JESUS GROUP OF ORGANISATION

SARDAR RAJA COLLEGE OF ENGINEERING, ALANGULAM

DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

MICRO LESSON PLAN

SUBJECT : TRANSMISSION AND DISTIRBUTION

CODE : EE2303

CLASS : III Year (EEE) / V SEM

STAFF: Ms.S.PRIYADHARSINI,

A.P/EEE

EE2303 TRANSMISSION AND DISTRIBUTION **L T P C**
3 1 0 4

UNIT I INTRODUCTION **9**

Structure of electric power system - different operating voltages of generation, transmission and distribution – advantage of higher operating voltage for AC transmission.An introduction to EHV AC transmission, HVDC transmission and FACTs. Mechanical design of transmission line between towers – sag and tension calculations using approximate equations taking into account the effect of ice and wind.

UNIT II TRANSMISSION LINE PARAMETERS **9** Parameters of resistance, inductance and capacitance calculations - single and three phase transmission lines - single and double circuits - solid, stranded and bundled conductors -symmetrical and unsymmetrical spacing – transposition of lines - concepts of GMR and GMD – skinand proximity effects - interference with neighbouring communication circuits.Corona discharge characteristics – critical voltage and loss. (Simple diagrams of typical towers and conductors for 400, 220 and 110 kV operations)

UNIT III MODELLING AND PERFORMANCE OF TRANSMISSION LINES **9**

Transmission line classification - short line, medium line and long line - equivalent circuits – Ferranti effect - surge impedance, attenuation constant and phase constant - voltage regulation and transmission efficiency - real and reactive power flow in lines – power circle diagrams – shunt and series compensation. An introduction to power angle diagram - surge-impedance loading, loadability limits based on thermal loading; angle and voltage stability considerations.

UNIT IV INSULATORS AND CABLES **9**

Classification of insulators for transmission and distribution purpose – voltage distribution in insulator string and grading - improvement of string efficiency. Underground cables - constructional features of LT and HT cables – insulation resistance, capacitance, dielectric stress and grading – tan δ and power loss - thermal characteristics.

UNIT V SUBSTATION, GROUNDING SYSTEM AND DISTRIBUTION SYSTEM 9

Classification, functions and major components of substations. Bus-bar arrangements - substation bus schemes - single bus, double bus with double breaker, double bus with single breaker, main and transfer bus, ring bus, breaker-and-a-half with two main buses, double bus-bar with bypass isolators. Importance of earthing in a substation. Qualitative treatment to neutral grounding and earthingpractises in substations. Feeders, distributors and service mains. DC distributor – 2-wire and 3-wire, radial and ring main distribution. AC distribution – single phase and three phase 4-wire distribution.

L=45 T = 15 TOTAL = 60PERIODS

TEXT BOOKS

1. B.R.Gupta, 'Power System Analysis and Design', S. Chand, New Delhi, 2003.
2. S.N. Singh, 'Electric Power Generation, Transmission and Distribution', Prentice Hall of India Pvt. Ltd, New Delhi, 2002.

REFERENCES

1. Luces M. Fualkenberry, Walter Coffer, 'Electrical Power Distribution and Transmission', Pearson Education, 1996.
2. HadiSaadat, 'Power System Analysis,' Tata McGraw Hill Publishing Company', 2003.
3. Central Electricity Authority (CEA), 'Guidelines for Transmission System Planning', New Delhi.
4. 'Tamil Nadu Electricity Board Handbook', 2003

SUBJECT DESCRIPTION AND OBJECTIVES

DESCRIPTION

To teach the basic concepts in the elements of a transmission line and basic parameters of the transmission line. It is a subject which dealt with the importance and the functioning of transmission and distribution of the electric power in an electrical utility (or) a power system. It is a platform for all engineers to analyses the voltage transmission and distribution in insulator strings and cables and methods to improve the same. In this subject we are going to provide a sound knowledge about the basic concepts of computation of transmission line parameters to understand the operation of the different distribution schemes.

Transmission line parameters and modeling.

It covers the fundamental parameters in the transmission line system and the types of circuits also the losses accounted in it. It explains the concept of real and reactive power flow in lines by using power circle diagrams for shunt and series compensation.

Insulators and Cables

It dealt with the classification of insulators for transmission and distribution purpose and the voltage distribution in insulator string and grading .It also covers the underground cables constructional features based on LT and HT cables and to evaluate the thermal characteristics.

Substation, Grounding System and Distribution System.

In this unit we can study about the components and the Bus-bar arrangements of substations. It also insists the importance of earthing in a substation also involves in the evaluation of performance of feeders, distributions, service mains and AC distribution system.

OBJECTIVES

i. To develop expressions for the computation of transmission line parameters.
ii.To obtain the equivalent circuits for the transmission lines based on distance and operating voltage for determining voltage regulation and efficiency. Also to improve the voltage profileof the transmission system.

iii.To analyses the voltage distribution in insulator strings and cables and methods to improve the same
iv. To understand the operation of the different distribution schemes.

MICRO LESSON PLAN

WEEK	HOURS	LECTURE TOPICS	BOOK
UNIT I INTRODUCTION			
1	1,2	Structure of electric power system (AV)	T1
	3,4,5	Different operating voltages of generation, transmission and distribution. Advantage of higher operating voltage for AC transmission	T1
2	6	An introduction to EHV AC transmission (AV)	T1
	7,8	HVDC transmission and FACTs. Mechanical design of transmission line between towers,Problem	T2
	9,10	Sag and tension calculations using approximate equations taking into account the effect of ice and wind.	T1
3	11,12	Problem	T1
UNIT II TRANSMISSION LINE PARAMETERS			
3	13,14	Parameters of resistance, inductance and capacitance calculations, Problem	T1
4	15,16	Single and three phase transmission lines ,single and double circuits	T1
	17,18	Solid, stranded and bundled conductors, symmetrical and unsymmetrical spacing , Problem	T1
	19	Transposition of lines ,Concepts of GMR and GMD(AV),	T2
	20	Skinand proximity effects, interference with neighbouring communication circuits.(AV)	T2
5	21,22	Problem	T1
	23	Corona discharge characteristics, critical voltage and loss.	T1
	24	(Simple diagrams of typical towers and conductors for 400, 220 and 110 kv operations)	T1
UNIT III MODELLING AND PERFORMANCE OF TRANSMISSION LINES			
6	25	Transmission Line Classification, Short Line, Medium Line And Long Line(AV)	T1
	26,27	Equivalent Circuits , Problem	T1
	28	Ferranti Effect,Surge Impedance, Attenuation Constant And Phase Constant (AV),Voltage Regulation And Transmission Efficiency	T1
	29,30	Problem	T1
7	31	Real And Reactive Power Flow In Lines	T1
	32	Power Circle Diagrams ,Shunt And Series Compensation	T1
	33	Problem	T1

	34	An Introduction To Power Angle Diagram	T1
	35,36	Surge-Impedance Loading, LoadAbility Limits Based On Thermal Loading; Angle And Voltage Stability Considerations	T1
UNIT IV INSULATORS AND CABLES			
8	37,38	Classification of insulators for transmission and distribution purpose (AV)	T1
	39,40	Voltage distribution in insulator string and grading	T1
9	41,42	Improvement of string efficiency, Problem	T1
	43,44	Underground cables ,constructional features of LT and HT cables(AV)	T1
10	45,46	Insulation resistance, capacitance, dielectric stress and grading	T1
	47	Tan δ and power loss ,Thermal characteristics	T2
	48	Problem	T1
UNIT V SUBSTATION, GROUNDING SYSTEM AND DISTRIBUTION SYSTEM			
10	49	Classification, functions and major components of substations.	T2
	50,51	Bus-bar arrangements, substation bus schemes, Problem	T2
	52,53	Single bus, double bus with double breaker, double bus with single breaker, main and transfer bus, ring bus, breaker and a half with two main buses, double bus-bar with bypass isolators.	T2
11	54	Importance of earthing in a substation.	T2
	55	Qualitative treatment to neutral grounding and earthingpractises in substations.	R3
	56	Feeders, distributors and service mains. (AV)	T2
12	57	Dc distributor – 2-wire and 3-wire, Radial and ring main distribution. (AV)	T2
	58	Ac distribution – single phase and three phase 4-wire distribution	R3
	59,60	Problem	R3

PREPARED BY,
Ms. S.PRIYADHARSINI,
A.P/EEE