Smart Grid

Course Code	19EE4602C	Year	III	Semester	II
Course Category	Program Elective-III	Branch	EEE	Course Type	Theory
Credits	3	L-T-P	3-0-0	Prerequisites	Nil
Continuous Internal Evaluation:	30	Semester End Evaluation:	70	Total Marks:	100

Course Outcomes	
Upon successful completion of the course, the student will be able to	
CO1	**Understand** the concepts of smart grid. (L2)
CO2	**Discuss** on smart metering infrastructure (L2)
CO3	**Use** Load flow and contingency methods for smart grid. (L3)
CO4	**Employ** stability assessment tools for smart grid. (L3)
CO5	**Know** how a smart grid can be used to meet the needs of a utility(L5)
CO6	**Create** a frame work for knowledgeable power engineers to operate the grid more effectively. (L5)

Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of correlations (3:High, 2: Medium, 1:Low)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3						3						3	3
CO2	3		3		3	3	3						3	3
CO3	3	3											3	3
CO4	3	3											3	3
CO5	3				3	3	3						3	3
CO6	3			3		3	3					3	3	3

SYLLABUS		
Unit No.	**Contents**	**Mapped CO**
I	**Introduction to Smart Grid :** Smart grid Definition, benefits, Comparison of Traditional Grid and Smart Grid, Stakeholders in smart grid development, functions of smart grid components, Computation intelligence, Comparison between micro grid and smart grid.	**CO1, CO5**
II	**Communication and Measurement:** Introduction, wide area monitoring system, phasor measurement unit, Comparison of Conventional and smart metering, Benefits of smart meters, Functional block diagram of a smart meter architecture, advanced metering infrastructure, GIS technology, MAS technology.	**CO1, CO2, CO5, CO6**
III	**Performance Analysis Tools For Smart Grid Design:** Introduction to Load Flow Studies, Challenges to Load Flow in Smart Grid , load flow state, congestion management effect, Contingencies and their Classification , Contingency Studies for the Smart Grid, steady state contingency analysis, performance indices, sensitivity based approaches.	**CO1, CO3, CO6**

IV	**Stability Analysis for Smart Grid** Introduction to stability, voltage stability assessment types, voltage stability assessment technique, voltage stability indexing, analysis techniques.	**CO1 , CO4 , CO6**
V	**Computational Tools for Smart Grid** Introduction, decision support tools, optimization techniques, classical optimization techniques, linear programming, non linear programming, integer programming, dynamic programming, stochastic programming, chance constant programming.	**CO1 , CO6**

Learning Resources
Text Books:
1. Smart Grid – Fundamentals of design and analysis by James Mamoh, Wiley – IEEE press
Reference Books:
1. Smart Grid Technology and Application by Janaka Ekanakye, Kithsiri Liyanage, Jianzhang Wu, Akiihiko Yokoyama and Nick Jeenkins , Wiley publications