EE 1100 Basic Electrical Engineering
March – June 2023
Tutorial 7
Single Phase Transformers

1. A 100 kVA, 4 kV/ 200 V, 50 Hz single phase transformer is running under full load unity power factor. Determine its primary and secondary currents.

2. A 100 kVA, 4 kV/ 200 V, 50 Hz single phase transformer with R_1 = 3 Ω, X_1 = 5 Ω, R_2 = 0.008 Ω and X_2 = 0.013 Ω. Assume the no-load components magnetising reactance and no-load loss resistance are negligible.
   Determine (a) total resistance referred to primary and secondary, (b) total copper loss referred to primary, (c) equivalent impedance referred to primary.

3. A 50 kVA, 230 V/11 kV single phase transformer has no-load power loss of 100 W and power factor of 0.3. determine the magnetising current and working current (loss component current) referred to primary. Draw the corresponding phasor diagram during no-load with magnetic field as reference.

4. The primary and secondary windings of a 500 kVA transformer have resistances of 0.42 Ω and 0.0019 Ω respectively. The primary and secondary voltages are 11 kV and 400 V respectively, and the core loss is 2.9 kW. Assuming the load to have a p.f. of 0.8, calculate the efficiency at:
   a. Full load
   b. Half load

5. Consider the transformer shown below. The secondary is connected to a load impedance of $5 < 30^o$ Ω. Calculate the primary side input impedance, secondary terminal voltage, primary and secondary currents, and their respective power factors and real powers.