

KARTA PRZEDMIOTU

Rok akademicki: 2010/2011

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| Nazwa przedmiotu: ELECTROMECHANICAL DEVICES | Kod/nr RAu-1 |
| Rodzaj i tryb studiów: STACJONARNE I STOPNIA | |
| Kierunek: MAKROKIERUNEK | |
| Specjalność: | |
| Semestr: 7 | |
| Przedmioty wprowadzające oraz wymagania wstępne: Automatics and robotics – obligatory; Electronics and telecommunications, Informatics - optional | |
| Prowadzący przedmiot: | |
| Prowadzący zajęcia: <i>(poniżej wpisać imię nazwisko prowadzących)</i> | Liczba godzin: |
| Wykład: Prof. dr hab. inż. Krzysztof Kluszczyński | 1 |
| Ćwiczenia: - | |
| Laboratorium: dr inż. Wojciech Burlikowski, dr inż. Damian Krawczyk | 1 |
| Projekt: - | |
| Seminarium: - | |
| Założenia i cele przedmiotu:. This curriculum develops basic skills in the field of design, measurement and application of electrical machines and modern drives. Up to date information concerning various types of machines and their control schemes is provided. Special attention is focused on applications in automatic control systems and robotics. | |
| Treść programowe: LECTURE. Basics of electromechanical energy conversion: force and torque development. General aspects of motor selection for electrical drives. Alternating Current (AC) machines. Distributed windings and magnetic fields of AC machines. Converters for AC drive systems. Asynchronous machines: construction, theory and performance. Basic types of induction motors. Equivalent circuits of slip-ring and squirrel cage motors. Steady-state and transient operation. Speed-torque characteristics. Starting methods. Performance of converter-fed induction motors. Speed control: U/f and vector control schemes. Synchronous machines: construction, theory and performance. Basic types of synchronous machines. Generator and motor operation of salient-pole and cylindrical-rotor machines. Equivalent circuits. Steady-state and transient operation. Load angle-torque characteristics. Methods of starting and synchronisation. Stability margin. Performance of converter-fed synchronous machine. Control schemes for rotor positioning. Direct Current (DC) machines: windings and commutation. Basic types of DC machines: generator and motor operation. Equivalent circuits of series, shunt and separately excited machines. Steady-state and transient operation. Starting methods. Solid-state converters for DC drive systems and speed control. DC servomotors. Application and control schemes of small electric motors. Single-phase induction motors. Stepping motors. Switched Reluctance Motors (SRM). Permanent Magnet motors. Hysteresis motors. | |

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| <p>Treść/tematy: LABORATORY. Open-circuit and short-circuit tests of a transformer. No-load and locked-rotor tests of a slip-ring motor. Speed-torque characteristics of a squirrel-cage motor - scalar and vector control. Motor and generator operation of a Synchronous Permanent Magnet machine. DC separately excited machine - generator operation characteristics. Methods for measuring dynamic properties of controlled drives. Speed control of induction machine - measurement and computer simulation (Matlab/Simulink). Stepping motor - speed and position control (FESTO). Synchronous Permanent Magnet servomotor - speed and position control (FESTO).</p> |
| <p>Metody dydaktyczne: Problem-oriented based teaching. Computer-aided design and simulation. Supervised independent laboratory work. Tutorial problems.</p> |
| <p>Forma i warunki zaliczenia przedmiotu: Written test & laboratory reports</p> |
| <p>Literatura podstawowa:</p> <p>[1]. "Analysis of Electric Machinery", Paul C. Krause, McGraw-Hill Book Company, 1986;</p> <p>[2]. "Electric drives", Ion Boldea, S.A. Nasar, Taylor & Francis, 2005</p> |
| <p>Literatura uzupełniająca:</p> <p>[1]. "Electric Motors and their Controls", T.Kenjo, Oxford University Press, 1991</p> <p>[2]. "Switched Reluctance Motors and Their Control", TJE Miller, Oxford University Press, 1993</p> <p>[3]. "Electric Machine Dynamics", I.Boldea and S.A.Nasar, MacMillan Publishing Company, 1986</p> <p>[4]. "Permanent Magnet and Brushless DC Motors", T.Kenjo, Clarendon Press, Oxford, 1985.</p> |
| <p>Liczba pkt ECTS: 2</p> |

Zatwierdzono:

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(data i podpis prowadzącego)

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(data i podpis Dyrektora Instytutu/Kierownika
Katedry/Dyrektora Kolegium Języków Obcych/Kierownika
lub Dyrektora jednostki międzywydziałowej)