# **GUJARAT TECHNOLOGICAL UNIVERSITY**

**BE - SEMESTER-VI (OLD) - EXAMINATION - SUMMER 2017** 

Subject Code: 160901

Subject Name: Electrical Machine - III

Time: 10:30 AM to 01:00 PM

## **Total Marks: 70**

Date: 10/05/2017

## Instructions:

Q.1

- 1. Attempt all questions.
- 2. Make suitable assumptions wherever necessary.
- 3. Figures to the right indicate full marks.
  - (a) Describe the Hopkinson's test to find efficiency of DC machines. 07
    - (b) The no-load test of a 45 kW, 220 V DC shunt motor gave the following 07 results. Find the efficiency of this machine for following conditions.
       (1) Full load as a motor (2) 80% full load as a generator

No load input current = 13.5 A, Field current = 2.5 A, Armature resistance = 0.032 Ohm, Assume supply voltage equal to rated voltage.

- Q.2 (a) What is synchronization of alternator? Enlist the methods of 07 synchronization. Explain any one of them in detail.
  - (b) Draw the vector diagrams and explain the effect of variation in 07 excitation of synchronous motor connected to constant voltage on no load.

#### OR

- (b) Draw the circuit diagram and explain the retardation test. 07
- Q.3 (a) Comment on the starting torque of a synchronous motor. Describe any 07 two methods of starting of a synchronous motor.
  - (b) The Hopkinson's test on two identical DC shunt machines gave the following data. Calculate the efficiency of each machine.
    Line voltage = 110 V, Line current = 48 A, Motor armature current = 230 A, Field currents are 3 A and 3.5 A. Armature resistance of each machine is 0.035 Ohm.

#### OR

Q.3 (a) Explain the construction and working of a PMBLDC motor. 07
(b) The results of Field's test on a set of identical DC series motors are as follows: Motor armature current = 56 A, Voltage across motor = 590 V, Voltage

across generator field winding = 40 V, Generator terminal voltage = 400 V, Generator current = 44 A, Armature resistance of each machine = 0.3 Ohm. Find out the efficiency of each machine.

- Q.4 (a) What do you mean by SCR (short circuit ratio) of a synchronous 07 machine? What is its significance?
  - (b) Write a short note on auto synchronous motor. 07

### OR

- Q.4 (a) Briefly describe MMF method to find voltage regulation of alternator.
   (b) Describe the construction and working of a Switched Reluctance Motor.
   07
- Q.5(a) Describe the armature reaction in case of synchronous generator.07(b) Explain the construction and working of an induction regulator.07OROR
- Q.5 (a) Draw necessary circuit diagram and explain the slip test for salient pole 07 synchronous machine.
  - (b) Explain the construction and working of axial flux machines. 07