Unit - V

5. a) Give various types of single phase induction motor.
   b) How is the direction of rotation of a single phase induction motor reverse? Explain.
   c) State the principle of double field revolving theory.
   d) Explain the principle of operation of dc servo motor with necessary diagrams.

OR

Draw the phasor diagram of single phase ac series motor and draw typical performance characteristics against current. What are special design features when compared to a dc series motor.

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Roll No .....

EX - 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 questions 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) Define all day efficiency.
   b) Why short circuit test is performed on hv side of transformer? Explain.
   c) What is an autotransformer? State its merit and demerit over the two winding transformer.
   d) A single-phase transformer working at unity power factor has an efficiency of 90% at both half load and at the full-load of 500W. Determine the efficiency at 75% full load and the maximum efficiency of the transformer.

OR

Develop the exact equivalent circuit of a 1-phase transformer. From this derive the approximate equivalent circuit. State clearly the various assumptions made.

UNIT - II

2. a) What is meant by three-phase transformer groups?
   b) What is the role of breather in transformers?
   c) Mention the various cooling methods used for transformer.
   d) Discuss the essential and desirable conditions to be fulfilled for operating two single phase transformers in parallel.

OR

A two-phase 240V supply is to be obtained from a 3-phase 3-wire 440V supply by means of a pair of Scott connected single phase transformers. Determine the turn ratio of the main and teaser transformers. Find the input current in each of the three phase lines when each of the two-phase current is 10A lagging behind the respective phase voltage by 36.9°.

Unit - III

3. a) Explain how squirrel cage induction motor differs from wound rotor motor in performance.
   b) Draw torque-speed characteristics of 3-phase induction motor with proper labeling.
   c) Explain principle of working of an induction motor.

   d) Draw the circle diagram for 5hp, 200V, 50Hz 4-pole, 3-phase star connected induction motor from the following data:
      i) 200V, 5A, 350 watts
      ii) 100V, 26A, 1700 watts
      iii) Rotor copper loss at standstill = half of the total copper loss.

OR

The power input to the rotor of a 440V, 50Hz, 3-phase, 6-pole induction motor is 60kW. It is observed that the rotor emf makes 90 complete cycles per minute. Calculate
   i) The slip
   ii) The rotor speed
   iii) Rotor copper loss and
   iv) Mechanical power developed

Unit - IV

4. a) Give various applications of three phase induction motor.
   b) Explain working principle of induction generator.
   c) What are the advantages of double cage and deep bar induction motor.
   d) Explain impact of unbalanced supply on performance of three phase induction motor.

OR

The rotor of a 4-pole, 50Hz, slip ring induction motor has a resistance of 0.25Ω per phase and runs at 1440 rpm at full load. Calculate the external resistance per phase which must be added to lower the speed to 1200 rpm, the torque being the same as before.