



COLLEGE OF ENGINEERING & TECHNOLOGY

Department : Electrical & Control Engineering

Lecturer : Dr. Ahmed Kadry Abdelsalam

Course : Electrical Drives 1

Course Code : EE 424

Marks : 40

Date : 21/1/2015

Time : 2 hour

Final Exam

Answer all the following questions

Q1 [10 marks] A24

Discuss aided with diagrams countercurrent braking of induction motors. Illustrate the theory of operation with detailed T-N characteristics indicating all the operating points in case of unidirectional and bidirectional loads.

Q2 [5 marks] A3, B2

A three phase Y connected, 30 hp, 480 V, 6 pole, 60 Hz IM has a stator resistance of 0.5Ω equals to its referred rotor resistances. For a load torque of 120 Nm:

[Ignore the rotational losses and use the approximated developed torque equations]

- (1) Calculate the motor rated speed
- (2) Calculate the % of stator voltage reduction that leads to 5% decrease in the motor speed assuming same load torque.

Q3 [10 marks] A24

Compare between the following

- (i) Stator voltage control
- (ii) Voltage/Frequency control

from the following points of view

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

Also draw the TORQUE-SLIP characteristics for each control technique

| Members of course Examination Committee: | Signature: | Date: |
|--|------------|----------|
| Lecturer: DR AHMED KADRY | | 5/1/2015 |
| Course Coordinator : DR AHMED KADRY | | 5/1/2015 |
| Head of Department: PROF HAMDY ASHOOR | | 5/1/2015 |

Q4 [5 marks] A.24

Discuss aided with diagrams TVR braking of DC series motors. Illustrate the theory of operation with detailed T-N characteristics indicating all the operating points in case of unidirectional loads.

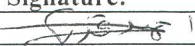

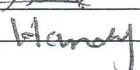
Q5 [5 marks] A.24

Discuss aided with diagrams speed regulation of DC shunt motors using armature resistance control. Illustrate the theory of operation with detailed T-N characteristics and governing equations.

Q6 [5 marks] A.3, B.2

A 150V dc shunt motor drives a constant load torque at 1200rpm. The armature and field resistances are 1Ω and 150Ω respectively. The motor draws a current of 10A at that load:

- a) calculate the resistance that should be added to the armature circuit to reduce the speed by 50%
- b) for a constant rotational loss, calculate the efficiency of the motor with and without the added resistance

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