48550 ELECTRICAL ENERGY TECHNOLOGY

SYLLABUS

Subject name: Electrical Energy Technology
Subject number: 48550
Course names:
Bachelor of Engineering - Diploma of Engineering Practice
Bachelor of Engineering/Bachelor of Arts (International Studies) - Diploma of Engineering Practice
Bachelor of Applied Science (Physics)/Bachelor of Engineering (Electrical) - Diploma of Engineering Practice

Teaching unit: Engineering
Credit points: 6
Pre-requisites:
48531 Electromechanical Systems
48530 Circuit Analysis
68038 Advanced Mathematics and Physics

Co-requisites: None
Coordinator: Prof. Jian Guo (Joe) Zhu

Subject Contents

This subject will be centred on studies of electrical energy systems, such as remote area power supply, grid power supply, and electric vehicles. By the end of this subject students should know system analysis and design principles – develop specifications, prepare options, compare options (analysis), and present a design. They should also understand the principles of cogeneration, renewable generation, remote and grid-connected systems, energy storage options, 3-phase circuit theory – balanced network, power measurement, star/delta, unbalanced load, p.u. system, voltage selection, utilisation devices to the extent of component steady-state non-ideal models and performance – DC and AC machines (DC, induction, synchronous as motor and generator, and switched reluctance).

The students will also acquire skills in working with equipment at normal mains supply voltage, in power instrumentation, and in experimental design and recording. Safety issues will be emphasised. They will further develop teamwork, information retrieval, and communication skills.

Lecture Notes
UTSOnline
http://www.eng.uts.edu.au/~joe

References

Assessment
Assignments 30%
Laboratory 20%
Final Exam 50%
**48550 Electrical Energy Technology – Timetable for Spring Semester 2007**

<table>
<thead>
<tr>
<th>Week</th>
<th>First Session 18:00 – 21:00 Tuesday, CB02.05.37</th>
<th>Second Session 18:00 – 21:00 Thursday</th>
<th>ASSESSMENT TASK DUE</th>
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<tr>
<td>1 31 July &amp; 2 Aug</td>
<td>(1) Subject Overview; (2) Introduction to electrical energy systems</td>
<td>CB02.06.35</td>
<td>(1) Lab safety Issues, (2) Assignment issues (3) Assignment 1</td>
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<tr>
<td>2 7 &amp; 9 Aug</td>
<td>Synchronous machine (SM): model, equivalent circuit, phasor diagram</td>
<td>CB02.06.35 Tut.1: SM</td>
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<td>3 14 &amp; 16 Aug</td>
<td>Synchronous machine: torque/angle, V curves, voltage regulation, power factor, synchronizing</td>
<td>CB01.18.16 Lab.1: SM</td>
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<td>4 21 &amp; 23 Aug</td>
<td>(1) Voltage options. AC and DC transmission. Transmission line options. (2) Storage options: batteries, super-capacitor, flywheel, and water. Battery charging</td>
<td>CB02.06.35 Ass.1 Presentation</td>
<td>Ass.1: System specification</td>
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<tr>
<td>5 28 &amp; 30 Aug</td>
<td>Induction machine (IM): operational principle, equivalent circuit, and parameter identification</td>
<td>CB01.18.16 Lab.2: IM parameters</td>
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<td>6 4 &amp; 6 Sep</td>
<td>Induction machine: torque/speed curve, motor speed control, generator operation, and self-excited generator</td>
<td>Tut.2: IM</td>
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<td>7 11 &amp; 13 Sep</td>
<td>Fuel cell systems</td>
<td>CB01.18.16 Lab.3: IM performance</td>
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<tr>
<td>8 18 &amp; 20 Sep</td>
<td>Super-capacitors</td>
<td>CB02.06.35 Tut.3: IM</td>
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<td>24 – 28 Sep</td>
<td>Vice Chancellor’s Week</td>
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<td>1 – 5 Oct</td>
<td>Tutorial Week</td>
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<tr>
<td>9 9 &amp; 11 Oct</td>
<td>Wind power generation</td>
<td>CB02.06.35 Ass.2 Presentation</td>
<td>(1) Lab.3 (2) Ass.2: Component options</td>
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<td>10 16 &amp; 18 Oct</td>
<td>Utilization/drive options: induction, switched reluctance and permanent magnet brushless DC, brushed DC machines</td>
<td>CB02.06.35 Tut.4: Electrical Drives</td>
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<tr>
<td>11 23 &amp; 25 Oct</td>
<td>DC Machine: model, field excitation schemes, torque/speed.</td>
<td>CB01.18.16 Lab.4: DC machine</td>
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<td>12 30 Oct &amp; 1 Nov</td>
<td>Switched reluctance machine: model, control schemes.</td>
<td>CB02.06.35 Tut.5: DC machine</td>
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<td>13 6 &amp; 8 Nov</td>
<td>System design summary and Revision</td>
<td>CB02.06.35 Ass.3 Presentation</td>
<td>(1) Lab.4 (2) Ass.3: System design</td>
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<td>10 – 30 Nov</td>
<td>Exam Period</td>
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