COLLEGE OF ENGINEERING & TECHNOLOGY

Department : **Electrical & Control Engineering**
Lecturer : **Dr. Ahmed Kadry Abdelsalam**
Course : **Electrical Drives 1**
Course Code : **EE 424** **Marks** : **40**
Date : **21/1/2016** **Time** : **2 hour**

Final Exam

Answer all the following questions

Q1 [10 marks] (B4)

Discuss aided with diagrams the **dynamic braking of induction motors**. Explain the theory of operation, performance curves, utilized power electronic converter and the possible operating points under unidirectional and bidirectional loads.

Q2 [10 marks] (A29)

a) Discuss aided with diagrams the **TVR braking of series DC motors** illustrating the utilized power electronic based hardware, T-N characteristics for unidirectional and bidirectional loads.

b) A DC separately excited motor has armature resistance of 0.5Ω and field constant $k\emptyset$ equal 3V.s. While the machine was running as motor, before braking process starts, the DC link voltage was 200V. The motor was driving a forklift of 180N.m, constant and unidirectional. A TVR braking is applied by switching the terminal voltage polarity and decreasing its value to be 30V. Calculate the steady-state speed and armature current at the new state.

Members of course Examination Committee:	Signature:	Date:
Lecturer:	Dr. Ahmed Kadry	5/1/2016
Course Coordinator :	Dr. Ahmed Kadry	5/1/2016
Head of Department:	Prof. Hamdy Ashoor Hamdy	5/1/2016

Q3 [10 marks] [A29, C5]

Compare in details between **frequency control** and **stator voltage control** techniques for induction motors speed control. Comments on the effect of each technique on the maximum torque, slip at maximum torque, starting torque and system losses. Describe each technique power electronic converter aided with detailed T-N characteristics.

Q4 [10 marks] [B4, C2]

A DC separately excited motor has a constant load torque of 60 Nm. The motor is driven by a full wave Thyristor based AC-DC rectifier connected to a 120V AC single phase supply. The motor has a field constant $k\varnothing$ equal 2.5 V.s and armature resistance of 2Ω. Calculate the triggering angle α for a speed of 200 rpm and continuous motor current.

Members of course Examination Committee:	Signature:	Date:
Lecturer:	Dr. Ahmed Kadry	5/11/2016
Course Coordinator :	Dr. Ahmed Kadry	5/11/2016
Head of Department:	Prof. Hamdy Ashoor	5/11/2016