COMPUTER AIDED DESIGN OF ELECTRICAL MACHINES

Time : 3 Hours   Min. Passing Marks : 24   Total Marks : 80

Attempt any five questions selecting one question from each unit. All questions carry equal marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.

Unit-'I'

1. (a) Desire the output equation for 3ϕ A.C. rotating machine by first principle. [8]

   (b) Show that specific electrical loading is approximately constant, provided that the current density, ratio of conductor to slot area, ratio of tooth width to slot with and slot width in a rotating machine are constant. [8]

OR

1. (a) What are types of magnetic materials. Give examples. [8]

   (b) Explain what is real and apparent flux density. Derive the equation for the relation between real and apparent flux density. [8]

Unit-'II'

2. (a) The rate of temperature as measured from a temp. time curve of a dc motor is 0.0803°C per minute and 0.0605° per min. When the temperature rise is 20.5°C and 28.5°C respectively. Find final steady temperature rise and heating time constant of D.C. Motor. [8]

   (b) Define cooling time constant of an electric machine and draw its cooling-time curve. [8]

OR

2. (a) Express the term "continuous rating", "intermittent rating" and short term rating as applicable to electrical machine. [8]

   (b) Derive the equation for temperature rise of an electrical machine during its heating. Draw temperature rise-time curve and define heating time constant. [8]

Unit-'III'

3. (a) Describe the difference between single layer and two-layer winding. [8]

   (b) What are function of conservator and breather in transformer? Explain. [8]

OR

3. (a) Write short note on difference between power and distribution transformer specially from the design consideration. [8]

   (b) Device expression between volts per turn and KVA rating of transformer. [8]

Unit-'IV'

4. (a) Explain advantage and disadvantage of low SCR. [8]

   (b) Differentiate between turbo and hydro alternator on basis of design aspects. [8]

OR

4. (a) Define short circuit ratio related to synchronous machine. Show that it is inversely proportional to the direct axis synchronous reactance of machine. [8]

   (b) Why field system is made rotating and armature stationary in modern alternators. [8]

Unit-'V'

5. (a) Write short note on design of stator core and winding of IM. [8]

   (b) Explain why stationary armature and revolving field type of construction is most commonly used in large alternator. [8]

OR

5. (a) Draw flow chart for design of induction motor. [8]

   (b) Discuss the factors which govern the choice of specific loading for a 3ϕ induction motor. [8]