Roll No. ☐☐☐☐☐☐☐☐☐☐☐   Total No. of Pages : 02

Total No. of Questions : 09

B.Tech.(Electrical & Electronics) (E-1 2013 Batch) (Sem.–6)
ELECTRICAL MACHINE DESIGN
Subject Code : BTEEE-603A
Paper ID : [A2328]

Time : 3 Hrs.   Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :
1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION-A

1.   **Answer briefly :**

a) Define unbalanced magnetic pull.

b) State the effect of change of air-gap length in a three-phase induction motor.

c) What are the methods to reduce harmonic torques?

d) Define field form factor.

e) What factor decides the number of turns in a winding?

f) What are standard periods for short time rating of a machine?

g) List the disadvantages of using higher flux density in the core.

h) Why short chorded windings are employed in induction motor?

i) What is window space factor in a transformer?

j) What are the drawbacks of sandwich winding in a transformer?

SECTION-B

2. What are the main dimensions of induction motor? What are the desired values of L/τ, peripheral speed and width of ventilation ducts?

3. Optimize the transformer design from the point of view of

   a) Minimum loss.

   b) Minimum cost.

4. Which type of material is preferred for core laminations? What are the advantages of using mitred joints in core construction?

5. Derive the equation of temperature rise with time in electric machine. What is heating time constant?

6. Which type of rotor construction is recommended for induction motor with high value starting torque? Explain.

SECTION-C

7. Name the different duties of electrical machines and discuss the continuous duty and short time duty.

8. Estimate the a) core area, b) window area, and c) conductor area of cross-section and number of turns of a three-phase Δ-Y core type transformer rated at 300kVA, 6600/440V, 50Hz. A suitable core with three steps having a circumscribing circle of 0.25m diameter and a leg spacing of 0.4m is available. The e.m.f. per turn is 8.5 volts. Assume current density is 2.5A/mm^2, window space factor is 0.28 and stacking factor is 0.9.

9. Discuss the methods employed to reduce the effect of harmonics in selection of the combination of rotor and stator slots in induction motors.