LESSON PLAN
COMPUTER METHODS IN POWER SYSTEM
(III Year B.Tech. II Sem.)

Sl. No.	Name of the Topic	No. of Classes required	Cumulative number of periods
UNIT – I : POWER SYSTEM NETWORK MATRICES			
1	Graph Theory : Definitions Tree,co-tree,Loop,Cutest matrics	2	2
2	Bus Incidence Matrix, Y_{bus} formation by Direct and Singular and Non Singular Transformation Methods	2	4
3	Numerical Problems.	2	6
4	Formation of Z_{BUS}: Partial network, Algorithm for the Modification of Z_{BUS} Matrix for addition element for the following cases; Addition of element from a new bus to reference, Addition of element from a new bus to an old bus, Addition of element between an old bus to reference and Addition of element between two old busses	3	9
5	Derivations and Numerical Problems	2	11
6	Modifications of Z_{BUS} for the changes in network Numerical problems	3	14
UNIT – II: POWER FLOW STUDIES			
7	Necessity of Power Flow Studies – Data for Power Flow Studies- Derivation of Static load flow equation	1	15
8	Load flow solutions using Gauss Seidel Method: Acceleration Factor,	1	16
9	Load flow solution with and without P-V buses, Algorithm and Flowchart.	1	17
10	Numerical Load flow Solution for Simple Power Systems (Max. 3 – Buses): Determination of Bus Voltages, Injected Active and Reactive Powers (Sample One Iteration only) and finding Line Flows / Losses for the given Bus Voltages.	2	19
11	Problem Solving	2	21
12	Newton Raphson Method in Rectangular and Polar Co-Ordinates Form:	2	23
13	Load Flow Solution with or without PV Busses – Derivation of Jacobian Elements, Algorithm and Flowchart.	2	25
14	Decoupled and Fast decoupled Methods – Comparison of Different Methods.	2	27
15	Numerical Problems	2	29
UNIT – III: SHORT CIRCUIT ANALYSIS			
16	Per- Unit System of Representation. Advantages per unit system Per –Unit equivalent reactance network of a three phase Power System	1	30
17	Numerical Problems.	2	32
18	Short Circuit and MVA Calculators, Fault levels, Applications of Series Reactors, classification of reactors	2	34

19	Numerical Problems.	2	36
20	Symmetrical Component Theory : Symmetrical Component Transformation, Positive, Negative and Zero sequence components: Voltages, Currents and Impedances.	2	38
21	Numerical Problems	1	39
22	Sequence Networks for Transformer, Synchronous machine, loades ,Transmission lines	1	40
23	Unsymmetrical Fault Analysis and calculation	2	42
24	Numerical Problems	2	44
UNIT – IV			
25	Elementary concepts of Steady, Dynamic and Transient Stabilities.	1	45
26	Transfer Reactance	1	46
27	Steady State Stability Power Limit Synchronizing Power Coefficient	1	47
28	Power Angle Curve and Determination of Steady State Stability and Methods to improve steady state stability.	2	49
29	Problem Solving	3	52
UNIT – V POWER SYSTEM TRANSIENT STATE STABILITY ANALYSIS			
30	Derivation of Swing Equation.	1	53
31	Determination of Transient Stability by Equal Area Criterion,	1	54
32	Application of Equal Area Criterion, Critical Cleaning Angle Calculation	1	55
33	Solution of Swing Equation: Point-by-Point method.	1	56
34	Methods to improve Stability	1	57
35	Application of Auto Reclosing and Fast Operating Circuit Breakers.	1	58
36	Problem Solving	2	60