COURSE CODE: **1151EE110**	COURSE TITLE: **POWER SYSTEM ANALYSIS**	L	T	P	C
		3	**0**	**0**	**3**

COURSE CATEGORY:

Program Core

PREAMBLE :

The course provides to the students with essential knowledge in power systems required for its analysis. It includes per-unit system, line models, application of network matrices techniques, power flow calculation for the steady-state and analysis, power system fault analysis including: symmetrical components, symmetrical faults, and unsymmetrical faults and power system stability by introduction of swing equation.

PREREQUISITE COURSES:

Transmission & Distribution

RELATED COURSES:

Power system operation and control, Power system simulation Lab

COURSE EDUCATIONAL OBJECTIVES :

The objectives of the course are to make the students,

- To introduce the characteristics of different transmission line models, steady state analysis and transient analysis of power systems
- To develop students with an understanding load flow calculation, active power and reactive power control in power system.
- To prepare the students to handle the un-symmetrical operations in power system.
- To develop students with an understanding short circuit calculation
- To provide the basic concept on power system stability to students

COURSE OUTCOMES :

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

CO Nos.	**Course Outcomes**	**Level of learning domain (Based on revised Bloom's taxonomy)**
C01	Explain the fundamentals of power systems analysis and the modelling for power systems component	K2
C02	Analyze the flow of active and reactive power in a large power system	K3
C03	Analyze symmetrical faults in power systems	K3
C04	Analyze unsymmetrical faults in power systems	K3
C05	Analyze transient stability of power systems	K3

CORRELATION OF COs AND POs

COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	H				L	L				L	M	
CO2	L					L	H			L	M	
CO3	M									L		
CO4	M		M		H		L				L	
CO5	H		M		H	M					L	

COURSE CONTENT:

UNIT I	**THE POWER SYSTEM – AN OVERVIEW AND MODELLING**	**9**
Modern Power System - Basic Components of a power system - Per Phase Analysis Generator model - Transformer model - line model. The per unit system -Change of base.		
UNIT II	**POWER FLOW ANALYSIS**	**9**
Introduction - Bus Classification - Bus admittance matrix - Solution of non-linear Algebraic equations - Gauss seidal method - Newon raphson method - Fast decoupled method - Flow charts and comparison of the three methods.		
UNIT III	**FAULT ANALYSIS-BALANCED FAULT**	**9**
Introduction – Balanced three phase fault – short circuit capacity – systematic fault analysis using bus impedance matrix – algorithm for formation of the bus impedance matrix.		
UNIT IV	**FAULT ANALYSIS – SYMMETRICAL COMPONENTS AND UNBALANCED FAULT**	**9**
Introduction – Fundamentals of symmetrical components – sequence impedances – sequence networks – single line to ground fault – line fault - Double line to ground fault – Unbalanced fault analysis using bus impedance matrix.		
UNIT V	**POWER SYSTEM STABILITY**	**9**
Basic concepts and definitions – Rotor angle stability – Voltage stability – Mid Term and Long Term stability – Classification of stability – An elementary view of transient stability – Equal area criterion – Reponses to a short circuit fault- factors influencing transient stability – Numerical integration methods – Euler method – modified Euler method – Runge – Kutta methods.		
		TOTAL: 45 PERIODS

TEXT BOOKS:

1. Hadi Saadat " Power system analysis", Tata McGraw Hill Publishing Company, New Delhi, 2002 (Unit I, II, III, IV)
2. P.Kundur, "Power System Stability and Control", Tata McGraw Hill Publishing Company, New Delhi, 1994 (Unit V)

REFERENCE BOOKS:

1. I.J.Nagrath and D.P.Kothari, 'Modern Power System Analysis', Tata McGraw-Hill publishing company, New Delhi, 1990.