Kafrelsheikh University
Faculty of Engineering
Subject: **Special machines**
Year: Fourth Electrical power (R. 2007)
Exam Date: 29/5/2017

Final Exam of 2nd semester-2016-2017
Department of Electrical Engineering
course code: EPM4014   Full Mark: 90 Marks
number of pages: 2   Time allowed: 3 hours

Attempt all question
Assume any missing data

(20 Mark)

Q1:

(i) Draw the torque-speed characteristics of a single phase induction motor and explain how it can be obtained.

(ii) Determine an approximate model for a single-phase AC induction motor with the following test results:

Blocked Rotor Test: $V_{sc} = 110V$, $I_{sc} = 17.67A$, $P_{sc} = 1342W$

No-Load Test: $V_o = 110V$, $I_o = 3.84 A$, $P_o = 53.9W$

Rotational Losses 17 W

DC Resistance 1.3 Ω.

==

(20 Mark)

Q2:

a) What is the difference between BLDC motor and switched reluctance motor.

b) A 120V, 60Hz, 1/4hp universal motor runs at 2000 rpm and takes 0.6A when connected to a 120V d.c. source. Determine the speed, torque and power factor of the motor when it is connected to a 120V, 60 Hz, supply and is loaded to take 0.6A (rms) of current. The resistance and inductance measured at the terminals of the motor are 20 ohm and 0.25H respectively.

==
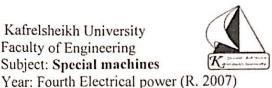
(25 Mark)

Q3:

a) How you can calculate the time response of servo motor for the angular speed and position.

b) A stepper motor has a step angle of 2.5°. Determine (a) resolution (b) number of steps required for the shaft to make 25 revolutions and (c) shaft speed, if the stepping frequency is 3600 p.p.s.

==

(25 Mark)

Q4:

a- A 2-pole permanent magnet stepper motor requires 6 steps per revolution. Determine: (i) the number of stator phases, (ii) the sequence of excitation, (iii) draw a cross sectional view of the stepper motor.

Kafrelsheikh University
Faculty of Engineering
Subject: **Special machines**
Year: Fourth Electrical power (R. 2007)
Exam Date: 29/5/2017

Final Exam of 2nd semester-2016-2017
Department of Electrical Engineering
course code: EPM4014   Full Mark: 90 Marks
number of pages: 2   Time allowed: 3 hours

b- Drive the thrust equation of linear induction motor in term of motor dimensions.

c- A 3-phase, 60 Hz linear induction motor has to reach a top no-load speed of 12 m/s and it must develop a standstill thrust of 10 kN. Calculate the required pole-pitch and the minimum I^{2}R loss in the rotor, at standstill.

===

With my best wishes
Dr. Eng./Mohamed I. Abd EL_Wanis