## EE - 404

### B.E. IV Semester Examination, June 2015
### Electrical Machine - I

*Time : Three Hours*

*Maximum Marks : 70*

*Note:* i) Answer five questions. In each question part A, B, C is compulsory and D part has internal choice.

ii) All parts of each question are to be attempted at one place.

iii) All questions carry equal marks, out of which part A and B (Max. 50 words) carry 2 marks, part C (Max. 100 words) carry 3 marks, part D (Max. 400 words) carry 7 marks.

iv) Except numericals, Derivation, Design and Drawing etc.

### Unit - I

1. a) Write the difference between shell type transformer and core type transformer.

   b) Define all day efficiency of transformer.

   c) Derive the condition for maximum efficiency for a 1-phase transformer.

   d) A 40 kVA, 1-phase transformer has iron losses of 800 W and Cu loss of 1140 W when supplying its full load of at unity power factor. Calculate the efficiency of the transformer at unity power factor at full load and half load.

   OR

   Explain Sumpner's test for testing two single phase transformers, also explain why this is beneficial for finding efficiency of transformer.

### Unit - II

2. a) What is the work of breather in transformer? Explain in brief.

   b) Write the necessary condition for two transformer operated in parallel.

   c) Explain the Scott connection with circuit diagram and where it used.

   d) On open circuit a 3-phase star/star/delta 6600/660/220 transformer takes 50 kVA at 0.15 PF. What is the primary input kVA and power factor when for balanced loads the secondary delivers 870 A at 0.8 P.F. lagging and tertiary delivers 260 line ampere at unity P.F. Neglected the leakage impedance.

   OR

   Write short notes on:

   i) Conservator

   ii) Cooling system of transformer

### Unit - III

3. a) Draw the torque speed characteristics of 3-phase induction machine.

   b) Write the working principle of 3-ϕ induction motor.

   c) Why the no load current of induction motor is more than transformer?

   d) A 3-phase, 6 pole 440 V, 50 Hz induction motor has a speed of 950 rpm on full load. Calculate the slip. How many complete alternations will the rotor voltage make per minute.

   OR

   Explain the procedure of no load test on a 3-phase induction motor. How are the parameter of equivalent circuit determined from test results?

### Unit - IV

1. a) Why used starter in 3-ϕ induction motor to start the motor?

   b) What do you mean by harmonics? Explain in brief.

   c) Explain Lagging in brief.

   d) Explain the method of speed control of 3-ϕ induction motor by varying the rotor resistance.

   OR

   The resistance and reactance (Equivalent) values of a double cage induction motor for state, outer and inner cage are 0.3, 0.8 and 0.2 Ω resistance and 3.9, zero and 3.5 ohm reactance respectively. Find the starting torque if the phase voltage is 250 V and the synchronous speed is 1000 RPM.

### Unit - V

   a) Why single phase induction motor is not self starting?

   b) Draw the connection diagram of a capacitor start induction motor showing starting and main winding.

   c) Derive the equivalent circuit of a single phase induction motor with the help of double revolving field theory.

   d) Prove that a single phase motor winding when excited by a single phase supply produces two equal and opposite revolving fields.

   OR

   Indicate the slip - torque characteristics of different types of single phase induction motor is one diagram and compare. State reason for their deviations?

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