

GUJARAT TECHNOLOGICAL UNIVERSITY
BE SEMESTER-VI OLD) EXAMINATION – WINTER 2017

Subject Code:160804**Date:13-11-2017****Subject Name: Electrical Machine Design****Time:02:30 pm to 5:00 pm****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1** (a) Deduce an expression for the M.M.F required for the air gap of an armature with slots and ducts. **07**
(b) What are the factors that limit the design of an electrical machine? **07**
- Q.2** (a) Show that for minimum total material cost of a 3-phase transformer the ratio (Weight of iron/Weight of copper) should be equal to the ratio (specific cost of Copper (Rs. /kg) / specific cost of iron ((Rs. /kg))). **07**
(b) State the advantages of hydrogen cooling in alternators. Explain radial and axial ventilation with the help of sketches. **07**
- OR**
- (b) Deduce an expression for the design of core for Square and cruciform sections also state the reason why circular coils are always preferred in comparison to rectangular coils. **07**
- Q.3** (a) What are the types of windings commonly used in transformer and on what basis are they selected? **07**
(b) Explain : **07**
a. Significance of cruciform core in transformer.
b. Design difference between power & distribution transformer.
- OR**
- Q.3** (a) Explain various factors affecting selection of Numbers of armature slots for D.C. machine. **07**
(b) Explain how eddy current loss occurs and derive an expression for eddy current loss in a magnetic material. **07**
- Q.4** (a) Define specific magnetic loading (B_{av}) and specific electric loading (a_c) and obtain an expression for the “output co-efficient for a d.c. machine. **07**
(b) Explain the design procedure in the design of field windings for a D.C. shunt machine. **07**
- OR**
- Q.4** (a) Explain the Real and Apparent flux densities. **07**
(b) Explain radial and axial ventilation with the help of sketches. Give the advantages of hydrogen cooling in alternators. **07**
- Q.5** (a) Discuss the factors that determine the choice of air-gap in induction motor. **07**
(b) List and explain briefly the limitations being imposed in the design of electrical machines also discuss the modern trends in the design. **07**
- OR**
- Q.5** (a) What are the types of windings commonly used in transformer and on what basis are they selected? **07**
(b) Derive the condition for the optimum design of transformer for the minimum cost and minimum losses. **07**