ANNA UNIVERSITY COIMBATORE

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

REGULATIONS – 2007

THIRD SEMESTER : ELECTRONICS & COMMUNICATION ENGINEERING

070120020 - ELECTROMECHANICAL ENERGY CONVERSION

TIME : 3 Hours **Max.Marks : 100**

PART – A

(20 x 2 = 40 MARKS)

ANSWER ALL QUESTIONS

1. Define Fleming's Right Hand Rule.
2. Write the Emf equation of dc generator.
3. Write any 4 applications of DC shunt motor.
4. A dc shunt generator has shunt field resistance of 100 Ω. It is supplying a load of 5 kW at a voltage of 250v. If armature resistance is 0.22 Ω. Calculate generated EMF.
5. What is transformation ratio?
6. Write the expression for equivalent resistance referred to primary and secondary.
7. Draw the phasor diagram of a transformer on load under unity power factor.
8. Write the conditions of parallel operation of transformer.
9. Write any four differences between slip ring & squirrel cage induction motors.
10. Define slip and slip frequency.
11. What are the starters used for 3Φ Induction motor?
12. Write the types of 1Φ Induction motor.
13. Define synchronous condenser.
14. An armature of 3Φ alternator has 120 slots. Alternator has 8 poles. Calculate K_d.
15. Define voltage regulation referred to synchronous generators.
16. Why synchronous motor is not self starting?

17. Define step angle.
18. What is microstepping?
19. Write the applications of hysteresis motor.
20. Draw torque-speed characteristics of switched reluctance motor.

PART – B

(5 x 12 = 60 MARKS)

ANSWER ANY FIVE QUESTIONS

21. a. Derive the torque equation of DC motor. 8

    b. A dc series generator has R_a = 0.5 Ω and R_{se} = 0.03 Ω. It drives a load of 50A. It has 6 turns/coil & total 540 coils on the armature and driven at 1500 rpm. Calculate terminal voltage at the load. Assume 4 pole, lap winding, flux/pole is 2 mWb and total brush drop is 2V. 4

22. a. Explain 4-point starter with neat sketch. 8

    b. Explain armature speed control of dc shunt motor with neat sketch. 4

23. a. Derive EMF equation of transformer. 6

    b. Draw equivalent circuit of transformer referred to primary and referred to secondary. 6

24. A 15 kVA, 2200/110V transformer has R_1=1.75 Ω, R_2=0.0045 Ω, X_1=2.6 Ω, X_2=0.0075 Ω. Calculate (i)Equivalent resistance referred to primary(ii)Equivalent resistance referred to secondary(iii)Equivalent reactance referred to primary(iv)Equivalent reactance referred to secondary. (v) Equivalent Impedance referred to primary(vi)Equivalent Impedance referred to secondary

25.	a.	Derive torque equation of 3Φ Induction motor under starting condition	8
	b.	Write the condition for maximum starting toruqe.	4
26.	a.	Describe double field revolving theory.	6
	b.	Explain the working of shaded pole induction motor with neat sketch.	6
27.	a.	Define hunting. How it can be prevented?	4
	b.	A 230V, 3Φ, star connected alternator gives an open circuit voltage of 230V, for a field current of 0.38A. For the same field current on short circuit causes an armature current of 12.5A. Armature resistance measured between 2 lines is 1.8 Ω. Find regulation for a current of 10A at 0.8 lagging and 0.8 leading power factors.	8
28.	a.	Explain the constructional details of Reluctance motor with neat sketch.	8
	b.	Differentiate variable reluctance stepper motor from PM stepper motor.	4

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