

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-VI • EXAMINATION – WINTER • 2014****Subject Code: 160804****Date: 05-12-2014****Subject Name: Electrical Machine Design****Time: 02:30 pm - 05:00 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) State the advantages of hydrogen cooling in alternators. Explain radial and axial ventilation with the help of sketches. **07**

(b) Define heating time constant and explain how it can be evaluated from heating curve. **07**

Q.2 (a) Deduce an expression for the m.m.f required for the air gap of an armature with slots and ducts. **07**

(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**

OR

(b) Derive output equation of 3 – Φ Transformer. Write significance of constant 'K'. **07**

Q.3 (a) What are the factors that limit the design of an electrical machine. **07**

(b) Explain : **07**
a. Significance of cruciform core in transformer.
b. Design difference between power & distribution transformer.

OR

Q.3 (a) Explain how eddy current loss occurs and derive an expression for eddy current loss in a magnetic material. **07**

(b) 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**

Q.4 (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) Explain the methods for the estimation of Mmf for the tapered teeth. **07**

OR

Q.4 (a) Explain various factors affecting selection of Numbers of armature slots for D.C. machine. **07**

(b) Explain the design procedure in the design of field windings for a D.C. shunt machine. **07**

Q.5 (a) What are the types of windings commonly used in transformer and on what basis are they selected? **07**

(b) What are the important considerations in choosing number of poles in D.C. machine? **07**

OR

Q.5 (a) i) Mention the criteria for selecting rotor slots in an induction motor. (05) **07**
ii) Define stacking Factor. (02)

(b) Discuss the factors that determine the choice of air-gap in induction motor. **07**
