III B.Tech – II Semester
(20EE6642) COMPUTER AIDED POWER SYSTEMS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	4	-	-	4

Pre-Requisites: Power System Analysis

Course Objectives

- To introduce computer applications in the analysis of power systems
- To understand the solution methods and techniques used in power system studies

UNIT–I: Graph Theory

Overview of Graph theory -tree, co-tree and incidence matrix,Development of network matrices from Graph theoretic approach.Review of solution of Linear System of equations by Gauss Jordanmethod, Gauss elimination, LDU factorization.

UNIT–II: Z*bus* Formulation

Bus Reference Frame: Injections and Loads Z*bus*. Formulation of Bus Impedance matrix for elements without Mutual Coupling.

UNIT–III: Load Flow Analysis

Review of Gauss-Seidel Iteration using Y*bus*, Newton-Raphson method, Fast Decoupled Load Flow (FDLF)DC load flow, Three-phase Load Flow, Optimal power flow: concepts, active/reactive power objectives

UNIT–IV: Network Fault Studies

Network fault calculations using Z*bus* and Y*bus* Table of Factors, Algorithm for calculating system conditions after fault –three phase short circuit, three phase to ground, double line toground, line to line and single line to ground fault.

UNIT–V: Contingency Analysis in Power Systems

Contingency Calculationsusing ZBUS and YBUS Table of Factors.State estimation – least square and weighted least square estimation methods for linear systems.

Course Outcomes:

After successful completion of the course, the students will be able to:

S.No	Course Outcome	BTL
1.	The students will gain the ability to implement the programs for various power system problems	L3
2.	The students will gain the ability to analyse the solution methods used in power system studies.	L3
3.	The students will gain the ability to analyse the short circuit faults in power systems using Z*bus* matrix	L3
4.	The students will gain the ability to perform the contingency analysis of power system.	L3

Correlation of COs with POs& PSOs:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1		2		1				1				1	2
CO2	1	1	1	2	1				1				1	2
CO3	1	1	1	2	1				1				1	2
CO4	1	1	1	2	1				1				1	2

Text Books:

1. Arthur R. Bergen, Vijay Vittal, Power Systems Analysis (English) 2nd Edition, Pearson Higher Education
2. G.L.Kusic, Computer Aided Power System Analysis, PHI, 1989
3. John J. Grainger, William D. Stevenson, Jr., Power System Analysis, Tata McGraw-Hill Series in Electrical and Computer Engineering.
4. M. A. Pai, Computer Techniques in Power Systems Analysis, Tata McGraw-Hill, Second edition 2005

Reference Books:

1. Computer Methods in Power System Analysis, Glenn Stagg and El-abiad, McGraw-Hill.
2. Computer-Aided Power Systems Analysis, George Kusic, CRC Press – Indian Edition.