







Department of Electrical and Electronics Engineering

COURSE MODULES OF THE SUBJECT TAUGHT FOR THE EVEN SEMESTER 2024-25

Course Syllabi with CO's

Faculty Name:	Dr. Shakunthala C	Academ	Academic Year: 2024-2025						
Department: Electrical and Electronics Engineering									
Course Code	Course Title	Core/Elective	Prerequisite	Coı	ntact l	Total Hrs/ Sessions			
Course Code	Course Title		Trerequisite	L T			P		
BEE402	Transmission and Distribution	Core	Basic Electricals, Differentiation, Integration and Two port Networks	4			50		
Course Objectives	 To understand the structure of electrical power system, its components, advantages of high voltage AC and DC transmission, various conductors used for transmission, sag and its calculation. To understand various types of insulators, methods to improve string efficiency. To understand the various transmission line parameters, their effects on transmission of electricity. To understand the various parameters that influences the performance of transmission line and to calculate performance parameters of various transmission lines. To understand carona and its effects, underground cables, its construction, classification, limitations and specifications. To understand 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 (AAC) 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

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.

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**

Module -4: Corona:

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









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current, Grading of cables – capacitance and inter-sheath. Dielectric loss. Comparison between ac and dc cables. Limitations of cables. Specification of power cables.

10Hours

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.

List of Text Books

- 1) A Course in Electrical Power Sony 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) Power System Analysis and Design, J. Duncan Gloverat el, Cengage Learning, 4th Edition 2008
- 2) Electrical power Generation, Transmission and Distribution, S.N. Singh, PHI, 2nd Edition, 2009
- 3) Electrical Power, S.L.Uppal, Khanna Publication
- 4) Electrical Power Systems, C. L. Wadhwa, New Age, 5th Edition, 2009
- 5) Electrical Power Systems, Ashfaq Hussain, CBS Publication
- 6) Electric Power Distribution, A.S. Pabla, McGraw-Hill, 6th Edition, 2012

List of URLs, Text Books, Notes, Multimedia Content, etc

• www.nptel.ac.in

	At the end of the course the student will be able to:							
	1. Explain the transmission & distribution scheme, and identify the importance of sag							
	calculation and potential distribution in insulators.[L2]							
Course	2. Analyze and compute the parameters of the transmission line for different							
Outcomes	configurations.[L3]							
	3. Assess the performance of transmission lines.[L3]							
	4. Analyze the effect of corona, and explain the use of underground cables [L4].							
	5. Classify different types of distribution systems; examine their quality & reliability [L3].							

Graduate Attributes (As per NBA)

Engineering Knowledge, Problem Analysis, Design / development of solutions, Engineers and society, Ethics.

Semester-End Examination:

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the course (duration 03 hours).

- 1. The question paper will have ten questions. Each question is set for 20 marks.
- 2. 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.
- 3. The students have to answer 5 full questions, selecting one full question from each module.
- 4. Marks scored shall be proportionally reduced to 50 marks.

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

Course Code:	BEE402	TITLE: Transmission and Distribution						ulty me:	Dr.	Dr. Shakunthala C		
List of		Program Outcomes										
Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO-1	3	2	-	-	-	-	-	-	-	-	-	2
CO-2	3	3	3	2	-	-	-	-	-	-	-	-
CO-3	3	3	3	2	-	-	-	-	-	-	-	2
CO-4	3	2	-	2	-	-	-	-	-	-	-	2
CO-5	3	3	-	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: BEE402	TITLE: Transmission and Distribution	Faculty Name: Dr. Shakunthala (
List of Course	Program Specific Outcome					
Outcomes	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