

MEP 1523 Electrical Drives – 2009/2010 Semester 2

TOPICS	WEEK	Recommended reference
<u>Module 1 Introduction to Electrical drives</u> Elements of Modern Electrical Drives Dynamics of Motor-Load System - Equivalent rotating system and fundamental torque equations Components of load torque Load and Motor torque-speed characteristics Quadrant of operations Steady state stability Thermal consideration	1	[9] Chapter 1, [2] Chapter 1, [3] Chapter 1 [2] Chapter 2, [5] Chapter 1 [2] Chapter 2.4-2.5 [5] Chapter 2.3 [2] Chapter 2.2 [5] Chapter 2.4, [2] Chapter 2.7 [5] Chapter 4, [2] Chapter 4.3
<u>Module 2 Power Electronic Converters in Electrical Drives</u> Controlled rectifier: modelling, control and simulation Switched-mode converters: modelling, control and simulation Current ripple in current controlled converters Current Control Converters: - hysteresis - ramp comparison in stationary and rotating frames Space Vector Modulation Simulation of PE Converters	1	[3] Chapter 3.3.2-3.3.4, [7] Chapter 3.4 [1] Chapter 4.1 & 4.7 [1] Chapter 4.1 & 4.7 [8] Chapter, [6] Chapter [10]
<u>Module 3 DC motor drives</u> Construction, modelling and transfer function of the DC machine Converters for DC drives & quadrant of operations Closed-loop control of DC drives & MATLAB/SIMULINK Simulation and experiment of DC motor drives	2	[1] Chapter 7.1-7.7, [3] Chapter [1] Chapter 7, [4] Chapter 13
<u>Module 4 Induction motor drives</u> Induction motor: Steady state equivalent circuit - Operation with non-sinusoidal supply Scalar control: open loop constant V/Hz control: Current control constant V/Hz Dynamic modelling of IM Vector control: rotor flux, stator flux and direct torque control Simulation of AC motor drives	2	[6] Chapter 6, [4] Chapter 14 [6] Chapter 6 [6] Chapter 7.8 [6] Chapter 7.5, 7.10 [3] Chapter 5.7, [8] Chapter 2, [11], [12]

List of reference used for the course

Books

- [1] Ned Mohan , "Electric Drives: An integrative approach", MNPERE, Minneapolis, USA, 2001
- [2] G.K. Dubey, -Fundamental of Electrical Drives", Narosa, 1994.
- [3] R. Krishnan, -Electric motor drives", Prentice-Hall, 2001
- [4] N. Mohan, -Power Electronics: Converters, applications and design" , 3e, John Wiley and Sons, 2003.
- [5] W. Leonhard, -Control of electrical drives", Springer-Verlag, 2001.
- [6] J. M. D. Murphy and F.G. Turnbull, -Power electronic control of AC motor", Pergamon press, 1988.
- [7] B.K. Bose, -Power electronics and AC drives", Prentice-Hall, 2002
- [8] D.W. Novotny &T.A. Lipo, -Vector control and dynamics of AC drives", Oxford Science Publicatios, 1996.
- [9] M.A. El-Sharkawi, -Fundamentals of Electric Drives", Brooks/Cole, 2000

Papers

- [10] J. Holtz, W. Lotzkat and A. Khambadkone, -On continuous control of PWM inverters in the overmodulation range including the six-step mode", IEEE Transactions on Power Electronics, Vol 8, No 4, pp 546-553, Oct 1993
- [11] I. Takahashi and T. Noguchi, -A new quick-response and high-efficiency control strategy of an induction motor", IEEE Trans. Ind. Appl. Vol. IA-22, No. 5, pp. 820-827. Sept. /Oct. 1986.
- [12] X. Xu, R. K. Doncker, D.W. Novotny, -A stator flux oriented Induction machine drive", IEEE-Power Electronic Specialist Conference, 1988.