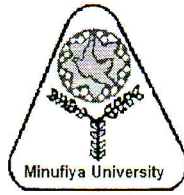


Menoufiya University
Faculty of Engineering
Shebin El-Kom
First semester examination
Academic Year: 2016-2017



Year: Master
Department: Electrical Engineering
Subject: Dynamic Analysis of Electric Machines
Time Allowed: 3 hours
Date: 8-1-2017

Allowed Tables and Charts: No

Question (1)

(25 Marks)

(1-a) Develop a mathematical model that represents the dynamic state of the dc series motor. Draw the analogue model of the dc series motor. Neglect the saturation of the magnetic core.

(1-b) The phases of a 3-phase circuit consist of equal resistances, equal inductances and equal capacitances connected in **series**. The phases are not coupled. Drive the voltage equations in the arbitrary reference frame and draw the equivalent circuit.

Question (2)

(20 Marks)

A 5 Kw. three phase, 4-pole, 50 Hz induction motor has full load efficiency of 85%. The total moment of inertia of rotor and connected load is 0.094 kg-m^2 . The total losses of motor may be assumed 2.25 times the rotor ohmic losses. Assuming full load slip to be negligibly small, calculate:

- i. The total energy losses in rotor during starting.
- ii. The total energy losses in rotor during reversing if the motor is plugged.
- iii. The number of times per minute that the motor can be reversed without exceeding its allowable temperature rise.

Question (3)

(30 Marks)

(3-a) Drive the q-d axis voltage equations in different reference frames (stationary and synchronously reference frames).

(3-b) Drive the mathematical model by which the dynamic response of a balanced three phase induction motor can be predicted.

Question (4)

(25 Marks)

(4-a) Drive a mathematical model to describe the dynamic behavior of three phase salient-pole synchronous generator, having one damper coil on the quadrature axis and one damper coil on the direct axis.

(4-b) Drive the mathematical model by which the dynamic response of permanent magnet synchronous motor can be predicted.

----- Good Luck -----