

Reg. No. :

Name :

**Sixth Semester B.Tech. Degree Examination, May 2016
(2008 Scheme)**

Branch : ELECTRICAL AND ELECTRONICS

08.601 : Electrical Machines – III (E)

Time : 3 Hours

Max. Marks : 100

Instruction : Answer *all* questions in Part – A and *one full* question from *each* Module in Part – B.

**PART – A
(4 marks each)**

1. Explain with a sketch the construction of squirrel cage induction motor.
2. Draw and explain the phasor diagram of a 3-phase induction motor.
3. Draw the equivalent ckt of the 3-phase induction motor and explain its parameters.
4. Explain crawling of a 3-ph induction motor.
5. Draw and explain the current locus of a double cage induction motor.
6. Explain with a circuit diagram, the working of a star-delta starter.
7. Explain the principle of slip power recovery scheme.
8. Explain the principle of working of a synchronous induction motor.
9. Describe the principle of shaded pole starting of single phase induction motor.
10. Explain the principle of operation of linear induction motor. **(10×4=40 Marks)**



P.T.O.



PART - B
(20 marks each)

Module - I

11. a) Derive the expression for torque developed in a 3-phase induction motor and obtain the condition for maximum torque. Also sketch and explain the torque-slip characteristics. 10
- b) A 6 pole, 3 phase, 50 Hz, induction motor develops maximum torque of 300 N-m at a speed of 960 rpm. Determine the torque exerted by the motor at 5% slip. The rotor resistance/phase is 0.6 ohms. 10

OR

12. a) Prove that the locus of stator current of an induction motor is a circle. 5
- b) A 2.4 kw, 400 V, 50 Hz, 3 phase delta connected induction motor has stator resistance = 0.06Ω /phase. Stator turns/Rotor turns = 2. The test values are No-load test - 400 V, 3.2 A, $\cos \phi = 0.17$. Blocked Rotor test - 210 V, 16A, $\cos \phi_{sc} = 0.35$. Draw the circle diagram and find :
- 1) Line current, power factor and slip for full load condition
 - 2) Maximum torque in terms of full load torque. 15

Module - II

13. a) With neat diagram, explain the principle of operation of a rotor resistance starter used for 3-ph induction motor. 8
- b) The cages of a double cage induction motor have stand still impedances of $(3.5 + j 1.5) \Omega$ and $(0.6 + j 7.0) \Omega$ respectively. The full load slip is 6%. Find the starting torque at normal voltage in terms of full load torque. Neglect stator impedance and magnetising current. 12

OR

14. a) Explain any three methods of speed control of 3-phase induction motor. 12
- b) Explain the principle of operation of an induction generator. Compare induction generator with synchronous generator. 8



Module – III

15. a) Explain the construction and principle of operation of synchronous induction motor. 10
- b) A 400 V, 3-phase, 50 Hz, induction motor has a magnetising current of 15A. When at rest, the voltage between slip rings of star connected rotor is 150 V. As a synchronous induction motor dc is supplied between one slip ring and other two joined together. Find the rotor current when the motor takes 60 A at a power factor of 0.8 leading. 10

OR

16. a) Explain the double field revolving theory of single phase induction motor and draw its torque-slip curve. 8
- b) Write short notes on :
- 1) Universal motor
 - 2) Single phase repulsion motor. 12

