

(a) Inductance of the coil (b) Power factor

(c) Voltage across the coil

Q9. A coil of resistance 40Ω and inductance 0.75 H in a series circuit with a capacitor C. The resonant frequency is 55 Hz, if supply is 250 V, 50 Hz find:

(a) Power factor (b) Power consumed

Q10. Given V 200 sin 377t V and i = 8 sin (377t – 30) A for an a.c. circuit Determine:

(a) Power factor (b) True power

(c) Apparent power (b) Reactive power

Q11. If the bandwidth of a resonant circuit is 10 K Hz and lower half frequency is 120 K Hz. Find out the value of upper half frequency and the quality factor of the circuit.

Q12. Two impedances $Z_1 = (10 + j5)$ and $Z_2 = (8 + j6)$ are connected in parallel across a voltage of V 200 + j0. Calculate the circuit current, power factor and reactive power.

Q13. A 100 V, 80 W lamp is to be operated on 230 V, 50 Hz a.c. Calculate the inductance to be connected in series with the lamp. Lamp can be taken as pure resistances.

Q14. A load having impedance of $(1 + j1)\ \Omega$ is connected to an a.c. voltage represented as $V = 20\sqrt{2}\cos(\omega t + 10^0)$ V.

(a) Find the instantaneous current in load

(b) Find real power consumed by the load

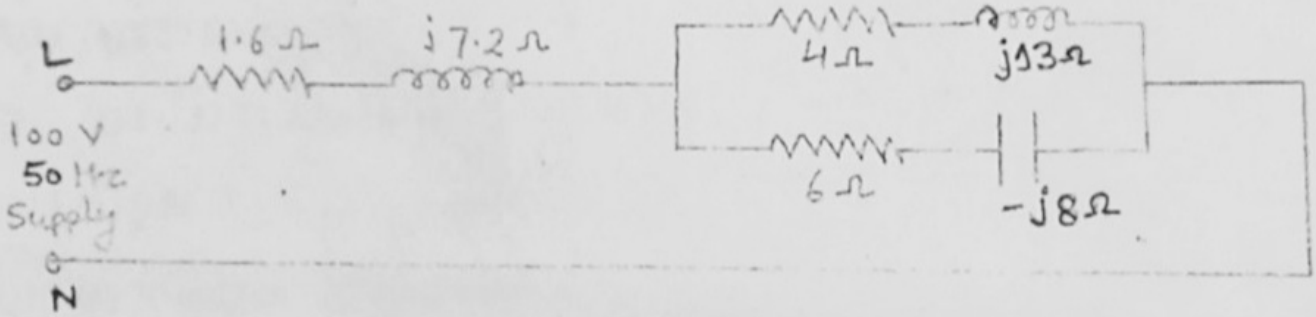
Q15. In the circuit shown below calculate:

(a) Admittance of each parallel branch

(b) Total circuit impedance

(c) Supply current and power factor

(d) Total power supplied by the source



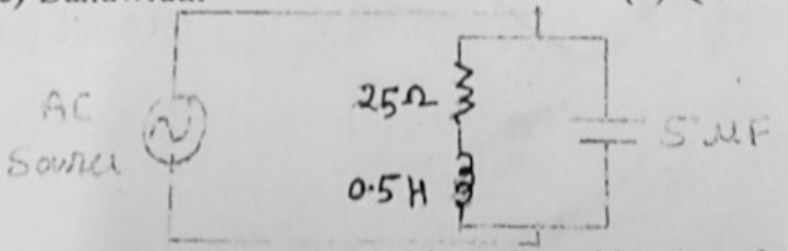

Q16. For the circuit shown below calculate:

(a) Resonant frequency

(b) Total impedance of the circuit at resonance

(c) Bandwidth

(d) Q-Factor




Q17. A 10 m H coil is connected in series with a loss free capacitor to a variable frequency source of 20 V. The current in the circuit has a maximum value of 0.2 A at a frequency of 100 KHz. Calculate:

(a) The value of capacitance

(b) The Q-factor of the coil

## Answers

Q1. (a) 42.42A (b) 100 Hz (c) 30 A (d) 27.02A (e) 1.11
(f) 1.414

Q2. (a) 1 V, 3.27 V, 3.27, 1.22
(b) 31.85 V, 50 V, 1.57, 2
(c) 27.2 V, 47.68 V, 1.75, 2.1

Q3. (a) 50 Hz (b) 100 V (c) 90.1 V (d) 114.4 V (e) 2.5 ms

Q4. (a) $100.2 \sin (440t - 32.78^0)$ (b) 70.1 Hz, 70.86 V

Q5. (a) $87.2 \sin (\theta - 23.4^0)$ (b) $52.92 \sin (\theta + 40.9^0)$ (c) 61.67 V

Q6. (a) R = 10Ω, L = 55.2 mH, $\cos\phi = 0.5$ (lagging)

Q7. (a) 16.94Ω (b) 13.58A (c) 0.47 (lagg) (d) 308.95 V

Q8. (a) 50.96 mH (b) 0.6 (lagg) (c) 160 V

Q9. (a) 0.63 (leading) (b) 619.4 W

Q10. (a) 0.866 (lagg) (b) 692.8 W (c) 800 VA (d) 400 $VA_r$

Q11. (a) 130 KHz, 12.5

Q12. (a) I = 37.74 A, 0.84 (lagg), 4001.86 $VA_r$

Q13. (a) 0.86 H

Q14. (a) $20 \cos (\omega t - 35^0)$ (b) 200 W

Q15. (a) (0.022 − j0.07)mho, (0.06 + j0.08)mho
(b) (13.68 + j5.76)Ω
(c) (6.74 A, 0.92 (lagg)
(d) 621.34 W

Q16. (a) 100.4 Hz (b) 4000 Ω (c) 7.94 Hz (d) 12.65

Q17. (a) 253.6 μF (b) 0.063