University of Mumbai			
Class: S.E.	**Branch:** Electrical Engineering	**Semester: IV**	
Subject: Elements of Power System			
Periods per Week (Each 60 min)	Lecture	4	
	Practical	---	
	Tutorial	2	
		Hours	Marks
Evaluation System	Theory	3	100
	Practical and Oral	---	---
	Oral	---	25
	Term Work	---	25
	Total	3	150

Module	Contents	Hrs
1	**Introduction** Electrical supply system, typical AC supply system comparison between DC and AC supply systems, comparison between overhead and underground system, choice of working voltage for transmission and distribution	06
2	**Transmission Line Parameters** **Inductance** Definition of inductance, Inductance of a single phase two wire line Conductor types, bundled conductors, Inductance of composite condu phase line, double circuit three phase line **Resistance** Resistance, Skin effect and proximity effect **Capacitance** Potential difference between two conductors of a group of parallel Conductors, Capacitance of a two wire line, three phase line with equilateral spacing, three phase line with unsymmetrical spacing, Earth effect on transmission line capacitance, Bundled conductors, method of GMD.	10
3	**Representation of Power System Components** Introduction, Single phase solution of balanced three phase networks one line diagram, impedance and reactance diagram, Per unit (p.u.) system, per unit impedance diagram, representation of loads	06
4	**Transmission Line : Model and Performance** Short, medium and long line model, equivalent circuit of a long line, Ferranti effect, tuned power lines, surge impedance loading power flow through transmission lines	05
5	**Mechanical design of transmission line** Components of overhead lines, types of towers, conductor materials,	05

	cross arms, Conductor configuration, spacing and Clearance Span lengths, Sag and Tension.	
6	**Overhead Line Insulators** Types of insulators, potential distribution over a string of suspension insulators, methods of equalizing potential	05
7	**Underground Cable** General construction, classification of cables, Insulation resistance of single core cable, capacitance of single core cable, grading of cable, Selection of cable	05
8	**Grounding and safety techniques** Measurement of earth resistance, soil resistivity, tolerable limits of body currents, tolerable step and touch voltage, actual step and touch voltage, measurement of tower footing resistance, methods of neutral grounding, grounding practices	06

Theory Examination:

1. Question paper will comprise of total 7 questions, each of 20 marks.
2. Only 5 questions need to be solved.
3. Q.1 will be compulsory and based on the entire syllabus.
4. Remaining questions will be mixed in nature
5. In question paper weightage of each module will be proportional to the number of respective lecture hours as mentioned in the syllabus
6. No question should be asked from the pre-requisite module

Oral Examination:

The oral examination will be based on entire syllabus of Power Plant Engineering (Semester III) and Elements of Power System (Semester IV).

Term work:

Term work consists of minimum eight experiments and a written test. The distribution of the term work shall be as follows,

Laboratory work (Experiments and Journal) :10 marks
Test (at least one) :10 marks
Attendance (Practical and Theory) :05 marks

The final certification and acceptance of term-work ensures the satisfactory performance of laboratory work and minimum passing in the term-work.

Books Recommended:

Text books:

1. Wadhwa C. L *Electrical power system* Willey Eastern Ltd.
2. Kothari Nagrath *Power system engineering* 3rd edition, TCMH

Reference books:

3. Stevenson's *Modern power system analysis* TMH publication
4. .Mehta V.K.,Chand S. *Principles of power system*

5. Gupta B.R. *Power system analysis & design*.Wheeler publication 3rd edition ,1998