

**The University of Sheffield**  
**Department of Electrical and Electronic Engineering**

## EEE117 Homework 8

- Q1.** A 50kVA transformer which steps down from  $6600V_{\text{rms}}$  to  $220V_{\text{rms}}$  has a primary resistance of  $10\Omega$  and a secondary resistance of  $0.01\Omega$  (you can ignore the leakage reactances in this question). Find:
- (a) the total resistance referred to the primary side
  - (b) the total resistance referred to the secondary side
  - (c) the copper loss when operating on full load
- Q2.** A  $3300V_{\text{rms}} / 250V_{\text{rms}}$  50Hz ideal transformer is constructed on a core having a cross-sectional area of  $12500\text{mm}^2$ . There are 70 turns on the low-voltage winding. Find the maximum core flux density and the number of turns on the high voltage winding.
- Q3.** A 20kVA, 800:500 $V_{\text{rms}}$ , 50Hz, single-phase transformer gave the following test results:
- |                   |                            |                            |                              |
|-------------------|----------------------------|----------------------------|------------------------------|
| On no load:       | $V_I = 800V_{\text{rms}},$ | $I_I = 1.6A_{\text{rms}},$ | input power, $W_{oc} = 300W$ |
| On short circuit: | $V_I = 50V_{\text{rms}},$  | $I_I = 25A_{\text{rms}},$  | input power, $W_{sc} = 200W$ |
- (a) find the total transformer resistance and leakage reactance referred to the primary, the no-load input current and its power factor.
  - (b) if the transformer is connected to a load of  $(12 + j9)\Omega$ , calculate the total input current and the actual magnitude and phase of the voltage across the load.

***Answers should be handwritten. Please remember to include your name or registration number on your answer sheet.***