EE

C 47617 (Pages : 2) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE EXAMINATION
JUNE 2008

EE 04 605—ELECTRICAL MACHINE DESIGN

Time : Three Hours Maximum : 100 Marks

Part A

Answer **all** *questions.*

I. (a) List and discuss the application of DC machines.

(b) Find the minimum number of poles for a 1200 kW generator if the average voltage between commutator segments is not to exceed 15 and the armature mmf per pole is not to exceed 10,000 A.

(c) Compare core and shell type transformers.

(d) What are the different methods of cooling of transformers.

(e) Discuss the effect of short circuit ratio of alternator on machine performance.

(f) Discuss the factors that affect the choric of specific electric loading in synchronous machines.

(g) Discuss the effect of shape of stator slots in induction motors.

(h) What are the rules for selecting rotor slots in the case of squirrel cage machines.

(8 × 5 = 40 marks)

Part B

II. (a) What are the ginding factors for choice of number of armature slots ? (5 marks)

(b) A 4 pole generator supplies a current of 140 A. It has 480 armature conductors wave connected. The brushes are given an actual lead of 10°. Calculate the cross and demagnetising mmf per pole. The field winding is shunt connected, and takes a current of 10 A, find the number of extra shunt field turns to neutralize the demagnetization.

(10 marks)

Or

III. Explain and discuss on armature design concepts in dc machines. (15 marks)

IV. Design a single-phase transformer to be connected to a 230 V, 50 Hz supply. The transformer is to deliver 3 A at 50 V.

(15 marks)

Or

V. Explain about the forces on windings of a transformer during short circuit. (15 marks)

VI. (a) Obtain the main dimensions of the rotor of a 50 mVA, 2-pole, 50 Hz synchronous generator. The peripheral speed is limited to approximately 160 m/s. Take an electric loading of 65,000 A/m and a mean gap density of 0.575 wb/m^2. Assume a gap length of 25 mm.

(10 marks)

Turn over

(b) What is the advantage of revolving field system in shynchronous machines. (5 ma

Or

VII. (a) Differentiate between salient pole and cylindrical rotor machines. (5 ma

(b) Determine suitable stator dimensions of a 500 kVA, 50 Hz, 3-phase alternator to ru 375 r.p.m. Take mean gap density over the pole pitch as 0.55 wb/m^2, the specific ele loading as 25000 A/m. The peripheral speed should not exceed 35 m/s.

(10 ma

VIII. Design a 2.2 kW, 400 V, 3-phase, 50 Hz, 1500 synchronous r.p.m. squirrel cage induction mo The machine is to be started by a star delta starter. The efficiency is 0.8 and power factor is 0 at full load.

(15 ma

Or

IX. (a) What are the factors taken into account during the design of end rings. (6 ma

(b) A 11 kW, 3-phase, 6 pole, 50 Hz, 220 V star connected induction motor has 54 stator sl each containing 9 conductors. Calculate the values of bar and end ring currents. The num of rotor bars is 64. The machine has an efficiency of 0.86, and a power factor of 0.85. The r m.m.f. may be assumed as 85 percent of stator mmf.

(9 ma

[4 × 15 = 60 ma