



Department of Electrical Electronics Engineering		LP: EE22302
Regulation: 2022		Rev. No: 00
B.E/B.Tech/M.E/M.Tech : EEE		Date: 02/08/2023
PG Specialisation : NA		
Sub. Code Sub. Name : EE22302 - ELECTRIC POWER SYSTEM		
Unit : I		

**Unit Syllabus: STRUCTURE OF POWER SYSTEM**

Structure of Electric Power System – Conventional, Deregulated Structure, Micro-grid and Smart Grid Structure – Methods of electric power generations – Conventional (Thermal and Hydro Power Plants)–Renewable Energy based generation – Trends in Transmission and Distribution: EHVAC, HVDC and FACTS – Indian Electricity (IE) Rules and Acts – Tariff – Types – Electrical Safety.

Objective: Learn about various components of Power systems

Session No *	Topics to be covered	Ref	Teaching Aids
1	Structure of Electric Power System	1,2,3,4, 5,6,7	PPT
2	Conventional, Deregulated Structure, Micro-grid and Smart Grid Structure	1,2,3,4, 5,6,7	PPT
3	Methods of electric power generation	1,2,3,4, 5,6,7	PPT
4	Conventional (Thermal and Hydro Power Plants)	1,2,3,4, 5,6,7	PPT
5	Renewable Energy based generation	1,2,3,4, 5,6,7,8	PPT
6	Trends in Transmission and Distribution: EHVAC, HVDC and FACTS	1,2,3,4, 5,6,7,8	PPT
7	Indian Electricity (IE) Rules and Acts	1,2,3,4, 5,6,7,8	PPT
8	Tariff & Type	1,2,3,4, 5,6,7,8	PPT
9	Electrical Safety	1,2,3,4, 5,6,7,8	PPT

**Content beyond syllabus covered (if any):**



**Sub. Code / Sub. Name:** EE22302 - ELECTRIC POWER SYSTEM

**Unit :** II

**Unit Syllabus: TRANSMISSION SYSTEM PARAMETERS**

Resistance, Inductance and Capacitance calculations -solid, stranded, and bundled conductors- Single-phase and three phase lines - single and double circuit lines - Typical configuration, conductor types - Symmetrical and unsymmetrical spacing and transposition - application of self and mutual GMD - skin and proximity effects- effect of earth on transmission line capacitance-Distribution line model

**Objective:** Calculate the transmission line parameters for various conductor configurations.

Session No *	Topics to be covered	Ref	Teaching Aids
10	Resistance, Inductance calculations - solid, stranded, and bundled conductors - Typical configuration, conductor types	1,2,3,4, 5,6,7	BB,PPT
11	Inductance calculations - Single-phase phase lines and three phase lines- Symmetrical spacing	1,2,3,4, 5,6,7	BB,PPT
12	Inductance calculations- Three phase lines unsymmetrical spacing and transposition	1,2,3,4, 5,6,7	BB,PPT
13	Inductance calculations - double circuit lines- Application of self and mutual GMD	1,2,3,4, 5,6,7	BB,PPT
14	Capacitance calculations - Single-phase phase lines and three phase lines- Symmetrical spacing	1,2,3,4, 5,6,7	BB,PPT
15	Capacitance calculations - Three phase lines unsymmetrical spacing and transposition	1,2,3,4, 5,6,7	BB,PPT
16	Capacitance calculations - double circuit lines- Application of self and mutual GMD	1,2,3,4, 5,6,7	BB,PPT
17	Skin and proximity effects - Effect of earth on transmission line capacitance - Distribution line model	1,2,3,4, 5,6,7	BB,PPT
18	Tutorial problem on Inductance and Capacitance calculations	1,2,3,4, 5,6,7	BB,PPT
<b>Content beyond syllabus covered (if any):</b>			

\* Session duration: 50 mins



**Sub. Code / Sub. Name:** EE22302 - ELECTRIC POWER SYSTEM

Unit : III

**Unit Syllabus: MODELLING AND PERFORMANCE OF TRANSMISSION LINES**

Classification of lines- Performance of Transmission lines – short line, medium line and long line – ABCD constants - equivalent circuits, phasor diagram – real and reactive power flow in lines – Power Circle diagrams – Ferranti effect- shunt and series compensation- surge-impedance loading, loadability limits based on thermal loading – Formation of Corona – Critical Voltages – Effect on line Performance.

Objective: P

redict the performance of Transmission lines.

Session No *	Topics to be covered	Ref	Teaching Aids
19	Classification of lines - Performance of Transmission lines	1,2,3,4, 5,6,7	BB,PPT
20	Short line, medium line and long line	1,2,3,4, 5,6,7	BB,PPT
21	ABCD constants - equivalent circuits, phasor diagram	1,2,3,4, 5,6,7	BB,PPT
22	Real and reactive power flow in lines	1,2,3,4, 5,6,7	BB,PPT
23	Power Circle diagrams	1,2,3,4, 5,6,7	BB,PPT
24	Ferranti effect- shunt and series compensation	1,2,3,4, 5,6,7	BB,PPT
25	Surge-impedance loading, loadability limits based on thermal loading	1,2,3,4, 5,6,7	BB,PPT
26	Formation of Corona – Critical Voltages- Effect on line Performance.	1,2,3,4, 5,6,7	BB,PPT
27	Tutorial problem on Performance of Transmission lines	1,2,3,4, 5,6,7	BB,PPT
<b>Content beyond syllabus covered (if any):</b>			

\* Session duration: 50 mins

**Sub. Code / Sub. Name:** EE22302 - ELECTRIC POWER SYSTEM

Unit : IV

**Unit Syllabus: INSULATORS, CABLES AND SAG CALCULATION**

Insulators: Types – voltage distribution in insulator string – improvement of string efficiency – testing of insulators. Underground cables: Underground cables – Types of cables – insulation resistance – potential gradient – capacitance of single-core and three-core cables- Grading of cables – DC cables. Mechanical designs of transmission line: sag and tension calculations for different weather conditions – Tower spotting & Types of towers.

Objective: Understand about different Insulators and Underground cables.

Session No *	Topics to be covered	Ref	Teaching Aids
28	Insulators: Types – voltage distribution in insulator string	1,2,3,4, 5,6,7	BB,PPT
29	Improvement of string efficiency	1,2,3,4, 5,6,7	BB,PPT
30	Testing of insulators	1,2,3,4, 5,6,7	BB,PPT
31	Underground cables - Types of cables – insulation resistance - potential gradient	1,2,3,4, 5,6,7	BB,PPT
32	Capacitance of single-core and three-core cables	1,2,3,4, 5,6,7	BB,PPT
33	Grading of cables- DC cables	1,2,3,4, 5,6,7	BB,PPT
34-35	Mechanical designs of transmission line: sag and tension calculations for different weather conditions	1,2,3,4, 5,6,7	BB,PPT
36	Tower spotting & Types of towers.	1,2,3,4, 5,6,7	BB,PPT

**Content beyond syllabus covered (if any):**

\* Session duration: 50 mins



## SRI VENKATESWARA COLLEGE OF ENGINEERING

## COURSE DELIVERY PLAN - THEORY

**Sub. Code / Sub. Name:** EE22302 - ELECTRIC POWER SYSTEM

Unit - V

**Unit Syllabus: SUBSTATION, GROUNDING SYSTEM AND DISTRIBUTION SYSTEM**

Classification, major components of substations - Bus-bar arrangements - Importance of earthing in a substation - Qualitative treatment to neutral grounding and earthing practices in substations - Distribution Systems - Kelvin's Law - AC and DC distributions - Concentrated and Distributed loading- Techniques of Voltage Control and Power factor improvement - Distribution Loss- Anti-theft measures - Demand side management (Qualitative)

Objective: Familiarize the basic concepts related to Substation and Distribution system.

Session No *	Topics to be covered	Ref	Teaching Aids
37	Classification, major components of substations	1,2,3,4, 5,6,7	PPT
38	Bus-bar arrangements	1,2,3,4, 5,6,7	PPT
39	Importance of earthing in a substation	1,2,3,4, 5,6,7	PPT
40	Qualitative treatment to neutral grounding and earthing practices in substations	1,2,3,4, 5,6,7	PPT
41	Distribution Systems - Kelvin's Law	1,2,3,4, 5,6,7	PPT
42	AC and DC distributions-Concentrated and Distributed loading	1,2,3,4, 5,6,7	PPT
43	Techniques of Voltage Control and Power factor improvement	1,2,3,4, 5,6,7	PPT
44	Distribution Loss- Anti-theft measures	1,2,3,4, 5,6,7	PPT
45	Demand side management (Qualitative)	1,2,3,4, 5,6,7	PPT

Content beyond syllabus covered (if any):


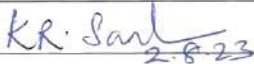
\* Session duration: 50 mins



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**REFERENCES:**

1. Gupta B.R. 'Power System Analysis & Design', S.Chand and Company Ltd, 2014, 7<sup>th</sup> Edition.
2. Metha, V.K. and Rohit Metha.. 'Principles of Power System', S.Chand and Company Ltd., 2020.
3. Hadi Saadat, 'Power System Analysis,' PSA Publishing; Third Edition, 2011
4. Wadwa, C.L.. 'Electric Power Systems, New Age International (P) Ltd', New Delhi, 2022, 8<sup>th</sup> Edition.
5. John J. Grainger and Stevenson Jr. W. D. 'Power System Analysis', McGraw Hill International edition, 2016.
6. S.N. Singh, 'Electric Power Generation, Transmission and Distribution', Prentice Hall of India Pvt. Ltd. New Delhi. Second Edition, 2011.
7. D.P.Kothari and I.J. Nagrath, 'Power System Engineering', Tata McGraw-Hill, 2019, 3<sup>rd</sup> Edition.
8. Central Electricity Authority (CEA). "Guidelines for Transmission System Planning", New Delhi

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Date	02/08/2023	02/08/2023
Remarks *:		
Remarks *:		

\* If the same lesson plan is followed in the subsequent semester/year it should be mentioned and signed by the Faculty and the HOD