BE - EE - Sem VII - CBSGS

(64)

EMD

04/12/15

Q.P. Code : **5936**

(3 Hours) [**Total Marks : 80**

N.B. : (1) Question No. 1 is **compulsory**.
(2) Attempt any **three** questions out of remaining **five** questions.
(3) Assume suitable data if necessary and justify the same.

1. (a) Explain the classification of insulating materials based on temperature rise. 5
   (b) Explain CRGO steel is preferred over non grain oriented steel in case of transformer. 5
   (c) Explain methods for reducing harmonic torque in induction motor. 5
   (d) Explain the factors affecting size of induction motor. 5

2. (a) Derive the output equation of three phase core type transformer. 10
   (b) Determine the dimensions of the core and yoke for a 100 KVA, 50Hz, single phase, core type transformer. A square core is used with distance between the adjacent limbs equal to 1.6 times the width of the laminations. Assume voltage per turn of 14 volts, maximum flux density 1.1 wb/m^2, window space factor = 0.32 and current density 3A/mm^2, Stacking factor= 0.9, flux density in yoke is to be 80% of flux density in core. 10

3. (a) Explain the need of EEM and discuss the modification in terms of stator, rotor and air gap. 10
   (b) List the different parts of magnetic circuit of a three phase induction motor and estimate the magnetizing current in terms of components mmf. 10

4. (a) Explain different methods of cooling transformer with neat sketches. 10
   (b) A single phase, 400V, 50 Hz, transformer is built from stamping having a relative permeability of 1000. The length of flux path is 2.5 m, the area cross section of core is 2.5×10^{-3} m^2 and the primary winding has 800 turns. Calculate no load current of transformer. The iron loss at working flux density is 2.6 w/kg. Iron density is 7.8×10^3 kg/m^2, stacking factor= 0.9. 10

5. (a) Explain dispersion coefficient and its effect on maximum power factor and overload capacity of induction motor. 10
   (b) Discuss the various assumptions in leakage reactance calculation of a core type transformer with LV and HV winding. 10

6. (a) Derive an output equation of three phase induction motor in terms of main dimensions. 10
   (b) In the design of 30 HP, 3 Phase, 440V, 960 rpm, 50 Hz, delta connected induction motor, assume the specific electric loading of 25000 ac/m, Specific magnetic loading of 0.46 wb/m^2. Full load efficiency 86%, power factor 0.87, Take ratio of core length to pole pitch as 1, estimate the following:- 10
      (i) Stator core dimensions
      (ii) Flux per pole
      (iii) Stator Turns per phase
      (iv) Total number of stator slots.