2053
B.E. (Electrical and Electronics Engineering)
Eighth Semester
EE-808 (I): Electrical Machine Design

Time allowed: 3 Hours

Max. Marks: 50

NOTE: Attempt five questions in all, including Question No. I which is compulsory and selecting two questions from each Unit.

x-x-x

1

(a) Explain the significance of the ratio $r = \Phi_m/AT$ in the design of transformer.

(b) What type of mechanical forces are developed in transformer windings?

(c) Why fractional slot winding is not used for induction motor?

(d) What are the disadvantages of choosing higher Specific electric and magnetic loading of a machine?

(e) Discuss the advantages of hydrogen cooling with regard to cooling of electrical machines.

(5*2=10)

UNIT - I

2 (a) Define the terms specific electric loading and specific magnetic loading as applied to electrical machines. What are the considerations in the choice of these for rotating machines? (5)

(b) Explain in detail, with the help of suitable diagrams, the various cooling methods of electrical machines. (5)

3 (a) Describe any two methods used for determination of motor rating for variable load drives and give their temperature time curves. (5)

(b) Calculate the proportions of the cruciform section of minimum area for the core of a transformer. Show that the gross area of a core of a cruciform section is 79% of the area of the circumscribing circle. (5)

4 Determine the dimensions of core and yoke of a 200KVA, 50Hz, single-phase core type transformer. A cruciform core is used with distance between adjacent limbs equal to 1.6 times the width of core lamination. Assume voltage per turn of 12 V, maximum flux density=1.1T, window space factor of 0.32, current density of 3A/mm^2 and a stacking factor of 0.9. (10)

P.T.O.

UNIT - II

5 (a) Explain the design of rotor bars and end rings of induction motor. (5)

(b) Write the step-by-step design procedure for a wound rotor. Discuss various considerations to be taken into account while selecting the number of rotor slots in squirrel cage induction motor. (5)

6 (a) Deduce an expression for the output equation of a synchronous machine (alternator). Also derive its output coefficient. (5)

(b) Discuss briefly the factors, which influence the air gap length of a 3-phase synchronous machine. (5)

7 (a) Explain the Analysis method of solving electrical machine using CAD with the help of a flow chart. What are the advantages of analysis method? (5)

(b) Explain the influence of air gap length on the performance of synchronous machines with regard to i) voltage regulation ii) stability iii) synchronizing power. (5)

x-x-x