Average flux density in air gap = 0.48 Wb/m²

Specific electric loading = 26000 ac/m

Efficiency = 92%

Power factor = 0.88

Winding factor = 0.955

Current density = 5 A/mm²

Pole are to pole pitch ratio = 1.25

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Roll No ....

EX - 801

B.E. VIII Semester

Examination, June 2016

Computer Aided Electrical Machine Design

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.

1. a) What are the main factors affecting the design of electrical machines?

   b) Enumerate the limitations imposed on design of electrical machine using computer.

   c) What are the constraint functions in optimal design of electrical machines?

   d) Explain what is computer-aided design. Explain by a flow chart.

OR

Develop a general algorithm for designing an electrical machine using non-linear programming technique.

2. a) What are the variables affecting the optimal design of field winding of dc machine?

b) Discuss the factors affecting the specific loadings of dc machine.

c) Describe the formulation of design equations for dc machine.

d) Explain the design procedure for design of armature winding of dc machine.

OR

Draw a flow chart for optimal design of dc machine.

3. a) What is meant by stepped core in a transformer?

b) What are the constraint functions in optimal design of a core type power transformer?

c) Compare the design aspects for core type and shell type power transformers.

d) How do you design magnetic circuit of a core type power transformer? Explain it clearly.

OR

Draw the flow chart for overall design of power transformer.

4. a) What is the role of damper bars in the alternator?

b) Discuss the importance of objective function in problem formulation.

c) Describe the significance of selection of variables for optimal design of three-phase alternator and name the variable also.

d) Describe the formulation of design equations of three-phase alternator with the help of a suitable example.

OR

Explain by means of a flow chart the optimal design of field system for non-salient pole three-phase alternator.

5. a) Write the equations for end ring current in a squirrel cage rotor of a three-phase induction motor.

b) Explain in brief various leakage reactances in a three-phase slip-ring induction motor.

c) Describe clearly in brief the selection of variables for optimal design of three-phase squirrel cage induction motor.

d) Write an algorithm for determining the overall dimensions of stator of three-phase induction motor using equations.

OR

Calculate diameter and length of stator core and number of turns per phase of a 3-phase, 120 kW, 2200 Volts, 750 rpm (synchronous speed), 50Hz, star connected slip ring induction motor. Given that: