

GUJARAT TECHNOLOGICAL UNIVERSITY
BE - SEMESTER- IV(NEW) EXAMINATION – SUMMER 2015

Subject Code: 2140906

Date: 30/05/2015

Subject Name: AC Machines

Time: 10:30am-1.00pm

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) What is slip? Explain torque-slip and torque-speed characteristics of an induction motor. **07**
(b) What is the need of speed control for an induction motor? Explain different speed control methods of induction motor. **07**
- Q.2** (a) Explain working principle and construction of induction motor. Also differentiate squirrel cage and slip ring induction motor. **07**
(b) A 10 pole, 3 phase, 600 V, 50 Hz star connected IM has rotor resistance and standstill reactance of 0.03 and 0.5 ohms per phase respectively. Find (1) Speed at maximum torque (2) the ratio of full load torque to maximum torque, if the full load speed is 570 rpm. **07**
- OR**
- (b) A 3 phase, 50 Hz, 500 V, I.M. with 8 poles gives an output of 30 kW at 700rpm with 0.8 PF lagging. The mechanical losses are equal to 1 kW. Find (1) slip (2) rotor copper loss (3) input if the stator losses are 1200 W and (4) line current. **07**
- Q.3** (a) Prove that when 3 phase supply is applied across the stator of 3 phase IM, a rotating magnetic field of constant magnitude is produced. **07**
(b) A 100 kVA, 3000 V, 50 Hz, 3 phase star connected alternator has effective armature resistance of 0.25 ohm. The field current of 400 A produces short circuit current of 180 A and an open circuit voltage of 1040 V (line value). Find the full load voltage regulation at 0.85 PF lagging and 0.85 PF leading. **07**
- OR**
- Q.3** (a) What is voltage regulation of an alternator? Explain any one method to find out voltage regulation of an alternator. **07**
(b) Discuss the conditions to be satisfied for proper synchronization of two alternators. **07**
- Q.4** (a) Why single phase induction motors are not self started? Explain double field revolving theory for single phase induction motor. **07**
(b) Explain working principle with necessary diagrams of any two single phase induction motors. **07**
- OR**
- Q.4** (a) What is harmonic torques? Explain crawling and cogging for 3 phase induction motors. **07**
(b) Discuss working of Repulsion motor and Universal Motor. **07**
- Q.5** (a) Explain the working principle of Induction Generator. Also discuss the applications of Induction generator. **07**
(b) What is the role of commutator In AC commutator motor? Explain the working of Schrage motor. **07**
- OR**
- Q.5** (a) Define pitch factor and distribution factor of an alternator. Also derive the EMF equation of an alternator. **07**
(b) Explain V-curves and its importance for synchronous motors. **07**
