

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER-III(OLD) • EXAMINATION – WINTER 2016

Subject Code:130904

Date:09/01/2017

Subject Name:Electrical Machines-1

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) Explain in detail the working and construction of 3- Φ Induction motor **07**
(b) Draw and explain the characteristics of DC generator and state their application. **07**

- Q.2** (a) Explain with neat diagram SC and OC test on a transformer and how parameters of equivalent circuit can be calculated with the help of this test **07**
(b) Derive the relation for starting and running torque for a 3- Φ Induction motor. Also draw and explain the torque-slip characteristics. **07**

OR

- (b) Draw and explain the vector diagrams for actual transformer on-load. **07**
- Q.3** (a) Write a short note on auto-transformer. Give its applications and derive the relation for saving of copper compared to 2-winding transformer. **07**
(b) Explain the voltage build-up process in a self excited DC shunt generator. Also explain critical resistance. **07**

OR

- Q.3** (a) Write short note on pitch factor and distribution factor of an alternator. **07**
(b) Explain the method of determining voltage regulation of an alternator by synchronous impedance method. **07**
- Q.4** (a) Explain the conditions necessary for parallel operation of two alternators. Also explain any one method for synchronizing the two alternators. **07**
(b) With a neat diagram explain the power stages in a DC motor **07**

OR

- Q.4** (a) Explain with a neat circuit diagram Swinburne's test to find the efficiency of a DC motor. Also state its limitation. **07**
(b) A 3-phase, 50-Hz, 4-pole induction motor has a slip of 4%. Determine the frequency of rotor emf and speed of motor if rotor has a resistance of 1Ω and standstill reactance of 4Ω , Calculate the power factor of the motor(i) at standstill and (ii) at a speed of 1400rpm. **07**
- Q.5** (a) Explain with a neat diagram working of a 3-point starter. **07**
(b) A short shunt compound wound DC generator supplies a load current of 50-A at 220-V. The generator has the following winding resistance: Armature winding resistance 0.5Ω , Series field resistance 0.2Ω , shunt field resistance 100Ω . Calculate the generated e.m.f. Assume brush drop 1-V per brush. **07**

OR

- Q.5** (a) State and explain the necessary condition for parallel operation of two single phase transformer. **07**
(b) State different methods of speed control of DC motors. Explain Ward Leonard method of speed control in detail. **07**
