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10EE46

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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