GANPAT UNIVERSITY

B. Tech. Semester : 3rd Mechatronics Engineering
Regular Examination November – December 2013
2MC303 : Electrical Machines and Drives

Time: 3 Hours

Total Marks: 70

Instruction:
1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Assume suitable data wherever necessary.

Section - I

Que. – 1	(A)	Explain voltage build up process of D.C. Generator. Also derive E.M.F. equation of D.C. Generator.	07
	(B)	Draw and Explain Torque vs. Armature current and Speed vs. Armature Current characteristics of D.C. shunt motor.	05

OR

Que. – 1	(A)	Explain three point starter with necessary diagram.	05
	(B)	Explain different losses occurs in D.C generator with diagram .	04
	(C)	What do you mean by back E.M.F? Give significance of it.	03

Que. – 2	(A)	Explain open circuit and short circuit test on 1-Φ transformer with necessary diagrams and equations.	06
	(B)	Discuss the Three Phase Transformer and List out its Connection.	05

OR

Que. – 2	(A)	Explain the working principle of transformer. Derive EMF equation for Transformer.	07
	(B)	What is auto-transformer? Explain it's working principle with necessary diagram.	04

Que. – 3	(A)	A 220 V D.C. series motor is running at a speed of 800 rpm and draws 100 A. Calculate at what speed the motor will run when developing half torque. Total resistance of armature and field is 0.1 Ω. Assume that the magnetic circuit is unsaturated.	05
	(B)	What are the advantages of Electrical Drives	04
	(C)	25 KVA, 1 – phase transformer has 250 turns on primary and 40 turns on secondary winding. The primary is connected to 1500 V, 50 Hz supply mains. Calculate (i) primary and secondary current on full load. (ii) secondary E.M.F. (iii) maximum flux in the core.	03

[P.T.O.]

Section – II

Que. – 4
(A) Draw and explain equivalent circuit synchronous motor. Draw vector diagrams for different power factors.   05

(B) Explain synchronous condenser.   04

(C) Discuss different starting method of synchronous motor.   03

OR

Que. – 4
(A) Explain armature reaction in synchronous machine with necessary diagram.   05

(B) A 4 pole, 50 Hz, star-connected alternator has 15 slots per pole and each slot has 10 conductors with the winding factor being 0.95. When running on no load for a certain flux per pole, the terminal e.m.f was 1825 volt. If the winding are lap connected as in D.C machine, what would be the e.m.f. between the brushes for the same speed and the same flux/ pole. Assume Sinusoidal distribution of flux.   05

(C) Give the features of synchronous motor.   02

Que. – 5
(A) Explain how does the rotor of induction motor rotate?   05

(B) Explain star delta starter with neat sketch.   03

(C) A 4 pole, 50 Hz squirrel cage induction motor runs on load at a shaft speed of 1440 r.p.m. Calculate the frequency of induced current in rotor.   03

OR

Que. – 5
(A) Draw and Explain torque-slip characteristics of Induction Motor.   04

(B) Derive the equation of starting torque for three phase induction motor. Also derive the condition for maximum starting torque.   07

Que. – 6
(A) State and explain relation between speed and frequency of synchronous machine.   03

(B) Give the statement of following :
   1) Lenz's Law
   2) Fleming's right hand rule   02

(C) Make a truth table for half stepping mode of operation for 4/2 stepper motor.   02

(D) Explain the working principle of shaded pole induction motor.   05

END OF PAPER