

NOVEMBER 2006

2005 MAHATMA GANDHI UNIVERSITY  
I B.TECH DEGREE EXAMINATIONS  
VII SEMESTER ELECTRICAL AND ELECTRONICS ENGINEERING  
ELECTRICAL MACHINES -III

TIME : 3 HOUR  
MARK : 100

ANSWER ALL QUESTIONS

**PART A[10\*2=20]**

1. Explain how torque is produced in a polyphase induction motor.
2. Draw and explain the phasor diagram of a 3-phase induction motor at a general slips.
3. Draw and explain a Direct-on-line starter for a 3-phase squirrel-cage induction motor.
4. Explain the pole-changing technique adopted for the control of 3-phase induction motor.
5. What is a synchronous induction motor?
6. Explain revolving field theory.
7. Explain the construction and use of universal motor.
8. Discuss the operation and application of a hysteresis motor.
9. Show that in addition to speed control, power factor control is also possible in discharge motor.
10. Explain the principle of operation of a linear induction motor.

**PART B[10\*8=80]**

11. (a) Develop the equivalent circuit of a 3-phase induction motor.  
(b) The power input to the rotor of a 3-phase, 50Hz, 6-pole, slip-ring induction motor is 40 kw and the motor runs at 960 rpm. The rotor resistance per phase is 0.25 ohm. Determine the rotor current per phase.
12. A 400 V, 4-pole, 50Hz, 3-phase induction motor has a star connected stator whose impedance is represented as  $(0.5 + j1.5)$  ohm. The equivalent resistance and stand still leakage reactance of the rotor referred to the stator phase are 1.0 and 2.0 ohms respectively. Determine the current drawn from the supply and torque in synchronous watts when the motor is running at a speed of 1,400 rpm.
13. Describe, with diagrams, the principle and constructional details of a star-delta starter.
14. A 3-phase squirrel-cage induction motor has a starting current 175% of full load line current and develops 35% of full load torque when operated by a star-delta switch. What would be the starting torque and current if an auto-transformer with 80% tapping is employed.
15. Explain the operation of induction generator under (1) Self-excited and (2) Line excited condition.
16. Discuss the construction and working of a shaded pole single induction motor.
17. Explain in detail the construction, operation and application of a single-phase series motor.
18. Discuss the constructional features, principle of operation and torque-speed characteristics of reputation start induction motor.
19. Describe special type of rotor construction for obtaining high starting torque in the cage induction motors. Sketch the torque-slip characteristics in these cases.
20. What are phase advancers? Indicate the types. Explain their basic principles.