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B.E./B.Tech. DEGREE EXAMINATION, MAY/JUNE 2007.

Fourth Semester

(Regulation 2004)

Electrical and Electronics Engineering

EE 1251 — ELECTRICAL MACHINES — II

(Common to B.E. (Part-Time) Third Semester Regulation – 2005)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Why is the synchronous impedance method used to determine voltage regulation of synchronous machine called pessimistic?
2. How is the armature windings in alternators different from those used in dc machines?
3. When is a synchronous motor said to receive 100% excitation?
4. What is a synchronous capacitor? State its application.
5. Which of the two ac motors has more efficiency? Name the type of rotors of induction motors.
6. From the equivalent circuit of an induction motor, represent which component is the electrical equivalent of the mechanical load on the motor.
7. What is cogging in induction motors? How can it be overcome?
8. State two advantages of speed control of IM by injecting an emf in the rotor circuit.
9. List four applications of reluctance motors.
10. What is a universal motor?

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PART B — (5 × 16 = 80 marks)

11. (a) (i) A 2000 kVA, 11 kV, 3- ϕ star-connected alternator has a resistance of 0.3 Ω and reactance of 5 Ω /phase. It delivers full-load current at 0.8 lagging power factor at rated voltage. Compute the terminal voltage for the same excitation and load current at 0.8 power factor leading. (8)
- (ii) Derive the emf equation of alternator. (8)

Or

- (b) (i) Discuss about the parallel operation of two alternators with identical speed/load characteristics. (8)
- (ii) Explain the two reaction theory in short. (8)
12. (a) (i) Define the various torques associated with a synchronous motor. (8)
- (ii) Draw the equivalent circuit and phasor diagram of a synchronous motor. (8)

Or

- (b) (i) Discuss about the methods of starting and procedure for starting synchronous motor. (8)
- (ii) Explain the significance of V and inverted V curves. (8)
13. (a) (i) A 3 phase 440 V 50 Hz 40 pole Y-connected induction motor has rotor resistance of 0.1 Ω and reactance 0.9 Ω per phase. The ratio of stator to rotor turns is 3.5. Calculate gross output at a slip of 5%, and the maximum torque in syn. watts and corresponding slip. (8)
- (ii) Deduce the equivalent circuit of an induction motor. (8)

Or

- (b) (i) A 415 V, 29.84 kW, 50 Hz delta connected motor gave the following test data :

No load test : 415 V 21 A 1250 W

Locked rotor test : 100 V 45 A 2730 W

Construct the circle diagram and determine the line current and power factor for rated output, and the maximum torque. Assume stator and rotor Cu losses equal at stand still. (12)

- (ii) What is an induction generator? (4)

14. (a)

(b)

15. (a)

(b)

14. (a) Discuss about the various starting methods of induction motors. (16)

Or

- (b) Explain the different speed control methods of phase wound induction motor. (16)

15. (a) Write short notes on the salient features of :

- (i) Stepper motor
(ii) Double field revolving theory.

Or

- (b) Give the classification of single phase motors. Explain the types of single phase induction motors. (16)
