

(ELECTIVE – A/I)**4/4 B.Tech. SEVENTH SEMESTER**

EE7T5A **COMPUTER METHODS IN POWER SYSTEMS** **Credits:3**
Lecture: 3 periods/week **Internal assessment: 30 marks**
Tutorial: 1 period /week **Semester end examination: 70 marks**

Course Objective:

This course is designed to give students the required knowledge for the design and analysis of electrical power system. Calculation of power flow in a power system network using various techniques, formation of Ybus, Zbus and its importance are covered in this course. It also deals with analysis of transient stability.

Course Outcomes:

After completing this course, student is able to

1. Analyse fault using Z-bus.
2. Develop computer programs for different load flow techniques.
3. Analyse security of the power system.
4. Perform stability analysis of power system

UNIT I**Network Topology**

Incidence and network matrices: Introduction, graphs, incidence matrices, primitive matrices, types of network matrices, formation of network matrix, π -representation of off-nominal tap transformers, Y-bus formation by singular transformation, examples of formation of incidence matrices, formation of Ybus by inspection method.

UNIT II**Analysis Of Faulted Power System**

Algorithms for formation of Z-bus matrix: Step by Step algorithm for formation of Z-bus. Modification of Z-bus matrix for changes in the network, numerical Problems. Short circuit analysis of large power systems using Z bus, analysis of open circuit faults.

UNIT III**Power Flow Analysis**

Introduction, sparsity technique for Ybus , power flow solution algorithms, Gauss-Seidal method , Newton Raphson load flow method, Fast decoupled load flow method and dc load flow method, numerical examples.

UNIT IV**Security and Contingency Analysis**

Introduction, factors affecting power system security, contingency analysis- linear sensitivity factors , contingency selection.

UNIT V**Stability Analysis**

Classification of power system stability, classical model of synchronous machines(SMIB) - excitation and power system stabilizer(PSS) representation. Numerical integration methods -Runge Kutta fourth order methods and modified Euler's method. Transient stability algorithm using modified Euler's method and fourth order Runge Kutta method.

Learning Resources

Text Books:

1. Computer Techniques in Power System Analysis, Pai, M. A- TMH Publishers, 2nd edition, 2006.
2. K.U.Rao: Computer Techniques and Models in Power Systems, I.K.International Pvt.Ltd.
3. Modern Power System Analysis, Nagrath, I. J., and Kothari, D. P, TMH,4th edition, 2003.

Reference Books:

1. Advanced Power System Analysis and Dynamics, Singh, L. P,New Age International (P) Ltd, New Delhi, 2001, 5th Edition.
2. Power System Analysis, Haadi Sadat, TMH, 2nd Edition, 4th edition, 2007