NAME_____ ROLL NO_____

2007 ANNA UNIVERSITY

B.E/B.TECH DEGREE EXAMINATION

ELECTRICAL MACHINE

(ELECTRICAL AND ELECTRONICS ENGINEERING)

MAY-2007

TIME-3HOUR
MARKS-100

ANSWER ALL QUESTIONS

PART - A [10X2=20]

1. What is meant by compounding curve in synchronous generator?

2. state factors responsible for a change in synchronous generator terminal voltage while feeding isolated load.

3. why synchronous motor is not a self starting motor?

4. what is cogging?

5. what is locked rotor torque?

6. why slots on the rotor of induction motor are skewed?

7. a 3-phase squirrel cage induction motor should not be started directly from the main supply. State reasons.

8. what is the effect of change in line frequency on the performance of induction motor?

9. mention some of the advantage of stepper motor.

10. how do you size the capacitor rating required for an induction motor?

PART - B [5X16=80]

11. (a) (i) Explain the quick stopping of a synchronous machine may be achieved.

(ii) A 5000 KVA, 10000 V, 1500 rpm, 50 Hz alternator runs in parallel with other machines. Its synchronous reactance is 20%. Find for (1) no load (2) full load at power factor 0.8 lagging, synchronizing power per unit, mechanical angle of phase displacement and calculate the synchronizing torque if the mechanical displacement is 0.5°.

OR

(b) (i) Explain the procedure that are followed to connecting a synchronous a machine to a infinite busbars.

(ii) State the assumptions made in the potier method and explain the effect of these assumptions on the accuracy of the voltage regulation.

12. (a) (i) Name the important characteristics of an synchronous motor not found in an induction motor.

(ii) A 1500 KW, 3 phase, star connected, 3.3kV synchronous motor has reactance of xd = 4.01 and xq = 2.88 O per phase. All losses may be neglected. Calculate the excitation emf when the motor is supplying rated load at unity p.f. Also calculate the maximum mechanical power that the motor can supply with excitation held fixed at this value.

OR

(b) (i) Explain the phenomenon of hunting in an synchronous motor. How it is remedied?

(ii) A 2500 V, 3 phase, star-connected motor has a synchronous reactance of 5O per phase. The motor input is 1000 kW at rated voltage and an excitation emf of 3600 V (line). Calculate the line current and power factor.

13. (a) (i) Draw the approximate circuit model of an induction motor and explain what each circuit element represents.

(ii) A 6 pole, 50 Hz, 3 phase induction motor has a rotor resistance of 0.25Ω per phase and a maximum torque of 10 N-m at 875 rpm. Calculate (1) the torque when the slip is 5% and (2) the resistance to be added to the rotor circuit to obtain 60% of the maximum torque at starting. Explain why two values are obtained for this resistance. Which value will be used? The stator impedance is assumed to be negligible.

OR

(b) (i) Discuss briefly the effect on the speed-torque characteristics of an induction motor produced by: (1) halving the applied voltage with normal frequency (2) halving both the applied voltage and frequency.

(ii) A 12 pole, 3 phase, 50 Hz induction motor draws 2.80A and 110 kW under blocked rotor test. Find the starting torque when on direct to rated voltage and frequency supply. Assume the stator and rotor copper losses to be equal under blocked rotor test.

14. (a) Explain with relevant diagram, the construction and working of auto transformer and star-delta starters.

OR

(b) Write short notes on the following:

i. Cascade operation of 3-phase induction motor.

ii. Slip power recovery scheme.

15. (a) (i) Explain with suitable diagram the working principle of split-phase and capacitor start induction motor.

(ii) How can yhou reverse the directions of such motors and mention some of its applications?

OR

(b) Discuss briefly the operation and characteristics of

(i) Repulsion motor.

(ii) A.C. Series motor.