Roll No .....

EX - 801

B.E. VIII Semester

Examination, June 2014

Computer Aided Electrical Machine Design

Time : Three Hours

Maximum Marks : 70

Note: Attempt any five questions. All questions carry equal marks.

1. Discuss the various types of optimization problems and their mathematical formulations.

2. Discuss in detail the various factors in the design of transformers for (a) minimum cost and (b) maximum efficiency.

3. a) Discuss the various factors that influence the choice of number of poles and main dimensions for a D.C machine.
   b) Discuss how the armature winding of a D.C machine is designed.

4. A shunt field coil has to develop an MMF of 10,000 AT. The voltage drop in the coil is 40V and the resistivity of the wire employed is 0.021 Ω/m and mm². The depth of the winding is 3.6 cms and the length of mean turn is 150 cms. Design a field coil so that the power wasted is 700 w/m² of the total coil surface. Take the diameter of the insulated wire is 0.4mm greater than that of bare wire.

5. Derive the necessary equations for objective function and constraint equations for the optimal design of a 3 phase alternator. What are the independent variables employed in the optimal design?

6. a) Explain clearly the various steps involved in the design of a wound rotor of a 3 phase induction motor.
   b) Indicate how do you estimate the various losses in an induction motor from design data.

7. Calculate the equivalent resistance of rotor per phase in terms of stator current in each bar and end ring and total rotor copper loss from the following design data: 4 pole, 3 phase, 50Hz, 400V case motor has 48 slots in stator with 30 conductors/ slot. Each conductor carries a current of 10 A. Assume full pitch coils. The rotor has 57 slots, each slot has a bar of 12 cms length and 60 mm² area. The mean diameter of the ring is 20 cms and its area is 175 mm². Resistivity is 0.02 Ω/m and mm². Power factor is 0.8.Assume suitable data if necessary.

8. Write short notes on any two of the following:
   a) Design of the rotor of a Turbo alternator.
   b) Design of field winding of a D.C machine.
   c) Optimal design of an induction motor.

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