

Department of Electrical and Electronics Engineering

COURSE MODULES OF THE SUBJECT TAUGHT FOR THE ODD SEMESTER 2023-24

Course Syllabi with CO's

Faculty Name: Dr. Vinod Kumar P				Academic Year: 2023-2024			
Department: Electrical and Electronics Engineering							
Course Code	Course Title	Core/Elective	Prerequisite	Contact Hours			Total Hrs/ Sessions
				L	T	P	
21EE51	Transmission and Distribution	Core	Basic Electricals, Differentiation, Integration and Electric Circuit Analysis	2	2		40 + 10 Extra Classes
Course Objectives	1. To understand the concepts of various methods of generation of power. 2. To understand the importance of HVAC, EHVAC, UHVAC and HVDC transmission. 3. To design insulators for a given voltage level. 4. To calculate the parameters of the transmission line for different configurations and assess the performance of the line. 5. To study underground cables for power transmission and evaluate different types of distribution systems						
Topics Covered as per Syllabus							
Module-1 : Introduction to power system: Structure of electric power system: Generation, Transmission and distribution. Advantages of high voltage transmission: HVAC, EHVAC, UHVAC and HVDC. Interconnection. Feeders, Distributors and service mains. Overhead transmission lines: A brief introduction to types of supporting structures and line conductors- Conventional conductors; Aluminium Conductor steel reinforced (ACSR), All –aluminium alloy conductor (AAAC) and All –aluminium conductor (AAC). High temperature conductors; Thermal resistant aluminium alloy (ATI), Super thermal resistant aluminium alloy (ZTAI), Gap type thermal resistant aluminium alloy conductor steel reinforced (GTACSR), Gap type super thermal resistant aluminium alloy conductor steel reinforced (GZTACSR). Bundle conductor and its advantages. Importance of sag, Sag calculation – supports at same and different levels, Effect of wind and ice. Line vibration and vibration dampers. Overhead line protection against lightening; ground wires. Overhead line Insulators: A brief introduction to types of insulators, Material used porcelain, toughened glass and polymer (composite). Potential distribution over a string of suspension insulators. String efficiency, Methods of increasing string efficiency. Arcing horns. 10Hours Teaching-Learning Process : Chalk and Board, Power Point Presentation.							
Bloom's Taxonomy Level		L1 – Remembering, L2 – Understanding					
Module -2: Line Parameters: Introduction to line parameters- Resistance, Inductance and capacitance. Calculation of inductance of single phase and three phase lines with equilateral spacing, Unsymmetrical spacing, Double circuit and transposed lines. Inductance of composite – conductors, Geometric mean radius (GMR) and geometric mean distance (GMD). Calculation of capacitance of single phase and three phase lines with equilateral spacing, Unsymmetrical spacing, Double circuit and transposed lines. Capacitance of composite – conductor, Geometric mean radius (GMR) and geometric mean distance (GMD). Advantages of single circuit and double circuit lines. 10Hours Teaching-Learning Process : Chalk and Board, Power Point Presentation.							
Bloom's Taxonomy Level		L1 – Remembering, L2 – Understanding, L3 – Applying , L4 – Analysing.					
Module -3: Performance of transmission lines: Classification of lines – Short, Medium and Long lines. Current and voltage relations, Line regulation and Ferranti effect in short length lines, Medium length lines considering Nominal T and nominal circuits, and long lines considering hyperbolic form equations. Equivalent circuit of a long line. ABCD constants in all cases. 10Hours Teaching-Learning Process : Chalk and Board, Power Point Presentation.							
Bloom's Taxonomy Level		L1 – Remembering, L2 – Understanding, L3 – Applying, L4 – Analysing.					
Module -4: Corona:							

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Phenomena, Disruptive and visual critical voltages, Corona loss. Advantages and disadvantages of corona. Methods of reducing corona. Underground cable: Types of cables, Constructional features, Insulation resistance, Thermal rating, Charging current, Grading of cables – capacitance and inter-sheath. Dielectric loss. Comparison between ac and dc cables. Limitations of cables. Specification of power cables. 10Hours	
Teaching-Learning Process : Chalk and Board, Power Point Presentation.	
Bloom's Taxonomy Level	L1 – Remembering, L2 – Understanding, L3 – Applying, L4 – Analysing
Module -5: Distribution: Primary AC distribution systems – Radial feeders, parallel feeders, loop feeders and interconnected network system. Secondary AC distribution systems – Three phase 4 wire system and single phase 2 wire distribution, AC distributors with concentrated and uniform loads. Effect of disconnection of neutral in a 3 phase four wire system.	
Reliability and Quality of Distribution system: Introduction, Definition of reliability, failure, Probability concepts, Limitation of distribution systems, Power quality, Reliability aids. 10Hours	
Teaching-Learning Process : Chalk and Board, Power Point Presentation.	
Bloom's Taxonomy Level	L1 – Remembering, L2 – Understanding
List of Text Books	
1) A Course in Electrical Power Soni Gupta and Bhatnagar Dhanpat Rai 2) Principles of Power System, V.K. Mehta, Rohit Mehta S. Chand 1st Edition 2013.	
List of Reference Books	
1) Electrical power systems C. L. Wadhwa New Age International 5 th Edition, 2009 2) Electrical power systems Ashfaq Hussain CBS Publication 3) Electric Power Distribution A.S. Pabla Mc Graw-Hill 6th Edition,2011 4) Power System Analysis and Design J. Duncan Glover at el Cengage Learning 4th Edition 2008 5) Electrical power Generation, Transmission and Distribution S.N. Singh PHI 2nd Edition,2009 6) Electrical Power S.L.Uppal Khanna Publication.	
List of URLs, Text Books, Notes, Multimedia Content, etc	
<ul style="list-style-type: none">• https://nptel.ac.in/courses/108/102/108102047/• www.jpowers.co.jp/english/product/pdf/gap_c1.pdf	
Activity Based Learning (Suggested Activities in Class)/ Practical Based learning Activity Based Learning, Quizzes, Seminars.	
Course Outcomes	At the end of the course the student will be able to: 1. Explain transmission and distribution scheme, identify the importance of different transmission systems and types of insulators. 2. Analyze and compute the parameters of the transmission line for different configurations. 3. Assess the performance of overhead lines. 4. Interpret corona, explain the use of underground cables. 5. Classify different types of distribution systems; examine its quality & reliability.
Graduate Attributes (As per NBA) Engineering Knowledge, Problem Analysis, Design / development of solutions, Engineers and society, Ethics.	
Assessment Details (both CIE and SEE) The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50)in the semester-end examination(SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.	
Question paper pattern: The question paper will have ten questions. Each question is set for 20 marks. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), should have a mix of topics under that module. The students have to answer 5 full questions, selecting one full question from each module.	

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The Correlation of Course Outcomes (CO's) and Program Outcomes (PO's)

Course Code:	21EE51	TITLE: Transmission and Distribution						Faculty Name:	Dr. Vinod Kumar P			
List of Course Outcomes	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO-1	3	2	-	-	-	2	2	-	-	-	-	2
CO-2	3	2	-	-	-	-	-	-	-	-	-	2
CO-3	3	2	-	-	-	-	-	-	-	-	-	-
CO-4	3	2	-	-	-	2		-	-	-	-	2
CO-5	3	2	-	-	-	2	-	-	-	-	-	2

Note: 3 = Strong Contribution 2 = Average Contribution 1 = Weak Contribution - = No Contribution

The Correlation of Course Outcomes (CO's) and Program Specific Outcomes (PSO's)

Course Code: 21EE51	TITLE: Transmission and Distribution	Faculty Name: Dr. Vinod Kumar P
List of Course Outcomes	Program Specific Outcome	
	PSO1	PSO2
CO-1	3	-
CO-2	3	-
CO-3	3	-
CO-4	3	-
CO-5	3	-

Note: 3 = Strong Contribution 2 = Average Contribution 1 = Weak Contribution “-“= No Contribution