Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–V • EXAMINATION – WINTER • 2014

Subject Code: 150901 Date: 26-11-2014

Subject Name: Electrical Machines - II

Time: 10.30 am - 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)** Explain the different phase group of power transformer using vector and winding diagram. **07**

(b) Discuss different methods of speed control of 3–phase Induction motor. **07**

Q.2 **(a)** Explain construction of welding transformer. How does it differ from power transformer? **07**

(b) Explain Scott-connection of transformer in detail. Compare it with open – delta connection. **07**

OR

(b) Where is the delta - delta connection is applied? **07**
A 3-phase transformer has its primary connected in delta and secondary in star, it has an equivalent resistance of 1% and equivalent reactance of 6%. The primary applied voltage is 6,600V. what must be the ratio of transformation in order that it will deliver 4800V at full load current and 0.8 power factor lag.

Q.3 **(a)** Draw the phasor diagram and equivalent circuit of a 3-phase induction motor. **07**

(b) With the help of a neat diagram explain parallel operation of two 3-phase transformer. Explain the essential & desirable conditions to be fulfilled for operating two 3-phase transformers in parallel. **07**

OR

Q.3 **(a)** Explain the principle and operation of Induction generator. **07**

(b) Explain why a single phase induction motor does not self start. Discuss its operation based on double revolving field theory. **07**

Q.4 **(a)** Two single phase scott-connected transformers supply a 3-phase 4-wire 50Hz distribution system with 400V between lines. The h.v windings are connected to a 2-phase 6000 V (per phase) system.The core area is 250cm^2. While the maximum allowable flux density is 1.2 T. Determine the point to be tapped for the neutral wire on the 3-phase side. **07**

(b) Explain the working, equivalent circuit and advantages of double cage squirrel cage induction motor. **07**

OR

Q.4 **(a)** Explain the construction and working principle of Repulsion motor. **07**

(b) Draw the circle diagram of a 20 h.p, 400V,50Hz,3-phase star-connected induction motor from the following test data (line values) **07**
No load 400v 9A p.f 0.2
Block rotor 200v 50A p.f 0.4
From the circle diagram find [i] line current and p.f at full load [ii] maximum power out put

Q.5 **(a)** What is the role of commutator in an AC commutator motor? Explain the working of a Schrage motor. **07**

(b) An ac operated universal motor has a 2-pole armature with 960 conductors. At a certain load the motor speed is 5000 rpm and the armature current is 4.6A; the armature terminal voltage and input are respectively 100 V and 300 W. Calculate the following quantities assuming an armature resistance of 3.5 Ω. (i) Effective armature reactance (ii) Max. Value of useful flux/pole. **07**

OR

Q.5 **(a)** Explain with necessary diagrams how two 1-phase transformers can be used to convert a 3-phase supply to a 2-phase one. If the load is balanced on one side, show that it will be balanced on other side. **07**

(b) Draw the constructional features and operating characteristics of shaded pole motor. Also state its application. **07**

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