

M.TECH FIRST SEMESTER
ADVANCED COMPUTATIONAL METHODS IN POWER SYSTEMS
17EEPC1T1 **Credits: 4**
Lecture: 4 periods/week **Internal Assessment: 40 marks**
End Semester Assessment: 60 marks

Course Objective:

To emphasize the fundamentals of Power System analysis while employing a Computer for computational purposes.

Course Learning Outcomes: At the end of the course the student will be able to

1. Formulate the Incidence Matrices using Graph theory to determine the network solutions.
2. Apply load flow analysis to an electrical power network and interpret the results of the analysis.
3. Perform short circuit analysis to understand the effects of different types of faults.
4. Understand how Power System contingency and Security analysis are helpful in power system planning and operation studies.

UNIT-I: Incidence and network matrices: Introduction, Graphs, Incidence matrices, Primitive network, Formation of network matrices by singular transformation

UNIT-II: Load Flow studies, formulation of load flow problem, Solution techniques using Y-bus, Gauss-Siedel method, Newton-Raphson method, Decoupled power flow algorithms, Fast decoupled method, DC load Flow

UNIT-III: Symmetrical Component Analysis, determination of symmetrical fault current using Z_{BUS} Inversion, Generalised Fault Analysis using Z_{BUS} for Three phase balanced fault, single Line to Ground Fault, Line to Line Fault, Double Line to Ground Fault, Analysis of open conductor faults

UNIT-IV: Formulation of Z_{BUS} using step by step method, addition and removal of lines in power system, Analysis of Single Line Contingency, Analysis of Multiple Line Contingency, Contingency Analysis using DC Power flow model, Power System Security

TEXT BOOKS:

1. Computer Methods in Power System Analysis - Stagg and EI Abiad, Tata McGraw Hill Edition
2. Power System Analysis Operation and Control – Abhijit Chakrabarti and Sunita Halder, PHI Learning Private Limited

REFERENCE BOOKS:

1. Elements of Power System Analysis - W D Stevenson, Fourth Edition, Mc Graw Hill Edition
2. Advanced Power System Analysis and dynamics by L.P.Singh, New Age International Publishers
3. Modern Power System Analysis- DP Kothari and IJ Nagrath, Tata McGraw Hill Edition
4. Power System Analysis and Design – J Duncan Glover, Mulukutla S Sarma, Thomas J Overbye, Cengage Learning
5. Power System Analysis – Hadi Saadat, Tata McGraw Hill Edition
6. Computer aided Power System Operation and Analysis - R.N.Dhar, McGraw Hill