Department of Mechanical, Materials and Manufacturing Engineering

The University of Nottingham

Electromechanical Devices MMME2051

Exercise Sheet 11 – Transformers

11.1 A 240V:12V 50Hz transformer supplies a secondary (low voltage) load comprising 3Ω resistor and 12.7mH inductor. Calculate the primary current in Cartesian notation and polar notation.

0.072 – j0.96A = 0.12A ∠–53.1°

11.2 A transformer has a primary:secondary turns ratio of 20:1 and is supplied from a 240 V (rms) 50 Hz ac supply. If its load is a 10Ω resistor, what current does the transformer draw, and hence what is the resistance of the load referred to the primary? Ignore magnetisation current and assume the transformer is 100% efficient.

60 mA; 4000 Ω

11.3 A 240V:120V 60Hz transformer has its low voltage winding connected to 120V supply (so note the way around the transformer is connected!). Across the high voltage winding is a resistor in series with a capacitor. The supply current is (0.8 + j0.6) A. Calculate the current in the load in Cartesian and polar form, the impedance of the load and the resistance and capacitance.

0.4 + j0.3A, 0.5A ∠36.9°; 384–j288Ω; 384Ω, 9.2μF

11.4 8.4 A 200V : 50V 60Hz transformer supplies a load comprising a 10Ω resistor in series with a 100mH inductor. Calculate the load impedance, secondary current, power dissipated in the load, equivalent impedance for the transformer and the load, primary current, and power supplied.

39Ω∠+75.1°, 1.28A∠–75.1°, 16.5W, 624Ω∠+75.1°, 0.32A∠–75.1°, 16.5W