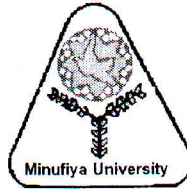


Menoufiya University
Faculty of Engineering
Shebin El-Kom
First Semester Examination
Academic Year: 2012-2013



Year: 3rd
Department: Electric Eng.
Subject: Electric Machine (2)
Time Allowed: 3 hours
Date: 13 – 1 - 2013

Allowed Tables and Charts:

Answer of the following questions and assume any missing data.

Question (1)

(1-a) What is the effect of armature reaction in synchronous machines at lagging and leading zero power factors? (5 Marks)

(1-b) A 2 MVA, 66 KV, 50 Hz, Y connected, 3-phase synchronous generator, the synch. Reactance is 8Ω / ph.

Determine the excitation e.m.f. voltage when the generator is operating at full- load with 0.8 power factor lagging. (10 Marks)

Question (2)

(2-a) A 56 MVA, 11 KV, 60 HZ, Y connected, 3-phase salient- pole synch. generator has $X_d = 2.2 \Omega$, $X_q = 1.6 \Omega$ it delivers the rated full- load at 0.85 p.f. lagging. Determine the power developed by the generator. (neglected the arm. resistance) (10 Marks)

(2-b) A 100 KVA, 2400 V, 60 HZ, 6 pole, Y connected, 3-ph. synch. generator if the stator leakage of 6.2Ω and the magnetizing reactance of 43.8Ω (neglected the arm. resistance). Determine the field current, the input power at the prime- mover coupling was 4KW and find the max. torque. (10 Marks)

Question (3)

(3-a) Draw the phasor diagram showing the effect of change in field excitation on armature current of power angle (δ) and power factor of synch. motor and what is the power equation of salient- pole synch. generator. (5 Marks)

(3-b) A 120 HP, 3-ph. , Y connected, 60 HZ, 440 V, 6 pole, synch. motor is operating at 0.85 p.f. lagging, the synch. reactance is 2.4Ω /ph. Determine : the excitation e.m.f. voltage, the power angle and the max. torque. (10 Marks)

Question (4)

(4-a) Discuss the differences between; (a) Rotor resistance starting, (b) Rotor reactance starting, of three phase wound rotor induction motor. (5 Marks)

(4-b) 3-phase induction motor, 12 pole, 440 V, 50 c/s. The stator is delta connected, $r_1=2.95$ ohm, $r_2'=2.08$ ohm, $x_1=6.82$ ohm, $x_2'=4.11$ ohm, no-load line current is 6.7 A, no-load power is 269 W. Calculate at slip of 3 % : the stator line current, rotor phase current, motor power factor and motor torque. (10 Marks)

Question (5)

(5-a) Discuss a suitable method of speed control for three phase squirrel cage induction motor loaded by a fan load. (5 Marks)

(5-b) A 40 hp., 3 phase 500 Volts, 6 pole, 50 Hz, induction motor mesh connection, the stator to rotor turns per phase are 2, the stator resistance per phase is 0.6 ohm and the rotor resistance is 0.16 ohm per phase. The following test results (line values) are ;

No load : 500 Volt, 18 Amp., 1200 Watt.

Blocked rotor : 250 Volt, 100 Amp., 11000 Watt.

Construct the circle diagram and find: a) Full load line current, slip and power factor. b) The maximum output power. c) The starting torque.

d) The maximum torque. (10 Marks)

Question (6)

(6-a) Discuss the operation and characteristics of capacitor start – capacitor run single phase induction motor. (5 Marks)

(6-b) Discuss the operation and explain the advantages of AC series motor. Why the AC shunt motor can not be manufactured. (5 Marks)

(6-c) 3-Phase induction motor has, 6 pole, the stator is delta connected to a 400 volts supply, rotor resistance and reactance at standstill are 0.1 ohm, 1 ohm respectively. The ratio of stator to rotor turns is 2, full load speed is 960 r.p.m. Calculate; (a) full load torque, (b) maximum torque. (c) the speed at maximum torque. (10 Marks)

Field	National Academic Reference Standard(NARS)			
	Knowledge & Understanding	Intellectual Skills	Professional Skills	General Skills
Program Academic Standards that the course contribute in achieving				
Question No.				