Community College of Skill Development

Lesson Plan: Transmission and Distribution of Electrical Power

Program: B. Voc Electrical **Semester: III** **Course Code: ELV-203-V** **Credits: 3-0-0**

Course Objectives: The objective of this course is to provide students with a solid foundation in the principles and practices of electrical transmission and distribution systems. The course emphasizes the design, construction, and protection of power lines, both overhead and underground, and equips students with the skills to analyse, evaluate, and troubleshoot these systems. Students will also gain knowledge of fault detection and protection mechanisms to ensure the reliability and safety of power systems.

Course Outcomes: After the successful completion of the course, students will be able to:
CO1: Understand and explain the basic concepts of overhead and underground transmission systems, including the materials used and the construction of underground cables.
CO2: Analyse different distribution system configurations, including radial and ring main systems, and evaluate their advantages and disadvantages in various scenarios.
CO3: Apply knowledge of electrical and mechanical design principles to address issues like corona effect, sag, and conductor bundling in transmission lines.
CO4: Evaluate and design protection systems using various types of relays and circuit breakers to ensure the safety and reliability of power systems.

Equipment required in Classroom/ Laboratory/ Workshop

i. LCD/Projector
ii. Whiteboard/ Black Marker

Assessment Scheme

S.No.	Criteria	Marks
1	End Term Examination	75
2	Internal Evaluation Scheme	25
2a	Class Tests	15
2a (i)	Class Test-I	7.5
2a (ii)	Class Test-II	7.5

2(b)	Teacher Assessment (Continuous Evaluation)	10
2b (i)	Attendance	5
2b (ii)	Assignment / Presentation	5

Lecture No.	Topic Covered	Pedagogy	Date of Implementation	Course Outcomes Covered	Faculty Sign
1	Introduction to Transmission, Need & Types of transmission system	Interactive lecture, discussion, real world examples.	30/7/2025	Students differentiate between AC/DC, Overhead and underground transmission.	
2	Overhead Transmission System – Overview, Construction	Lecture with diagrams, demonstration.	7/8/2025	Identify structural parts and layout of overhead lines.	
3	Advantages & Disadvantages of Overhead Lines	Lecture +PPT, comparative chart.	7/8/2025	Analyze operational advantages and drawbacks.	
4	Underground Transmission System – Construction, Features	Lecture with sectional diagrams, video demo.	13/8/2025	Understand underground system design.	
5	Advantages & Disadvantages of Underground Lines	Lecture+PPT, Discussion.	14/8/2025	Choose suitable system as per site requirements	
6	Materials used in Transmission Lines (conductors, insulators, supports)	Demonstration, sample study.	14/8/2025	Select materials based on electrical and mechanical properties.	
7	Transmission Line Parameters – R, L, C (basic concepts)	Lecture, derivations, numerical examples.	21/8/2025	Compute line constants and analyze influence.	
8	Symmetrical & Unsymmetrical systems – Concepts & Comparison, Construction of Underground Cables	Concept-based lecture with phasor diagrams.	21/8/2025	Understand load balancing and phase relations and Identify suitable cable	

				type for application.	
9	Introduction to Distribution Systems – Primary vs Secondary	Lecture with block diagrams.	4/9/2025	Differentiate between primary and secondary distribution.	
10	Radial Distribution System – Concept, Advantages, Disadvantages	Lecture + PPT, circuit analysis.	4/9/2025	Compute voltage drop and performance.	
12	Ring Main Distribution System – Concept, Advantages, Disadvantages	Comparative teaching with radial.	10/9/2025	Understand fault tolerance and load balancing.	
13	A.C. Distributors fed from one end – Voltage drop calculation	Problem-solving lecture.	11/9/2025	Calculate voltage variation along distributor.	
14	A.C. Distributors fed from both ends – Cases & Calculations	Lecture with example-based explanation.	11/9/2025	Compute load flow and voltage regulation.	
15	Construction of Distribution Lines – Pole erection methods	PPT+ video demonstration.	17/9/2025	Understand practical installation procedure.	
16	Fixing of Insulators & Conductors – Practical aspects	Lecture, case study.	18/9/2025	Describe safe fixing methods.	
17	Testing, Operation & Maintenance of Distribution Lines	Lecture with case study, group discussion.	18/9/2025	Apply testing and preventive maintenance practices.	
18	Corona Effect – Concept, Mechanism of Formation, Factors responsible for Corona, Critical Disruptive Voltage	Animated lecture, Lecture with examples	1/10/2025	Understand phenomenon of ionization and glow.	
19	Corona Loss, Advantages & Disadvantages of Corona,	Lecture with Examples, Conceptual teaching.	8/10/2025	Understand advantages and disadvantages of corona.	
20	Numericals on Corona loss, Methods of Reducing Corona Effect, Practical importance	Interactive lecture, group discussion.	9/10/2025	Explain power loss due to corona and suitable preventive measures.	

21	Skin Effect – Concept, Factors, Practical Impact	Lecture+PPT.	9/10/2025	Evaluate current distribution and AC resistance.	
22	Sag in Transmission Lines – Concept, Importance	Lecture with illustrations.	15/10/2025	Understand concept and factors affecting sag.	
23	Calculation of Sag (Simple cases with supports at equal level)	Numerical derivation, examples		Calculate sag for equal support levels.	
24	Bundling of Conductors – Purpose & Effect on Transmission	Lecture with diagrams.		Understand its effect on corona and reactance.	
25	Numericals on Sag and skin effect	Numerical examples		Compute sag and skin depth.	
26	Introduction to Power System Protection – Requirements	Lecture with fault examples.		Understand goals of power system protection.	
27	Classification of Faults in Power System	Diagram-based Teaching +PPT		Differentiate types of symmetrical and unsymmetrical faults.	
28	Methods of Protection – Overview	Interactive lecture.		Correlate fault with protection scheme.	
29	Relays – Basic Principle & Types	Lecture and relay demo.		Understand operating principle of relays.	
30	Overcurrent Relay – Principle, Characteristics	Problem-solving and graphs.		Draw and interpret relay curves.	
31	Directional Overcurrent Relay – Application & Operation	Lecture with diagram explanation.		Identify its use in interconnected systems	
32	Differential Relay – Principle, Applications	Circuit demo, animation.		Apply principle to transformer protection.	
33	Distance Relay – Operating principle, Characteristics	Phasor diagram discussion.		Analyze protection zones.	

34	Circuit Breakers – Operating principle, Arc Phenomena & Extinction	Video demo, diagrams.		Understand breaker operation and duties.	
35	Duties of Circuit Breakers, Isolators, Summary & Revision	Recap discussion, seminar.		Integrate overall protection and isolation concepts.	

Text / Reference Books:

1. Electrical power system, Subir Roy, Prentice Hall.
2. Power System Engineering, Nagrath & Kothery, TMH.
3. Elements of power system analysis, C.L Wadwa, New age international.
4. Electrical Power System, Ashfaq Hussain, CBS Publishers & Distributors.