## POWER SYSTEM ANALYSIS – 2(Core Course)
## B.E., VII Semester, Electrical and Electronics Engineering [As per Choice Based Credit System (CBCS) scheme]

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| Course Code | 17EE71 | CIE Marks | 40 |
| Number of Lecture Hours/Week | 04 | SEE Marks | 60 |
| Total Number of Lecture Hours | 50 | Exam Hours | 03 |
| **Credits - 04** | | | |

**Course objectives:**

- To explain formulation of network models and bus admittance matrix for solving load flow problems.
- To discuss solution of nonlinear static load flow equations by different numerical techniques and methods to control voltage profile.
- To discuss optimal operation of generators on a bus bar, optimal unit commitment, reliability considerations and optimum generation scheduling.
- To discuss optimal power flow solution, scheduling of hydro-thermal system, power system security and reliability.
- To explain formulation of bus impedance matrix for the use in short circuit studies on power systems.
- To explain numerical solution of swing equation for multi-machine stability

| **Module-1** | **Teaching Hours** |
|---|---|
| **Load Flow Studies:** Introduction, Network Model Formulation, Formation of by Singular Transformation, Load Flow Problem, Gauss-Seidel Method. | **10** |
| **Revised Bloom's Taxonomy Level** $L_1$ – Remembering, $L_2$ – Understanding, $L_3$ – Applying $L_4$ – Analysing. | |
| **Module-2** | |
| **Load Flow Studies (continued):** Newton-Raphson Method, Decoupled Load Flow Methods, Comparison of Load Flow Methods, Control of Voltage Profile. | **10** |
| **Revised Bloom's Taxonomy Level** $L_1$ – Remembering, $L_2$ – Understanding, $L_3$ – Applying $L_4$ – Analysing. | |
| **Module-3** | |
| **Optimal System Operation:** Introduction, Optimal Operation of Generators on a Bus Bar, Optimal Unit Commitment, Reliability Considerations, Optimum Generation Scheduling. | **10** |
| **Revised Bloom's Taxonomy Level** $L_1$ – Remembering, $L_2$ – Understanding, $L_3$ – Applying $L_4$ – Analysing. | |
| **Module-4** | |
| **Optimal System Operation (continued):** Optimal Load Flow Solution, Optimal Scheduling of Hydrothermal System, Power System Security, Maintenance Scheduling, Power System Reliability. | **10** |
| **Revised Bloom's Taxonomy Level** $L_1$ – Remembering, $L_2$ – Understanding, $L_3$ – Applying $L_4$ – Analysing. | |
| **Module-5** | |
| **Symmetrical Fault Analysis:** Algorithm for Short Circuit Studies, Formulation. **Power System Stability:** Numerical Solution of Swing Equation, Multimachine Stability. | **10** |
| **Revised Bloom's Taxonomy Level** $L_1$ – Remembering, $L_2$ – Understanding, $L_3$ – Applying $L_4$ – Analysing. | |

**Course outcomes:**

At the end of the course the student will be able to:

- Formulate network matrices and models for solving load flow problems.
- Perform steady state power flow analysis of power systems using numerical iterative techniques.

**B.E ELECTRICAL AND ELECTRONICS ENGINEERING(EEE)**
**17EE71POWER SYSTEM ANALYSIS – 2(Core Subject) (continued)**
**CHOICE BASED CREDIT SYSTEM (CBCS)**

**Course outcomes(continued):**

- Discuss optimal scheduling for hydro-thermal system, power system security and reliability.
- Analyze short circuit faults in power system networks using bus impedance matrix.
- Perform numerical solution of swing equation for multi-machine stability.

**Graduate Attributes (As per NBA)**

Engineering Knowledge, Problem Analysis, Design/ Development of Solutions, Conduct investigations of complex problems, Modern Tool Usage, Ethics, Individual and Team Work, Communication, Life-long Learning.

**Question paper pattern:**

- The question paper will have ten full questions carrying equal marks. Each full question consisting of 16 marks.
- There will be two full questions (with a maximum of four sub questions) from each module.
- Each full question will have sub question covering all the topics under a module.

**Textbook**

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|---|---|---|---|---|
| 1 | Modern Power System Analysis | D. P. Kothari | McGraw Hill | 4th Edition, 2011 |

**Reference Books**

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|---|---|---|---|---|
| 1 | Computer Methods in Power Systems Analysis | Glenn W Stagg Ahmed H Ei - Abiad | McGraw Hill | 1stEdition, 1968 |
| 2 | Computer Techniques in Power System Analysis | M.A. Pai | McGraw Hill | 2ndEdition, 2006 |
| 3 | Power System Analysis | HadiSaadat | McGraw Hill | 2ndEdition, 2002 |