Óbuda University Kandó Kálmán Faculty of Electrical Engineering			Institute of Institutation and Automation	
Name & Neptun code of subject: Automatics *exam*		KMAAZ11AND	**Credit: 8**	
Subject leader:	Dr. Neszveda József professor		Gecsey László senior teacher	
Weekly hours::		Lecture: 4		Laboratory:

The goal of subject

Setting of work point of linear closed loop control systems. Constant value controlling systems and set point follower controlling systems. Cascade and feed-forward control systems. Stability of multi-loop control systems. A 'Z' transformation. Stabilization and quality of sampled control systems under time and 'Z' domain. Adaptive control systems. Non-linear control systems. Two and three level controllers and their block charts.
Digital controllers and their applications. PLC programing. Technical features of PLC PID controllers block.

Schedule and topics of lecture subject:	**Date / hours**	
A brief overview of the LTI single-loop systems. Control quality description. Concept of stability examination methods using open loop or closed loop transfer functions. PIDT1 controller structure. Fitting of controller type to the process.	**1.** 02/13	4
The Bode plots of PI, PDT1 and PIDT1. Compensation on frequency domain using frequency response of process field. The transfer functions which can be used approaching of the real reaction curve. Compensation on time domain using step response of process field.	2. 02/20	4
What case one applies a multi loop control in SISO system? Cascade control. Compensation steps of cascade control system. Feedforward control. Compensation steps of feedforward control system.	3. 02/27	4
A brief overview of the steady state behavior of LTI closed loop system and the describe value holding and tracking quality.	4. 03/06	4
On/Off and three/point controller. The quality feature of the on/off and three/point controls. Typical non-linearity in a closed loop system.	5. 03/13	4
How you can choose the sample time if you can't determine a limit frequency of the process field transfer function? What case we apply the discrete time method? How we can create the Z transform form?	6. 03/20	4
Compensation methods of digital controller.	7. 04/03	4
Programmable Logic Controller hardware structure, software structure, network structure. Designer program of PLC. Variables syntax.	8. 04/10	4
State space model of process field. State variables of a SISO system. State variables of sampled system.	9. 04/17	4
State observer. State controller.	10. 04/24	4
Case Study of state controller.	11. 05/08	4
Consultation. Inspection test paper	12. 05/15	4

Semester rating

The final inspection test paper contains nine questions The maximum points of one question is 2. Less than 8.75 points is insufficient. The 8.75 – 10.25 points belong to the rating 2, the 10.5 – 12.0 points belong to the rating 3, the 12.25 – 13.75 points belong to the rating 4, and the 14.0 – 18.0 points belong to the rating 5. A sufficient or higher final inspection test is required to sign in the exam.

The literature

Katsuhiko Ogata Modern Control Engineering ISBN 10: 0-13-615673-8
Pearson M. N. Bandyopadhyay, "Control Engineering: Theory and Practice" WEB
M. Sam Fadali: Digital control engineering: analysis and design ISBN 13: 978-0-12-374498-2 Google

Dr. Neszveda József