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SCHOOL OF ENGINEERING AND TECHNOLOGY		ELECTRICAL & ELECTRONICS ENGINEERING	OPERATIONAL FROM (2013-14)	FOR STUDENTS ADMITTED STARTING (2012-2013)
1	Course No.	EEE318		
2	Course Title	**POWER SYSTEMS II (DC)**		
3	Credits	5		
4	Contact Hours (L-T-P)	(3-1-2)		
5	Course Objective	To acquaint the students with the tools for performing power flow and fault analysis in power system and modern method for control of power flow through existing lines.		
6	Course Outcomes	On successful completion of this course students will be able to 1. know the representation of power system components for steady state analysis 2. know the reactance, impedance and single-line diagram 3. solve the non-linear algebraic equations 4. compute Y_{BUS} of a power system 5. formulate the load flow problems using various methods 6. apply symmetrical components of unsymmetrical phasor 7. perform the numerical and phasor analysis of fault occurrences in power system and calculate voltages in faulted power system with consideration of pre-fault current 8. describe and classify the different types of stability 9. explain the dynamic principle of power systems and generators 10. perform transient stability analysis using various methods 11. identify and employ the methods to control real power and frequency of power system 12. Identify and employ the methods to control reactive power and voltage of power system 13. know about various FACTS device		
7	Outline syllabus:			
7.01	**EEE318.A**	**Unit A**	**Review of Basic Concepts**	
7.02	EEE318.A1	Unit A Topic 1	Representation of synchronous machine and transformer in power system.	
7.03	EEE318.A2	Unit A Topic 2	Single line diagram, Impedance and Reactance Diagram.	
7.04	EEE318.A3	Unit A Topic 3	Per-unit system and its significance, change of base.	
7.05	**EEE318.B**	**Unit B**	**Power Flow Analysis**	
7.06	EEE318.B1	Unit B Topic 1	Formation of bus admittance matrix (Y_{BUS}) using inspection method and singular transformation method, Modification of $Y_{BUS.}$	
7.07	EEE318.B2	Unit B Topic 2	Bus classifications, Solution of non-linear algebraic equations.	
7.08	EEE318.B3	Unit B Topic 3	Gauss Seidel method, Newton Raphson method and Fast-decoupled method, Algorithms, flow-charts & comparison of the three methods.	
7.09	**EEE318.C**	**Unit C**	**Fault Analysis**	
7.10	EEE318.C1	Unit C Topic 1	Types of faults: phase faults, Short circuit capacity.	

7.11	EEE318.C2	Unit C Topic 2	Symmetrical components of unsymmetrical phasor, Sequence impedances, Sequence networks.
7.12	EEE318.C3	Unit C Topic 3	L-G, L-L and L-L-G faults, Unbalanced fault analysis.
7.13	**EEE318.D**	**Unit D**	**Power System Stability**
7.14	EEE318.D1	Unit D Topic 1	Basic concepts and definitions, Classification of stability; rotor angle stability and voltage stability, Steady-state stability, dynamic stability and transient stability.
7.15	EEE318.D2	Unit D Topic 2	Rotor dynamics and swing equation, Equal area criteria, Response to a short circuit fault, Factors influencing steady-state and transient stability.
7.16	EEE318.D3	Unit D Topic 3	Numerical integration methods for transient stability evaluation, Euler method, modified Euler method and Runge-Kutta methods.
7.17	**EEE318.E**	**Unit E**	**Power System Control and FACTS**
7.18	EEE318.E1	Unit E Topic 1	Concept of load frequency control.
7.19	EEE318.E2	Unit E Topic 2	Methods of voltage control, concept `of reactive power control,
7.20	EEE318.E3	Unit E Topic 3	Introduction to FACTS.
7.21	**EEE318.L**	**Unit F**	**Power System II Laboratory**
7.22	EEE318.L01	Lab expt.1	To determine the parameters and modelling of transmission lines.
7.23	EEE318.L02	Lab expt. 2	To measure the earth resistance and resistivity.
7.24	EEE318.L03	Lab expt. 3	To determine the breakdown strength of transformer oil.
7.25	EEE318.L04	Lab expt. 4	To determine the breakdown strength of solid insulating material.
7.26	EEE318.L05	Lab expt.5	To determine the location of fault in a cable using cable fault locator.
7.27	EEE318.L06	Lab expt.6	To determine the string efficiency of insulating disc.
7.28	EEE318.L07	Lab expt.7	To examine the Ferranti effect in transmission line.
7.29	EEE318.L08	Lab expt.8	To compute the parameters and modelling of transmission lines using MATLAB.
7.30	EEE318.L09	Lab expt.9	To determine the inductance and capacitance of a three-phase transposed line using MATLAB.
7.31	EEE318.L10	Lab expt.10	To determine the T and Pi parameters of medium transmission line using MATLAB.
7.32	EEE318.L11	Lab expt.11	To determine the voltage regulation of medium transmission line using MATLAB.
7.33	EEE318.L08	Lab expt.12	To evaluate the equivalent Pi model of long transmission line using MATLAB.
8	Course Evaluation		
8.1	Course work: 30 marks		
8.11	Attendance	none	
8.12	Homework	10 assignments, no weight	
8.13	Quizzes	7 best quizzes (based on assignment); 20 marks	
8.14	Labs	Evaluation of work done on each lab turn in the lab notebook and feedback from oral quiz about the work done that day. Zero, if the student is absent. 0.75N best marks out of N such evaluations: 10 marks	
8.15	Presentations	None	

8.2	MTE	20 marks
8.3	End-term examination: 50 marks	
9	References	
9.1	Text book	Kothari D.P. and Nagrath I.J., 'Modern Power System Analysis' Tata McGraw Hill Publishing Company Limited.
9.2	Other references	1. Grainer J.J. and Stevenson W.D., 'Power System Analysis' McGraw Hill. 2. H. Saadat, 'Power System Analysis' McGraw Hill.
9.3	Software	MATLAB/Simulink.

Mapping of Outcomes vs. Topics

Outcome no. → Syllabus topic↓	1	2	3	4	5	6	7	8	9	10	11	12	13
EEE318.A1	X												
EEE318.A2		X											
EEE318.A3		X											
EEE318.B1			X										
EEE318.B2				X									
EEE318.B3					X								
EEE318.C1						X							
EEE318.C2							X						
EEE318.C3						X							
EEE318.D1								X					
EEE318.D2									X				
EEE318.D3										X			
EEE318.E1											X		
EEE318.E2												X	
EEE318.E3													X