EE304  Electric Drives

Catalog Data
Introduction to electric drives; DC drives; AC drives: induction motors, synchronous motors, reluctance and stepping motors; servomotor drives.

Pre-requisites: EE212 or EE303

Textbook

Reference

Course Objectives
1. Calculation of the torque developed by motors and the various methods of speed control.
2. Knowledge of the various types of single and three-phase converters and how they are used with dc motor drives.
3. Understand the concept of equivalent circuit.
4. Understand the construction and design issues associated with electrical machines.
5. Understand the conventional and power electronic methods used to control the speed of ac motors.

Pre-Requisites by Topic
1. Electric Circuits
2. Electronics

Topics
1. Magnetic circuit, losses and inductance 2 Hours
2. DC machines 6 Hours
3. Power semiconductor converters 9 Hours
4. Three phase induction (asynchronous) machines 8 Hours
5. Synchronous machines 7 Hours
6. Servomotors 3 Hours
7. Reluctance and stepping motors 5 Hours

Computer Usage
Matlab Simulation

Estimated Content
Engineering Science 2.3 Credits
Engineering Design 0.7 Credits

Prepared by Dr. S. R. Alwash

Date 12.2.2008
### Mapping of course (EE304) objectives to program outcomes

<table>
<thead>
<tr>
<th>Course Objective</th>
<th>Delivery Methods</th>
<th>Assessment Methods</th>
<th>(a)</th>
<th>(b)</th>
<th>(c)</th>
<th>(d)</th>
<th>(e)</th>
<th>(f)</th>
<th>(g)</th>
<th>(h)</th>
<th>(i)</th>
<th>(j)</th>
<th>(k)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Calculation of the torque developed by motors and the various methods of speed control.</td>
<td>Lectures, tutorials.</td>
<td>Homework, quizzes, Exams.</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Knowledge of the various types of single and three-phase converters and how they are used with dc motor drives.</td>
<td>Lectures, tutorials.</td>
<td>Homework, quizzes, Exams.</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Understand the concept of equivalent circuit.</td>
<td>Lectures, tutorials.</td>
<td>Homework, quizzes, Exams.</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Understand the construction and design issues associated with electrical machines.</td>
<td>Lectures, tutorials.</td>
<td>Homework, quizzes, Exams.</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Understand the conventional and power electronic methods used to control the speed of ac motors.</td>
<td>Lectures, tutorials.</td>
<td>Homework, quizzes, Exams.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**ABET a–k Engineering and Technology program outcomes**

(a) An ability to apply knowledge of mathematics, science, and engineering
(b) An ability to design and conduct experiments, to analyze and interpret data
(c) An ability to design a system, component, or process to meet desired needs
(d) An ability to function on multi-disciplinary teams
(e) An ability to identify, formulate, and solve engineering problems
(f) An understanding of professional and ethical responsibility
(g) An ability to communicate effectively
(h) The broad education necessary to understand the impact of engineering solutions in a global and societal context
(i) A recognition of the need for, and an ability to engage in life-long learning
(j) A knowledge of contemporary issues
(k) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice