Fourth Semester B.E. Degree Examination, June / July 08
Transformers and Induction Machines

Time: 3 hrs.   Max. Marks:100

Note : *Answer any FIVE questions selecting at least TWO*
questions from each part.

PART – A

1 a. Obtain expression for effective inductance when two inductors are connected in
      i) Series aiding and ii) Parallel opposing   **(10 Marks)**
   b. Explain in brief construction, working and applications of i) Constant current transformer
      ii) Auto transformers.   **(10 Marks)**

2 a. Starting from fundamentals develop the exact equivalent circuit and approximate
      equivalent circuit of a single phase transformer referred to primary.   **(10 Marks)**
   b. A 250/125V, 5 KVA single phase transformer has primary resistance of 0.2Ω and
      reactance of 0.75Ω. The secondary resistance is 0.05Ω and reactance of 0.2Ω. Determine
      i) its regulation while supplying full load on 0.8 leading p.f.
      ii) the secondary terminal voltage on full load and 0.8 leading p.f.   **(10 Marks)**

3 a. Draw the phasor diagrams of single phase transformer with unity p.f. and lagging p.f.
      loads.   **(08 Marks)**
   b. A 12 KVA 220/440 V, 50Hz single phase transformer gave the following test data
      No load test : 220V, 2A, 165W (LV side) ;   S.C test   : 12V, 15A, 60W (HV side)
      Draw the equivalent circuit as referred to LV side and insert the appropriate values. Find
      the secondary terminal voltage on full load and at a p.f of 0.8 lag.   **(12 Marks)**

4 a. List the conditions for proper operation of three phase transformers in parallel.   **(08 Marks)**
   b. Two electric furnaces are supplied with single phase circuit at 100V from a 3-phase,
      13,750V supply by means of two single phase. Scott – connected transformers with similar
      secondary windings. When the load on main transformer is 625kW and the teaser is 1000
      kW, what currents will flow in each of 3-phase lines at unity power factor?   **(12 Marks)**

PART - B

5 a. Explain the concept of rotating magnetic field in three phase induction motors.   **(10 Marks)**
   b. A three phase step down transformer with per phase turns ratio 47.6:1 connected in delta-
      star is supplying a load of 400kW, 0.8 p.f. at 400V. Sketch the connection diagram and
      show in it different line currents and voltages.   **(10 Marks)**

6 a. Draw the phasor diagrams of induction motor 'on load' condition. Write steps involved in
      drawing it.   **(10 Marks)**
   b. A 18650 W, 4 pole, 50Hz, 3 phase induction motor has friction and windage losses of 2.5
      percent of the output. The full load slip is 4 percent. Compute for full load i) the rotor
      copper loss   ii) the rotor input   iii) the shaft torque.   **(10 Marks)**

7 a. Draw the torque characteristics for 3-phase induction motor covering motoring, generating
      and braking regions of operation.   **(04 Marks)**
   b. A 30 – hp, 500V, 50Hz, 4 – pole delta connected cage motor gave the following test data :
      No load : 500V, 8A, 1.5KW   Blocked rotor : 150V, 50A, 3.5 kW.
      Draw the circle diagram and obtain the values of i) line current ii) p.f   iii) efficiency.
      Assume stator and rotor resistance to be equal.   **(16 Marks)**

8 a. Explain any four speed control methods of induction motor.   **(12 Marks)**
   b. With schematic connection diagram and phasor diagram, explain the construction and
      working and application of a capacitor start induction motor.   **(08 Marks)**

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