ANNA UNIVERSITY COIMBATORE

B.E. / B.TECH. DEGREE EXAMINATIONS : OCTOBER 2009

REGULATIONS – 2007

FOURTH SEMESTER - ELECTRICAL AND ELECTRONICS ENGG.

070280026 - SYNCHRONOUS AND INDUCTION MACHINES

TIME : 3 Hours   Max.Marks : 100

PART – A

(20 x 2 = 40 MARKS)

ANSWER ALL QUESTIONS

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?

11. Give difference between cylindrical rotor type synchronous machine and salient pole type machine.

12. Define the term 'voltage regulation' of a synchronous generator.

13. What is hunting? How is hunting minimized?

14. Write the uses of capability curves in a synchronous machine.

15. Draw torque-slip characteristics of induction motor with increasing values of rotor resistance.

16. Why is starter necessary to start 3 phase induction motor?

17. List four methods of speed control in 3 phase induction motor.

18. Compare the performance and applications of Resistance split phase and permanent capacitor single phase induction motors.

19. Mention two advantages in using stepper motors.

20. What is the use of a linear motor?

PART – B

(5 x 12 = 60 MARKS)

ANSWER ANY FIVE QUESTIONS

21. 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°.

22. Explain the procedure that are followed to connecting a synchronous a machine to a infinite busbars.

23. A 1500 KW, 3 phase, star connected, 3.3kV synchronous motor has reactance of $x_d = 4.01$ and $x_q = 2.88$ 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.

24. Explain the phenomenon of hunting in an synchronous motor. How it is remedied?

25. 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.

26. 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.

27. Explain double revolving field theory of a single phase Induction motor. Write a brief note on Hysteresis motor.

28. Discuss briefly the operation and characteristics of
    (i) Repulsion motor.
    (ii) A.C. Series motor

********THE END********