

1. For the circuit given in FIGURE 1 the power factor is 0.72 lagging and the power dissipated is 375 W.

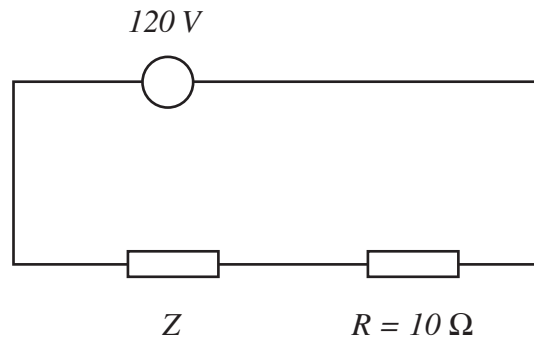


FIG. 1

Determine the:

- (i) apparent power
  - (ii) reactive power
  - (iii) the magnitude of the current flowing in the circuit
  - (iv) the value of the impedance  $Z$  and state whether circuit is inductive or capacitive.
2. A 50 kW load operates from a 60 Hz 10 kV rms line with a power factor of 60% lagging. Determine the capacitance that must be placed in parallel with the load to achieve a 90% lagging power factor.
3. A series RLC circuit is connected to a 5 V supply, the frequency of the supply is adjusted to give a maximum current of 11.9 mA at 2.5 kHz. The  $Q$  factor is 70. Determine the component values of the circuit.



4. A single phase transformer has the following rating: 120 kVA, 2000 V/100 V, 60 Hz with 1000 primary turns.

Determine:

- (a) the secondary turns
  - (b) the rated primary and secondary currents
  - (c) the maximum flux
  - (d) given a maximum flux density of 0.25 T, the cross-sectional area of the core.
5. An a.c. voltage,  $V$ , comprises of a fundamental voltage of 100 V rms at a frequency of 120 Hz, a 3rd harmonic which is 20% of the fundamental, a 5th harmonic which is 10% of the fundamental and at a phase angle of 1.2 radians lagging.
- (i) Write down an expression for the voltage waveform.
  - (ii) Sketch the waveforms of the harmonic components.
  - (iii) Determine the voltage at 20 ms.
  - (iv) Given an ideal  $V = 100$  V rms, what is the percentage error at 20 ms?

