



Kadi Sarva Vishwavidyalaya
Faculty of Engineering & Technology
Fourth Year Bachelor of Engineering (Electrical Branch)
With effect from: Academic Year 2020-21

Subject Code: EE803-N	Subject Title: Power System Practice and Design
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Course Objective:

- To present a problem oriented introductory knowledge of Economics and planning of Electrical Power System Design.
- To understand basic concepts of Transmission & Distribution Design.
- To present a Recent problems of power system Improvement with design criterion.

A. Teaching / Examination Scheme

Teaching scheme				Total Credit	Evaluation Scheme					Total Marks
L	T	P	Total		Theory		IE Marks	CIA Marks	Pract. Marks	
Hrs	Hrs	Hrs	Hrs		Hrs	Marks				
3	0	2	5	4	3	70	30	20	30	150

B. Outline of the Course

1.Design of Transmission Line:

Electrical design of transmission line, voltage level selection and choice of conductors, spacing of conductors, insulators and SIL, design problem. Mechanical design of transmission line: Considerations, loading on conductors, span, sag and tension clearance, stringing, problems. Transmission line tower design: Location of tower, earth wires, reduction of tower footing resistance, design of tower, examples. EHV transmission line design: Considerations, selection, spacing of conductors, corona and radio interference, insulation coordination and different types of EHV towers, EHV systems in India.

2. HVDC Transmission:

Introduction, Limitation of HVAC lines, Merits and Demerits of HVDC transmission, one line diagram, types of DC link, necessary equipment, operation and control, applications, recent advances & Projects, HVDC in India.

3. Design of Power Station:

Introduction, selection of sizes and location of generating stations, Size and Location of Sub-station, Interconnections issues with wind and Solar PV.

4. Power System Earthing – Power Station and Sub Station Earthing

Objectives, definitions, tolerable limits of body currents, soil resistivity, measurement of soil resistivity, earth resistance, measurement of earth resistance, tolerable step and touch voltage, actual step and touch voltage, design of earthing grid, impulse behavior of earthing system.



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5. Design of Distribution Systems:

Types of distribution systems: arrangements, selection and size of feeders using Kelvin's law, Design of cables in distribution systems considering ampere capacity, Primary distribution design, Secondary distribution design, Distribution substation, Calculation of distributor size and its examples, calculation of voltage drops and size of distributor in ring system. Voltage regulation and lamp flicker, Design of Rural Distribution, Design of Town Electrification Scheme.

6. Insulation Coordination and Location of Lightning Arrestor : Introduction, definitions, insulation-co-ordination curves, determination of line insulation, Basic Insulation level (BIL), Insulation levels of substation equipment, Lightning arrestor selection and location, Selection of arrestor voltage rating, arrestor discharge voltage and arrestor discharge current, protective margin.

C. Lesson Planning

SR No.	Lectures (Hours)	Weight-age in % in Exam	Topic
1	3	25	Design of Transmission Line: Electrical design of transmission line, voltage level selection and choice of conductors, spacing of conductors, insulators and SIL, design problem..
2	3		Mechanical design of transmission line: Considerations, loading on conductors, span, sag and tension clearance, stringing, problems.
3	3		Transmission line tower design: Location of tower, earth wires, reduction of tower footing resistance, design of tower, examples
4	4		EHV transmission line design: Considerations, selection, spacing of conductors, corona and radio interference, insulation coordination and different types of EHV towers, EHV systems in India.
5	6	20	HVDC Transmission: Introduction, Limitation of HVAC lines, Merits and Demerits of HVDC transmission, one line diagram, types of DC link, necessary equipment, Operation and control, applications, recent advances & Projects, HVDC in India.
6	4	10	Design of Power Station: Introduction, selection of sizes and location of generating stations, Size and Location of Sub-station, Interconnections issues with wind and Solar PV.
7	3	15	Power System Earthing – Power Station and Sub Station Earthing Objectives, definitions, tolerable limits of body currents, soil resistivity, measurement of soil resistivity, earth resistance, measurement of earth resistance,
8	3		tolerable step and touch voltage, actual step and touch voltage, design of earthing grid, impulse behavior of earthing system
9	3	20	Design of Distribution Systems: Types of distribution systems: arrangements, selection and size of feeders using Kelvin's law, Design of cables in distribution systems considering ampere capacity.



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10	4		Primary distribution design, Secondary distribution design, Distribution substation, Calculation of distributor size and its examples.
11	4		Calculation of voltage drops and size of distributor in ring system. Voltage regulation and lamp flicker, Design of Rural Distribution, Design of Town Electrification Scheme.
12	2	10	Insulation Coordination and Location of Lightning Arrestor : Introduction, definitions, insulation-co-ordination curves, determination of line insulation.
13	1		Basic Insulation level (BIL), Insulation levels of substation equipment.
14	2		Lightning arrestor selection and location, Selection of arrestor voltage rating, arrestor discharge voltage and arrestor discharge current, protective margin.
	45	100	

D. List of Practical:

- To study about the HVDC transmission line.
- To study about the different types of sub-station.
- To study about the design of transmission line system.
- To study about the design of distribution system.
- To study about the design of EHV lines.
- To study about the different types of bus-bar system.
- To study about the rural electrification.
- Tutorial-1: HVDC transmission line.
- Tutorial-2: Design of transmission line.
- Tutorial-3: Design of distribution system.

E. Instructional Method & Pedagogy

- At the start of course, the course delivery pattern , prerequisite of the subject will be discussed
- Lecture may be conducted with the aid of multi-media projector, black board, OHP etc. & equal weightage should be given to all topics while teaching and conduction of all examinations.
- Attendance is compulsory in lectures, which may carries five marks in overall evaluation.



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- One/Two internal exams may be conducted and total/average/best of the same may be converted to equivalent of 30 marks as a part of internal theory evaluation.
- Assignment based on course content will be given to the student for each unit/topic and will be evaluated at regular interval. It may carry an importance of ten marks in the overall internal evaluation.
- Surprise tests/Quizzes/Seminar/Tutorial may be conducted and having share of five marks in the overall internal evaluation.

F. Students Learning Outcomes

On successful completion of the course

- The student can be acquired the basic knowledge of Economics and planning of Electrical Power System Design.
- The students will be able to effectively employ electrical systems and lead the exploration of new applications and techniques for their use by design Implementation.

Reference books:

1. Electrical Power System Design – M. V. Deshpande, TMH publication
2. Electrical Power System Design – B. R. Gupta, S. CHAND
3. Electrical Power System Planning – A. S. Pabla, TMH publication
4. Substation Design – Satnam & Gupta, Dhanpat Rai and Co.
5. A course in Electrical Power- Soni,,Gupta and Bhatnagar, Dhanpat Rai & Sons



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