Birla Institute of Technology & Science, Pilani
EEE F211/INSTR F211 Semester- I 2016-17
Tutorial No.3

Q.1 You wish to operate a 40hp, 460V, 3-phase motor from a 600 V, 3-phase supply. The full load current of the motor is 42 A. Three 5kVA, 120V/480V, single phase transformer are available. How would you connect them? Are they able to furnish the load current drawn by the motor without overheating?

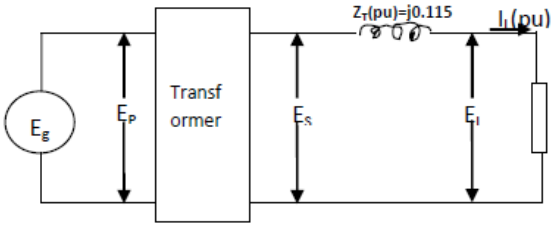
Q.2 A 3-phase step-up transformer (as shown below) is rated 1300 MVA, 24.5kV/345kV, 60 Hz, impedance 11.5%. it step up the voltage of a generating station to 345 kV transmission line.

Calculate the voltage across the generator terminals

When the HV side of the transformer delivers

810 MVA at 370kV with a lagging power factor of

0.9. (assume YY connection for Transformer).



Q.3 A three-phase transformer is assembled by connecting three 720-VA, 360/120-V, single phase transformer. The circuit parameters for each transformer are R_H = 18.9 Ω, X_H=21.6 Ω, R_L = 2.1 Ω, X_L=2.4 Ω, R_{Core} = 8.64k Ω, X_{Mag}=6.84k Ω. For each of the four configurations, determine the nominal voltage and power ratings of the three-phase transformer. Also, draw the winding arrangement and per-phase equivalent circuit for Y/D (Star/Delta) and D/D (Delta/Delta) configurations.

Q.4 Three single-phase transformers are all rated equal to 11kV/230 V, 100kVA. The primaries are connected to 11 kV feeders and the polarities of the three-secondaries have been checked and connected in parallel. They supply a load at terminal voltage V_L when the load current is 1304 A at 0.9p.f. lag with respect to the terminal voltage. The leakage reactances of the transformers are, however, 0.09, 0.12 and 0.15 p.u. on transformer rating. Calculate the load voltage V_L, the currents flowing in each transformer and the load supplied by each.

Q.5 Explain in brief following (with neat sketches of waveform) : (i) Magnetization Characteristics of Transformer core (ii) Draw Magnetization Current wave shape–discuss about various harmonics present and their impact on the performance of the transformer (iii) Why Y-Y connection are not preferred in three phase transformer (IV) V-V(Open delta) connection–deduce the relationship for real power delivered. (v) Conditions for parallel operation of two or more transformers.

Q-6 Two single-phase transformers operate in parallel to supply a load of 44+j 18.6 Ω . The transformer A has a secondary emf of 600 V on open circuit with an internal impedance of 1.8+j5.6 Ω referred to the secondary. The corresponding figures for transformer B are 610 V and 1.8+j7.4 Ω. Calculate the terminal voltage, current and power factor of each transformer.

Q.7 Two transformers each rated 250kVA, 11/2-kV, and 50 Hz, are connected in open delta on both the primary and secondary. (a) Find the load kVA that can be supplied by this transformer connection. (b) A delta connected load of 250 kVA, 0.8 pf, 2kV is connected to the low voltage terminals of this open transformer. Determine the the currents on the 11 kV side of the connection.

Q-8 Draw the winding connection & Phasor diagram for (i) YD11, DY11 Yz11—Grroup-4 (+30^{0}phase displacement) (ii) Dz6 ; Dd6—group-2(180^{0}phase displacement)