

Sixth Semester B.E. Degree Examination, Dec.08 / Jan.09
Transformers and Induction Machines

Time: 3 hrs.

Max. Marks:100

Note : Answer any FIVE full questions.

- 1 a. Explain with neat sketch the construction of single-phase core type and shell type transformer. (10 Marks)
- b. Write brief notes on:
- Methods of cooling of transformer.
 - Welding transformer.
 - Auto-transformers. (10 Marks)
- 2 a. Explain how the flux in the transformer core remains constant from No-Load to Full-load assuming Lagging pf. (08 Marks)
- b. Draw the equivalent circuit for a single phase 1100/220 V transformer on which the following results are obtained:
 1100 V, 0.5 A, 55 W – ON PRIMARY ; SECONDARY KEPT OPEN
 10 V; 80 A; 400 W – ON LV SIDE; HV SIDE BEING SC
 Calculate the η for the above transformer when supplying 100 A at 0.8 pf lag. (12 Marks)
- 3 a. What are the different losses occurring in a transformer on load? How can these losses be determined experimentally? (10 Marks)
- b. Find All-Day η of a transformer having maximum η of 98% at 15 kVA at upf and loaded as follows:
 12 Hours – 2 kW at 0.5 pf lag
 6 Hours – 12 kW at 0.8 pf lag
 6 Hours – No Load (10 Marks)
- 4 a. List out the conditions for successful parallel operation of a 3-phase transformer. (04 Marks)
- b. With neat circuit of 3-phase connection of
- STAR – STAR
 - DELTA – DELTA
 - DELTA – STAR
 - OPEN – DELTA
- Obtain the voltage and current relationship between the primary and secondary side. Mention their application. (08 Marks)
- c. Two electric furnaces are supplied with single-phase currents at 80 volts from a 3-phase, 10000 volts system by means of two single phase, SCOH connected transformer with similar secondary windings. When the load on one transformer is 500 kW and on the other is 800 kW, what currents will flow in each of 3-phase lines at upf? Draw the necessary phasor diagram. (08 Marks)
- 5 a. Show that a rotating magnetic field of constant magnitude is produced when the stator of a three phase induction motor is fed from balanced three phase supply. (10 Marks)
- b. A 6 pole, 50 Hz, 3 ϕ - IM has rotor resistance of 0.2 Ω /phase, maximum torque is 200 N-m, at 850 rpm, find
- Torque at 4% slip.
 - Additional rotor resistance to get two-third of maximum torque at starting. Neglect stator impedance. (10 Marks)

- 6 a. Why starter is necessary to start on induction motor? Explain electronic starter for 3-phase induction motor. (10 Marks)
- b. Derive the equation for torque developed by the 3-phase induction motor. Draw a typical torque-slip characteristic curve. (10 Marks)
- 7 a. Write short notes on : crawling and cogging. (08 Marks)
- b. A 3 ϕ , 400V, 20 HP, 50 Hz star connected induction motor, gave the following test readings (line value)
NO LOAD : 400 V, 1250 W, 9A
BLOCKED ROTOR : 150 V, 4000 W, 38A
Stator copper loss is equal to rotor copper loss at stand still. Draw the circle diagram and estimate
- Full load current.
 - Full load pf.
 - Full load slip
 - Ratio of maximum torque to full load torque. (12 Marks)
- 8 a. Explain the double field revolving theory as applied to single phase induction motor and prove that starting torque is zero. (10 Marks)
- b. With neat sketches, explain the construction, working and application of
- Split phase and
 - Capacitor start single phase induction motor. (10 Marks)