

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-VI (OLD) - EXAMINATION – SUMMER 2017****Subject Code: 160804****Date: 03/05/2017****Subject Name: Electrical Machine Design****Time: 10:30 AM to 01:00 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) List and explain briefly the limitations being imposed in the design of electrical machines also discuss the modern trends in the design. **07**
- (b) Explain the design procedure in the design of field windings for a d.c. shunt machine. **07**
- Q.2** (a) How are machines classified based on its ratings? Show the temperature variation for any one. **07**
- (b) Deduce an expression for the m.m.f required for the air gap of an armature with slots and ducts. **07**
- OR**
- (b) Define heating time constant and explain how it can be evaluated from heating curve **07**
- Q.3** (a) How are machines classified based on its ratings? Show the temperature variation for any one type. **07**
- (b) State the advantages of Hydrogen cooling in alternator. Explain Radial and axial ventilation with the help of sketch **07**
- OR**
- Q.3** (a) Derive the output equation of a single phase transformer. **07**
- (b) What are the types of windings commonly used in transformer and on what basis are they selected? **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) Derive the expression for the KVA rating of a three phase transformer and show that the e.m.f per turn $E_t = K\sqrt{KVA}$. **07**
- OR**
- Q.4** (a) Derive the condition for the optimum design of transformer for the minimum cost and minimum losses. **07**
- (b) Derive output equation of 3 – Φ Transformer. Write significance of constant ‘K’. **07**
- Q.5** (a) Distinguish between real and apparent flux densities **07**
- (b) What are the important considerations in choosing number of poles in d.c. machine? **07**

OR

- Q.5** (a) What are the factors that affect the size of rotating machines? Mention various factors on which brush friction loss depends. **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**
