Department of Electrical and Electronics Engineering

COURSE MODULES OF THE SUBJECT TAUGHT FOR THE SESSION SEPT – DEC 2023

Course Syllabi with CO's

Faculty Member: Raghavendra L			**Academic Year**: 2023-2024 (Odd Semester)				
Department: Electrical & Electronics Engineering							
Course Code	**Course Title**	**Core/Elective**	**Prerequisite**	**Contact Hours**			**Total Hrs/ Sessions**
				L	T	P	
18EE71	**POWER SYSTEM ANALYSIS-II**	**Core**	**POWER SYSTEM ANALYSIS -II**	**2**	**2**	**-**	**40**
Objectives	***This course will enable students to:*** **1.** To explain the formulation of network models and bus admittance matrix for solving load flow problems. **2.** To discuss the solution of nonlinear static load flow equations by different numerical techniques and methods to control voltage profile. **3.** To discuss the optimal operation of generators on a bus bar, optimal unit commitment, reliability considerations and optimum generation scheduling. **4.** To discuss optimal power flow solution, scheduling of hydro-thermal system, power system security and reliability. **5.** To explain the formulation of the bus impedance matrix for use in short circuit studies on power systems. **6.** To explain the numerical solution of the swing equation for multi-machine stability.						

Topics as per Syllabus

Module – 1

Network Topology: Introduction and basic definitions of Elementary graph theory Tree, cut-set, loop analysis. Formation of Incidence Matrices. Primitive network- Impedance form and admittance form, Formation of Y Bus by Singular Transformation and Inspection Method with Illustrative examples.

8 Hours

Module - 2

Load Flow Studies: Introduction, Classification of buses. Power flow equation, Operating Constraints, Data for Load flow, Gauss-Seidel iterative method. Illustrative examples. 8 **Hours**

Module - 3

Load Flow Studies(continued): Newton-Raphson method derivation in Polar form, Fast decoupled load flow method, Flow charts of LFS methods. Comparison of Load Flow Methods. Illustrative examples.

8 Hours

Module - 4

Economic Operation of Power System: Introduction and Performance curves Economic generation scheduling neglecting losses and generator limits Economic generation scheduling including generator limits and neglecting losses Economic dispatch including transmission losses Derivation of transmission loss formula. Illustrative examples.

Unit Commitment: Introduction, Constraints and unit commitment solution by prior list method and dynamic forward DP approach (Flow chart and Algorithm only). **8 Hours**

Department of Electrical and Electronics Engineering

Module - 5

Symmetrical Fault Analysis: Z Bus Formulation by Step-by-step building algorithm without mutual coupling between the elements by addition of link and addition of branch. Illustrative examples. Z bus Algorithm for Short Circuit Studies excluding numerical.

Power System Stability: Numerical Solution of Swing Equation by Point-by-Point method and Runge Kutta Method. Illustrative examples. **8 Hours**

List of Text Books

1. **Modern Power System Analysis,** Nagrath, I. J., and Kothari, D. P, TMH, 4th Edition, 2011.

List of Reference Books:

1. **Computer Methods in Power System Analysis,** Stagg, G. W., and EI- Abiad, A. H.- McGraw Hill International Student Edition. 1968
2. **Computer Techniques in Power System Analysis**, Pai, M. A- TMH, 2nd edition, 2006.
3. **Power System Analysis,** Haadi Sadat, TMH, 2nd Edition, 12th reprint, 2007

List of URLs, Text Books, Notes, Multimedia Content, etc

Course Outcomes	***After completion of the course, the students will be able to:*** CO1: **Formulate** network matrices and models for solving load flow problems. (M-1) [L3] CO2: **Analyze** steady state power flow analysis of power systems using the Gauss-Seidel Method. (M-2)[L4] CO3: **Analyze** steady state power flow analysis of power systems using Newton-Raphson and Fast decoupled load flow method (M-3)[L4] CO4: **Solve** issues of economic load dispatch and unit commitment problems. (M-4) [L3] CO5: **Analyze** short circuit faults in power system networks using bus impedance matrix and apply various methods to solve the Swing Equation. (M-5) [L4]

Internal Assessment Marks: CIE: Internal Assessment Marks (30) + Assignment (10)
Note: 30 marks (3 Session Tests are conducted during the semester and marks are allotted based on average of all the sessions)

The Correlation of Course Outcomes (CO's) and Program Outcomes (PO's)

Course Code:	**18EE71**	**TITLE: POWER SYSTEM ANALYSIS - II**			**Faculty Name:**		**Raghavendra L**				
List of Course Outcomes	**Program Outcomes**										
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO-1	3	-	-	-	3	-	-	-	-	-	-	2
CO-2	3	3	-	-	3	-	-	-	-	-	-	2
CO-3	3	3	-	-	3	-	-	-	-	-	-	2
CO-4	3	3	-	-	3	-	-	-	-	-	-	2
CO-5	3	3	-	-	3	-	-	-	-	-	-	2

Note: 3= Strong Contribution 2 = Average Contribution 1 = Weak Contribution - = No Contribution

Department of Electrical and Electronics Engineering

The Correlation of Course Outcomes (CO's) and Program Specific Outcomes (PSO's)

Course Code: 18EE71	**TITLE: POWER SYSTEM ANALYSIS - II**	**Faculty Name:** Raghavendra L
List of Course Outcomes	**Program Specific Outcome**	
	PSO1	**PSO2**
CO-1	2	-
CO-2	2	-
CO-3	2	-
CO-4	2	-
CO-5	2	-

Note: 3 = Strong Contribution 2 = Average Contribution 1 = Weak Contribution "-"= No Contribution