Power Electronics (ELEC-E8412)

Exercise# 01

Question No. 1

A load is supplied by,

$$V(t) = 5 + 100 \text{ Cos } (314t) + 6 \text{ Cos } (2(314)t+15°) + 40 \text{ Cos } (3(314)t+30°)$$

The current is given as,

$$i(t) = 8 + 50 \text{ Cos } (314t+30°) + 6 \text{ Cos } (2(314)t+45°) + 10 \text{ Cos } (3(314)t+65°)$$

Find,

a) RMS Voltage.
b) RMS Current.
c) THD of load current.

Question No. 2

A non-linear load is supplied by a voltage,

$$V(t) = 300 \text{ Cos } (2\pi 50t)$$

The resulting non-linear current is given as,

$$i(t) = 10 + 70 \text{ Cos } (2\pi 50t+20°) + 40 \text{ Cos } (6\pi 50t+15°) + 30 \text{ Cos } (8\pi 50t+25°)$$

Find,

a) Power absorbed by load.
b) Power factor of load.
c) THD of load current.

Question No. 3

The voltage across a 10Ω resistor is

$$v(t) = 170 \text{ Sin } (377t)$$

Determine,

a) Instantaneous power.
b) Average power.
c) Peak power.

Question No. 4

The voltage and current of a circuit is given by,

$$v(t) = 3 + 5 \cos(2\pi 60t + 15°) + 2 \cos(4\pi 60t)$$
$$i(t) = 2 + 7 \cos(2\pi 60t + 45°) + 3 \cos(6\pi 60t + 25°)$$

Find,

a) RMS voltage and current.
b) Power absorbed by the circuit.
c) Power factor.

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