

2054
B.E. (Electrical and Electronics Engineering)
Sixth Semester
PC-EE-605: Electric Machine Design

Time allowed: 3 Hours

Max. Marks: 50

NOTE: Attempt five questions in all, including Question No. 1 which is compulsory and selecting two questions from each Unit.

x-x-x

I. Attempt the following:-

- a) What are the factors that decide the choice of specific magnetic and electric loading?
- b) Write down the output equation of single phase and three phase transformer giving the details of each term.
- c) What are the advantages and disadvantages of larger air gap length in induction motor?
- d) List the factors to be considered for the choice of slots in synchronous machines.
- e) Draw the flow chart for hybrid technique of electric machine analysis. (5x2)

UNIT - I

- II.
 - a) Draw a well labelled diagram of radial, axial and combined radial and axial ventilation system for electrical machines.
 - b) Prove that for a rotating machines output equation in volt amperes is equal to $C_0 D^2 L_n$. Show that how and why the output coefficient changes with size and type of machine. (2x5)
- III.
 - a) Discuss various duties and ratings of rotating machines and give their temperature time curves.
 - b) Explain the different mechanical forces that affect the transformer winding. (2x5)
- IV. Determine the main dimensions of the core, the number of turns, the cross-section of conductors for a 50 kVA, 11000/400 volts, 50Hz, single phase core type distribution transformer. The net copper area in window is 0.6 times the net cross-section of iron in core. Assume a square cross-section for core, a flux density 1.0 wb/m^2 , a current density 1.4 A/mm^2 , window space factor 0.2. The height of window is 3 times its width. (10)

UNIT - II

- V. Calculate the following design information of a 30kW 440V, 3-phase, 6-pole, 50Hz, delta connected squirrel cage induction motor.
 - (a) Main dimension of stator frame.
 - (b) Number of turns per phase in stator winding
 - (c) Number of stator slots(10)

P.T.O.

(2)

- VI. a) How induction motor can be designed for least power factor? List the advantages of using open slots in induction motor.
- b) What is the limiting factor for the diameter of synchronous machine? Write the expression for air gap length in cylindrical rotor machine. (2x5)
- VII. a) State merits of computer aided design of electrical machines. Explain any one method of solving electrical machine using CAD with a flow chart.
- b) Enumerate the advantages and disadvantages of providing large air gap in synchronous machines. (2x5)

x-x-x