

Specification for the book of courses

Study program		Electrical Power Engineering		
Module		Electrical Power Engineering		
Type and level of studies		Master studies		
The name of the course		Selected Chapters of High Voltage Substations		
Lecturer (for lectures)		Korunović M. Lidija		
Lecturer/associate (for exercises)		Anastasijević B. Ivan		
Lecturer/associate (for OFE)				
Number of ECTS	5	Course status (obligatory/elective)	Elective	
Prerequisites				
Course objectives	Introducing excitation systems, extinction of the field, and excitation control of synchronous generators, to the students. Introduction of the calculation method for time-dependent change of the fault current on the basis of complete expression, time-dependent change of the current during unbalanced faults and the conditions of equipment selection. Additionally, the influence of overhead lines and cables on fault current, as well as the reliability of networks and high voltage substations, are introduced to the students.			
Course outcomes	Students are enabled to perform calculation of fault current on the basis of the complete expression. Additionally, students are enabled to specify the influence of excitation current on fault current. Students know to determine the time-dependent change of fault current during unbalanced faults. They are also enabled to quantify the influence of lines on the reduction of grounding current during the fault. Students know to determine equivalent reliability parameters of networks and high voltage power substations.			
Course outline				
Theoretical teaching	Excitation systems of synchronous generators. Extinction of generator field. Basic definitions regarding systems for excitation control, mathematical models. Complete expression of fault current. The influence of excitation control on fault current. Unbalanced faults and symmetrical components - corresponding equations. Unbalanced short-circuits at generator busbars. Critical conditions for equipment testing - operation condition of the system, fault type, fault location and critical schema of high voltage substation. Overhead lines as the elements of grounding system. Cables as the elements of grounding system. Reliability of networks and high voltage substations. Unrecoverable systems. Recoverable systems. Reliability of electric power networks. Reliability of high voltage substations.			
Practical teaching (exercises, OFE, study and research)	Exercises include the solution of computational tasks in the areas of theoretical lectures, and the solution of illustrative examples on the computer.			
Textbooks/references				
	1	J. Nahman, V. Mijailović, Selected Chapters of High Voltage Substations (in Serbian), School of Electrical Engineering, Academic mind, Belgrade, 2002.		
	2	J. Nahman, D. Salamon, V. Mijailović, High Voltage Substations - Workbook with Solved Problems with Appendixes (in Serbian), Academic mind, Belgrade, 2002.		
	3	J. Nahman, Short-circuit Currents in Electric Power Systems (in Serbian), School of Electrical Engineering, Science, Belgrade, 1996.		
	4	J. Nahman, V. Mijailović, Reliability of Electric Power Distribution Systems (in Serbian), Academic mind, Belgrade, 2009.		
	5	M. Đurić, Basis of Voltage and Frequency Regulation in Electric Power System (in Serbian), Beopress, Belgrade, 2003.		
Number of classes of active education per week during semester/trimester/year				
Lectures	Exercises	OFE	Study and research work	Other classes
2	2	0		
Teaching methods	Theoretical teaching includes the classic lectures and the lectures in electronic form. Exercises include the solution of computational tasks on the board and using the projector.			
Grade (maximum number of points 100)				
Pre-exam duties	Points	Final exam		Points
Activity during lectures		Written exam		25
Exercises		Oral exam		25
Colloquia	50			
Projects				