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SCHOOL OF ENGINEERING AND TECHNOLOGY	ELECTRICAL AND ELECTRONICS ENGINEERING DEPARTMENT	OPERATIONAL FROM (2013-2014)	FOR STUDENTS ADMITTED STARTING (2012-2013)
1	Course number	EEE311	
2	Course Title	**POWER SYSTEMS – I (DC)**	
3	Credits	4	
4	Contact Hours (L-T-P)	3-1-0	
5	Course Objective	To provide students with the ability of: 1. understanding of the basic components of Power System and then analyze the system using the technique of per unit system. Also introducing the students to cables, insulators and the corona phenomena which occurs in transmission system 2. representing the transmission system with the help of their equivalent circuits 3. calculating various design parameters of transmission lines	
6	Course Outcomes	On successful completion of this course students will be able to 1. assimilate necessary fundamental knowledge of different power system elements 2. predict the load variation more accurately with the help of load characteristics of an electrical power system 3. understand the rational behind per unit analysis, and be able to use per unit analysis to solve single- and three-phase circuits 4. do basic design of transmission lines to specified parameters 5. apply concepts from basic electromagnetics to determine the inductance, capacitance, and resistance of three-phase transmission lines, including lines with conductor bundling 6. derive the model for short, medium and long transmission lines 7. understand the single line diagram and be able to derive the impedance and reactance diagrams 8. compare HVDC System and AC transmission system 9. classify various HVDC links available 10. understand the concept behind the process of rectification and inversion in an HVDC System 11. understand the phenomenon of corona which occurs in a power system and thereby design the transmission system based on corona 12. 12. understand various aspects of underground cables and their increasing use in power system 13. examine the various design features of overhead transmission lines	
7	Outline syllabus:		
7.01	**EEE311.A**	**Unit A**	**Fundamentals of Power System**
7.02	EEE311.A1	Unit A Topic 1	Single phase transmission, three phase transmission, basic

			components of a power system, complex power.
7.03	EEE311.A2	Unit A Topic 2	Types of distribution systems.
7.04	EEE311.A3	Unit A Topic 3	Section and size of feeders.
7.05	**EEE311.B**	**Unit B**	**Transmission Line Constants and Performance**
7.06	EEE311.B1	Unit B Topic 1	Inductance of solid, stranded and bundled conductors, symmetrical and unsymmetrical spacing and transposition, application of self and mutual GMD
7.07	EEE311.B2	Unit B Topic 2	Capacitance of solid, stranded and bundled conductors, Symmetrical and unsymmetrical spacing and transposition, application of self and mutual GMD.
7.08	EEE311.B3	Unit B Topic 3	Characteristics and performance of lines - short line, medium line and long line; equivalent circuits, ABCD constants, Ferranti effect.
7.09	**EEE311.C**	**Unit C**	**Corona, Interference and Insulated Cables**
7.10	EEE311.C1	Unit C Topic 1	Corona, critical disruptive voltage and visible disruptive voltage, corona loss, line design based on corona, advantages and disadvantages of corona.
7.11	EEE311.C2	Unit C Topic 2	Skin and proximity effects, interference with neighbouring communication circuits and radio interference.
7.12	EEE311.C3	Unit C Topic 3	Insulated cables: Insulation, shielding and armouring of cables, types of cables, EHV cables, insulation resistance, capacitance and loss angle, capacitance grading, heating of cables, current rating, overhead/underground cables, gas insulated cables.
7.13	**EEE311.D**	**Unit D**	**Mechanical Design of Transmission Lines**
7.14	EEE311.D1	Unit D Topic 1	Catenary curve, sag-tension calculations, supports at different levels.
7.15	EEE311.D2	Unit D Topic 2	Stringing chart, sag template, equivalent span, vibration and vibration dampers.
7.16	EEE311.D3	Unit D Topic 3	Insulators: types, voltage distribution in insulator string and grading, methods of equalizing potentials.
7.17	**EEE311.E**	**Unit E**	**Advanced Topics**
7.18	EEE311.E1	Unit E Topic 1	Components of HVDC transmission system, comparison of AC and DC transmission.
7.19	EEE311.E2	Unit E Topic 2	Application of DC Transmission, types of HVDC links.
7.20	EEE311.E3	Unit E Topic 3	Introduction to Smart Grid.
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 assignments); 30 marks	
8.14	Projects	None	
8.15	Presentations	None	
8.16	Any other	None	
8.2	MTE	One, 20 marks	
8.3	End-term examination: 50 marks		
9	References		

9.1	Text book	I.J.Nagrath and D.P.Kothari, "Power System Engineering", Tata McGraw- Hill Publishers.
9.2	Other references	1. C.L.Wadhwa, "Electrical Power Systems", New Age International Publishers. 2. I.J.Nagrath and D.P.Kothari, "Modern Power System Analysis" Tata McGraw- Hill Publishers. 3. J.J. Grainer and W.D. Stevenson "Power System Analysis" McGraw Hill, New Age International Publishers.
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
EEE311.A1	X												
EEE311.A2		X											
EEE311.A3			X	X									
EEE311.B1					X								
EEE311.B2						X							
EEE311.B3							X						
EEE311.C1								X					
EEE311.C2									X				
EEE311.C3										X			
EEE311.D1											X		
EEE311.D2											X		
EEE311.D3												X	
EEE311.E1													X
EEE311.E2													X
EEE311.E3													X