	University of Ruhuna **Faculty of Engineering**	**EE 6303 Electrical Machines II**
Dep. of Electrical and Information Engineering		**Assignment 1: Three phase transformers**
		Deadline **11.07.2023**

Submit a soft copy of your answer sheet via the submission link given in LMS.

1) An ideal 3-phase step-down transformer connected delta/star delivers power to a balanced 3-phase load of 120 kVA at 0.8 power factor. The input line voltage is 11 kV and the turn-ratio of the transformer, phase-to-phase is 10. Determine the line voltages, line currents, phase voltages and phase currents on both the primary and the secondary sides.

2) Two single-phase transformers operate in parallel to supply a load of $44 + j\ 18.6\ \Omega$. The transformer A has a secondary emf of 600 V on open circuit with an internal impedance of $1.8 + j\ 5.6\ \Omega$ referred to the secondary. The corresponding figures for transformer B are 610 V and $1.8 + j\ 7.4\ \Omega$. Calculate the terminal voltage, current and power factor of each transformer.

3) A 400/100 V, 10 kVA, 2-winding transformer is to be employed as an autotransformer to supply a 400 V circuit from a 500 V source. When tested as a 2-winding transformer at rated load, 0.85 pf lagging, its efficiency is 97%.
   a) Determine its kVA rating as an autotransformer.
   b) Find its efficiency as an autotransformer.

4) A 6000 V/150 V, 50 Hz potential transformer has the following parameters with reference to Figure Q4 as seen from HV side.

   $X_1 = 876\ \Omega$ $X'_2 = 996\ \Omega$ $X_m = 398\ k\Omega$
   $R_1 = 684\ \Omega$ $R'_2 = 887\ \Omega$

   a) The primary is excited at 6400 V and the secondary is left open. Calculate the secondary voltage magnitude and phase.
   b) The secondary is loaded with 10 kΩ resistance, repeat part a).
   c) Calculate the percentage error in the measurement for the two cases in part a) and b).

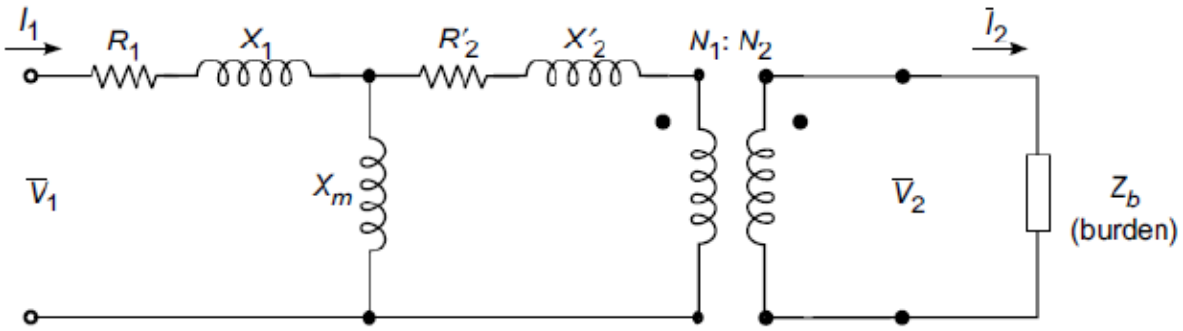

Figure Q4. Equivalent circuit of a potential transformer.