

<b>Department of Electrical Engineering</b>			
<b>Electric Power Systems II (63423)</b>			
<b>Total Credits</b>	<b>3</b>		
<b>major compulsory</b>			
<b>Prerequisites</b>	P1 : Electric Power Systems I (63422) OR Energy and Powers Systems I (63481)		
<b>Course Contents</b>			
Load flow control. Economic operation of power systems. Symmetrical three-phase faults. Symmetrical components. Unsymmetrical faults.			
<b>Intended Learning Outcomes (ILO's)</b>		<b>Student Outcomes (SO's)</b>	<b>Contribution</b>
1	The student should be able to perform load flow analysis for real networks	A	20 %
2	The student should be able to control power systems by reactive power compensation and transformers.	B	15 %
3	The student should be able to calculate unsymmetrical fault analyses.	E	55 %
4	The student should be able to calculate the economical distribution of load in a power system	B	10 %
<b>Textbook and/ or References</b>			
Elements of power system analyses. William D. Stevenson, J. McGraw-Hill, 1982.&Power system analysis: John J Grainger and William D. Stevenson, J. R. McGraw-Hill, 1994. &Principles of power system. V.K.Mehta, and Rohit Mehta. S.CHAND &COMPANY LTD.2005.			
<b>Assessment Criteria</b>		<b>Percent (%)</b>	
Mid. Term Exam		20 %	
Homeworks		10 %	
Projects		20 %	
Final Exam		50 %	
<b>Course Plan</b>			
<b>Week</b>	<b>Topic</b>		
1	LOAD FLOW SOLUTIONS AND CONTROL: Digital-computer studies of load flow. Control of power into a network. Capacitor banks. Control by transformers.		
2	LOAD FLOW SOLUTIONS AND CONTROL: Applications.		
3	ECONOMIC OPERATION OF POWER SYSTEMS: Distribution of load between units within a plant. Transmission losses as a function of plant generation. Distribution of load between plants. A method of computing penalty factors and loss coefficients.		
4	SYMMETRICAL THREE PHASE FAULTS: Transients in RL series circuits, internal voltages of loaded machines under transient conditions. The bus impedance matrix in fault calculations.		
5	SYMMETRICAL THREE PHASE FAULTS: A bus impedance matrix equivalent network. The selection of circuit breakers. Solving different problems.		
6	MIDTERM EXAM I		
7	SYMMETRICAL COMPONENTS: Syntheses of unsymmetrical phasors for their symmetrical components. Operators. The symmetrical components of unsymmetrical phasors.		
8	SYMMETRICAL COMPONENTS: Phase shift of symmetrical components in Y-?		

	transformer banks. Power in terms of symmetrical components. Unsymmetrical series impedances.
9	SYMMETRICAL COMPONENTS: Sequence impedances and sequence networks. Positive and negative-sequence networks. Zero-sequence networks. Solving different problems.
10	UNSYMMETRICAL FAULTS: Single line-to ground fault on unloaded generator. Line to-line fault on unloaded generator. Tutorial problems.
11	UNSYMMETRICAL FAULTS: Double line to-ground fault on unloaded generator. Unsymmetrical faults on power systems.
12	UNSYMMETRICAL FAULTS: Analyses of unsymmetrical faults using the bus impedance matrix. Faults through impedance. Computer calculations of fault currents.
13	FAULT CALCULATIONS OF POWER SYSTEMS: Tutorial problems.
14	MIDTERM EXAM II