**Power Systems-I**

| Course Code | 19EE3601 | Year | III | Semester | II |
|---|---|---|---|---|---|
| Course Category | Program core | Branch | EEE | Course Type | Theory |
| Credits | 3 | L-T-P | 3-0-0 | Prerequisites | BEEE |
| Continuous Internal Evaluation: | 30 | Semester End Evaluation: | 70 | Total Marks: | 100 |

| Course Outcomes | |
|---|---|
| Upon successful completion of the course, the student will be able to | |
| **CO1** | Understand the layout and working of various power plants, types of transmission lines and tariff (L2) |
| **CO2** | Estimate the transmission line parameters, mechanical design parameters of overhead lines. (L3) |
| **CO3** | Analyse the performance of transmission lines and Economic Aspects of power system (L4) |
| **CO4** | Demonstrate the effect of corona and importance of load sharing (L3) |

| Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of correlations (3:High, 2: Medium, 1:Low) | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** |
| **CO1** | 2 | | | | | | | | | | | | | |
| **CO2** | 2 | 3 | | | | | | | | | | | 1 | 1 |
| **CO3** | 2 | 3 | | | 1 | | | | | | | | 1 | 1 |
| **CO4** | 2 | | | | | | | | | | | | 1 | |

| SYLLABUS | | |
|---|---|---|
| **Unit No.** | **Contents** | **Mapped CO** |
| I | **Conventional and Non-conventional power Generation**<br>Introduction - General layout of thermal power plant, working and site selection - General layout of nuclear power plant, working and site selection - General layout and working of hydroelectric power plant, site selection, pumped storage plants - Comparison of thermal and hydel power plants. Introduction to Non-Conventional Sources (elementary treatment only): Solar Energy, wind Energy. | CO1 |
| II | **Transmission line Parameters**<br>Overhead Transmission Lines: Resistance, Capacitance and Inductance calculations for single phase two wire line, three phase line with symmetrical spacing for single circuit line, proximity effect and skin effect – numerical problems | CO1 & CO2 |
| III | **Performance of transmission lines:**<br>Classification of Transmission Lines -Short, medium and long lines, Medium lines- Nominal-T, Nominal-Π methods, Long lines-rigorous methods of solution, ABCD constants, regulation, efficiency, Ferranti effect, Surge Impedance loading - numerical problems | CO3 |

| | | |
|---|---|---|
| IV | **Mechanical design of over headlines**<br>Types of insulators, voltage distribution in suspension-type insulators, String efficiency, Methods of improving string efficiency, tension and sag calculation, effects of wind and ice loading - numerical problems<br>Corona: Formation of corona, Critical voltages, Power loss and factors affecting corona, Merits and Demerits. | CO2 & CO4 |
| V | **Economic Aspects and Tariffs**<br>Load curve, load duration curve, definition: connected load, average load, maximum demand, load factor, demand factor, diversity factor, plant capacity factor, plant use factor- numerical problems.<br>Tariffs: Base load and peak load stations, load sharing between base load and peak load stations - objectives of tariff, factors affecting tariff, types of tariffs block and stepped tariff – two-part tariff and three-part tariff – Frequency dependent tariff- unscheduled interchange-based tariff, Numerical problems | CO1, CO3 & CO4 |

| **Learning Resources** |
|---|
| **Text Books:** |
| 1. A course in Electrical Power systems, J.B. Gupta – 11th edition - Kataria Publications.<br>2. Electric power generation, transmission and distribution, S. N. Singh, 2nd edition- PHI Learning<br>3. Principles of Power Systems, V.K Mehta and Rohit Mehta - S.Chand & Company ltd. |
| **Reference Books:** |
| 1. A Text Book on Power System engineering, R.K.Rajput, Laxmi Publication (P) Ltd.<br>2. Generation, Distribution and Utilization of Electrical Energy, C.L.Wadhwa, New Age International publishers. |