



## COLLEGE OF ENGINEERING & TECHNOLOGY

Department : Electrical & Control Engineering

Lecturer : Dr. Ahmed Kadry Abdelsalam

Course : Electrical Machines 2

Course Code : EE 322

Marks : 40

Date : 28/5/2014

Time : 2 hour

### Final Exam

Answer all the following questions

Q1 [5 marks] *A4*

1. Step up transformers cannot be used as step down transformers ( )
2. In shell type transformers, the two windings are wound on the same leg ( )
3. High permeability silicon steel is used in the construction of the transformer windings ( )
4. For non-ideal transformers, the terminal voltages ratio is equal to the turns ratio ( )
5. For DC transformers, the leakage flux of a coil does not interfere with the other one ( )
6. Copper losses is reduced by laminating the transformer core ( )
7. The self reactance of a transformer winding is less than its leakage one ( )
8. The transformers' efficiency is in the range of 50% more or less ( )
9. The transformer maximum efficiency occurs when copper loss is double the core loss ( )
10. The current at the maximum efficiency of a transformer is greater than its rated ( )

Q2 [5 marks] *A5*

Discuss the IM classification classes, stating what the characteristic of each class is. Describe the starting current, starting torque, and rotor nature of each class.

Members of course Examination Committee:	Signature:	Date:
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Q2 [10 marks] A.25

A test data for a 208V, 60Hz, Y connected IM rated at 1710rpm is as follows

No load test	450W	1.562A	208V
Locked rotor test	59.4W	2.77A	27V

Calculate the IM parameters referred to the stator side.

Q3 [10 marks] B.11

Three phase 208 volt, 60Hz, 8 pole, star-connected, induction motor has negligible stator impedance of  $0.02 + j0.08 \Omega$ /phase at standstill (machine speed is zero). Determine:

- (a) Slip at maximum torque
- (b) Maximum torque
- (c) Starting torque
- (d) For a constant load of  $0.55T_{max}$  is applied, deduce if the machine will run or fails.

Q4 [10 marks] C.6, D2

Compare between the following

- (i) AC voltage controller
- (ii) voltage/frequency control
- (iii) Y/ $\Delta$  starter

from the following points of view

- (1) theory of operation, (2) starting torque, (3) maximum torque and (4) losses

Also draw the TORQUE-SLIP characteristics for each control technique

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