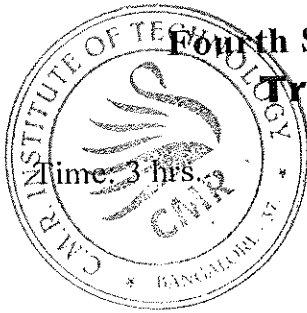**Fourth Semester B.E. Degree Examination, June/July 2016**

Transformers and Induction Machines

Time: 3 hrs.   Max. Marks:100

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

PART – A

1. a. With neat schematic diagram, explain core and shell type transformer. (06 Marks)
   b. Discuss the working condition of 1-ϕ transformer on resistive load with vector diagram. (06 Marks)
   c. A 230/460 volts transformer has a primary resistance of 0.2Ω and a reactance of 0.5Ω and the corresponding values for the secondary are 0.75Ω and 1.8Ω respectively. Find the secondary terminal voltage when supplying i) 10A at 0.8 p.f. lagging; ii) 10A at 0.8 p.f leading. (08 Marks)

2. a. Develop the equivalent of a 1-ϕ transformer referred to primary side from the fundamentals. (06 Marks)
   b. Discuss the different types of losses in transformer and derive efficiency of transformer. (06 Marks)
   c. A 200 kVA single phase transformer is in circuit continuously. For 8 hours in a day the load is 80 kW at unity power factor and for the remaining period of 24 ours it runs on no-load. Full load copper losses are 3.02 kW and the iron losses are 1.6 kW. Find all day efficiency. (08 Marks)

3. a. Discuss the essential and desirable conditions to be fulfilled for operating two single phase transformers in parallel. (06 Marks)
   b. What is an auto transformer? State its merits and demerits over two winding transformer. (06 Marks)
   c. Two transformers have following characteristics:
   Transformer 1 — % IR = 1.0% and % IX = 5.0%
   Transformer 2 — % IR = 1.5% and % IX = 4.0%
   How they will share a load of 100 kVA at 0.8 p.f lagging? (08 Marks)

4. a. Draw the soft connection of transformer and mark the terminals. Explain its merits and demerits. (06 Marks)
   b. Briefly discuss the choice of transformer connections. (06 Marks)
   c. Give the detail analysis of load sharing between two three phase transformers operating in parallel. (08 Marks)

PART – B

5. a. Bring out clearly, with the help of neat sketches the difference between the 3-phase slip ring induction motor and three phase squirrel cage induction motor. (06 Marks)
   b. Explain the terms slip, slip frequency and give the relation between them. (06 Marks)
   c. A 746 kW, 3-phase, 50 Hz 16-pole induction motor has a rotor impedance of (0.02 + j0.15) Ω at stand still full-load torque is obtained at 360 rpm. Calculate: i) The ratio of maximum to full-load torque; ii) The speed for maximum torque and iii) The rotor resistance to be added to get maximum starting torque. (08 Marks)

6 a. Enumerate various components of power loss in an induction motor and name the parts where in these occur.   (06 Marks)

   b. Draw the circle diagram of a 3-phase mesh connected, 30 h.p, 500V, 4 pole, 50Hz cage type induction motor. The table gives the measurements of line current and voltage and readings of two watt meters connected to measure the input power.

No-load	500V	8.3A	+2.85 kW	-1.35 kW
Blocked rotor test	100 V	32 A	-0.75 kW	+2.35 kW

Find from the diagram for full-load:

   i)   Line current
   ii)   Power factor
   iii) Efficiency   and
   iv)   Maximum output.   (14 Marks)

7 a. With neat sketch, explain the construction of deep bar cage rotor motor.   (06 Marks)

   b. Draw the torque-speed characteristics double cage rotor motor. How these characteristics are different from squirrel cage induction motor?   (06 Marks)

   c. Describe with a neat diagram the principle of operation of induction generator.   (08 Marks)

8 a. Why the starter is necessary to start an induction motor? Mention the various methods of starting and discuss the limitations of these methods.   (06 Marks)

   b. With neat schematic diagram, explain the method of star-delta transformer.   (06 Marks)

   c. With neat sketches, explain the construction working principle of
       i) Split phase   and   ii) Capacitor start single phase induction motor   (08 Marks)

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