SCHEME OF COURSE WORK

Course Details:

Course Title	**: SMART GRID**		
Course Code	**: 13EE1137**	**L T P C**	**: 4 0 0 3**
Program:	**: B.Tech.**		
Specialization:	**: Electrical and Electronics Engineering**		
Semester	**: VIII**		
Prerequisites	**: Basic knowledge in Power Transmission Engineering, Communication engineering**		
Courses to which it is a prerequisite	**: Distributed Generation.**		

Course Outcomes (COs):

After completion of the course student acquire knowledge in

1	Describe the communication technologies for smart grid.
2	Describe the information security for smart grid.
3	Recognize infrastructure for smart metering and distribution automation.
4	Describe the tools of Distribution management systems and describe Energy management systems.
5	Describe application of power electronics in Smart grid.

Program Outcomes (POs):

A graduate of Power System Control & Automation will be able to

1	Be on par with those from any advanced institution
2	Take up any job either in the core industry (or) in allied disciplines
3	Fit to write any competitive examinations for getting selected either for M.S. program (or) to undertake relevant career at a high end
4	Develop a techno ethical personality that makes him serve the people in general & Electrical & Electronics Engineering in particular
5	Enable the students adopt themselves in any socio-technological situation
6	Develop communication and leadership skills so that the candidates in their future become leaders in the industry & academia
7	Make students do projects either of fundamental nature (or) of the ones useful to industry such that in either case they enter the frontiers of research
8	Have a basic capability to analyze and /or design an electrical & electronics system and be useful to the community in general
9	Function effectively as an individual and also as a member and leader in diverse teams
10	Communicate effectively problems of his discipline to the experts of other disciplines
11	Have sufficient working knowledge in IT tools for him to correctly model the system and predict the solution

Course Outcome Versus**Program Outcomes:**

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO-1	S	S	M					M			
CO-2	S	S	M			M	M	M			
CO-3	S	S	M		M	M	M				
CO-4	S	S	M		M						
CO-5	S	S	M		M			M			

S - Strongly correlated, *M* - *Moderately* correlated, *Blank* - *No correlation*

AssessmentMethods:	Assignment / Quiz / Seminar / Case Study / Mid-Test / End Exam

Teaching-Learning and Evaluation

Week	TOPIC / CONTENTS	Course Outcomes	Sample questions	TEACHING-LEARNING STRATEGY	Assessment Method & Schedule
1	Introduction, Early Smart Grid initiatives, Overview of the technologies required for the Smart Grid. Introduction to data communication, Dedicated and Shared communication channels, Switching techniques, Communication channels, Layered Architecture and Protocols, Communication Technologies for the Smart Grid, Standards for information exchange	CO-1	Explain Dedicated and Shared communication channels?	▫ Lecture ▫ Discussion	Mid-Test 1 (Week 9) Seminar (Week 1)
2	Introduction to information security for the Smart Grid, Encryption and decryption, Authentication, Digital signatures, Cyber Security Standards.	CO-2	Describe cyber security standards?	▫ Lecture ▫ Discussion	
3	**SENSING, MEASUREMENT, CONTROL :** Introduction to Smart metering and Demand-side Integration, Smart Metering, Smart meters : An overview of the hardware used, Communication Infrastructure and protocols for smart metering, Demand-side Integration. **AUTOMATION TECHNOLOGIES:** Introduction to distribution	CO-3	Explain demand-side integration? Explain faults in distribution system?	▫ Lecture ▫ Discussion	

	automation equipment, Substation automation equipment, Faults in the distribution system, Voltage regulation.				
4	**DISTRIBUTION MANAGEMENT SYSTEMS:** Data sources and associated external systems, Modelling and Analysis Tools, Applications **TRANSMISSION SYSTEM OPERATION:** Data sources, Energy Management Systems, Wide Area Applications, Visualisation techniques.	CO-4	What are modeling and analysis tools? Explain energu management systems?	▫ Lecture ▫ Discussion	
5	Power electronics in the Smart Grid, Renewable energy generation, Fault current limiting, FACTS, HVDC, Energy storage technologies.	CO-5	Explain renewable energy generation?	▫ Lecture ▫ Discussion	