**Karunya University**

**(Karunya Institute of Technology and Sciences)**

(Declared as Deemed to be University under Sec.3 of the UGC Act, 1956)

**Supplementary Examinations – June 2016**

**Subject Title: INDUCTION AND SYNCHRONOUS MACHINES Time : 3 hours**

**Subject Code: 14EE2007 Maximum Marks: 100**

**Answer ALL questions (5 x 20 = 100 Marks)**

1. Discuss briefly about the performance of an induction motor based on its equivalent circuit.   
**(OR)**

2. a. Derive the Torque equation of a three phase induction motor both under starting and running conditions. State the expression for maximum starting and running torque. (15)

b. Draw the torque – slip characteristics of three phase induction motor with variation in rotor resistance. (3)

c. Why the induction motor is referred as an asynchronous motor? (2)

3. Explain how a revolving magnetic field is established in a single phase induction motor based on double field revolving theory. Derive the torque equation of a single phase induction motor.

**(OR)**

4. Discuss about the various types of single phase induction motor with neat circuit diagram.

5. a. Derive the EMF equation of an alternator. (8)

b. Find the no load phase and line voltage of a 6 pole, three phase star connected alternator which runs at 1200rpm, having flux per pole of 0.1wb sinusoidally distributed. The stator has 54 slots having double layer winding. Each coil has 8 turns and the coil is chorded by 1 slot. (7)

c. Define Voltage regulation. Mention the methods of determining the voltage regulation of an alternator. (5)

**(OR)**

6. a. State the conditions for synchronization of alternators. (3)

b. Discuss briefly about the methods of synchronization of alternators. (12)

c. A 5000kVA, 10kV, 1500rpm, 50Hz alternator runs in parallel with other machines. The synchronous reactance is 20%. Find (i) no load (ii) full load at power factor of 0.8 lagging, synchronizing power per unit mechanical angle of phase displacement and calculate the synchronizing torque if the mechanical displacement is 0.5〫. (5)

7. Explain why a synchronous motor is not a self-starting motor. Write notes on the methods of starting the synchronous motor.

**(OR)**

8. Based on V curve and inverted V curve, discuss about the effect of excitation on armature current and power factor.

9. **Compulsory:**

Based on two reaction theory, explain how the direct and quadrature axis reactances can be determined using slip test.