SCHEME OF COURSE WORK

Course Details:

Course Title	: REAL TIME CONTROL OF POWER SYSTEM					
Course Code	: 13EE2103	L	T	P	C	: 4 0 0 3
Program:	: M.Tech.					
Specialization:	: Power Systems Control & Automation					
Semester	: I					
Prerequisites	: Basics of Power Systems					
Courses to which it is a prerequisite	:					

Course Outcomes (COs):

After completion of the course student acquire knowledge in

1	Activities of operator
2	Supervisory control and data acquisition
3	Real time software and state estimation
4	Computer control of power systems
5	Security management

Program Outcomes (POs):

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

1	The graduate will be able to acquire in depth knowledge in the area of power system control and automation
2	The graduate will attain the ability to think critically and analyze complex engineering problems related to power system control and automation
3	The graduate will obtain the capability of problem solving and original thinking to arrive at feasible and optimal solutions considering societal and environmental factors
4	The graduate will be able to extract information through literature survey and apply appropriate research methodologies, techniques and tools to solve power system problems.
5	The graduate will be able to use the state-of-the-art tools for modelling, simulation and analysis of problems related to power systems
6	The graduate will attain the capability to contribute positively to collaborative and multidisciplinary research to achieve common goals
7	The graduate will demonstrate knowledge and understanding of power system engineering and management principles and apply the same for efficiently carrying out projects with due consideration to economical and financial factors.
8	The graduate will be able to communicate confidently, make effective presentations and write good reports with engineering community and society
9	The graduate will recognize the need for life-long learning and have the ability to do it independently
10	The graduate will become socially responsible and follow ethical practices to contribute to the community for sustainable development of society
11	The graduate will be able to independently observe and examine critically the outcomes of his actions and reflect on to make corrective measures subsequently and move forward positively by learning through mistakes

Course Outcome Versus **Program Outcomes:**

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

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

Assessment Methods:	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	Power system control-operation, operator activities	CO-1	Explain the operation of power system and mention the operator activities to operate power system.	▫ Lecture ▫ Discussion	Mid-Test 1 (Week 9) Seminar (Week 1)
2	control center, elements of computer control system	CO-1	What are the main functions of control center?	▫ Lecture ▫ Discussion	Mid-Test 1 (Week 9) Seminar (Week 2)
3	Supervisory and control functions – data acquisition	CO-1	What is SCADA? What are its functions.	▫ Lecture ▫ Discussion	Mid-Test 1 (Week 9) Seminar (Week 3)
4	monitoring and event processing, control functions	CO-1	Explain the process of monitoring and event processing in power systems.	▫ Lecture ▫ Discussion	Mid-Test 1 (Week 9) Seminar (Week 4)
5	Time tagged data, disturbance data collection and analysis, reports and calculations	CO-2	What is time tagged data? Explain how disturbance data is collected and analyzed.	▫ Lecture ▫ Discussion	Mid-Test 1 (Week 9) Seminar (Week 5)
6	Man-machine communication – operators console	CO-2	Explain briefly about Man-machine communication and operator console.	▫ Lecture ▫ Discussion	Mid-Test 1 (Week 9) Seminar (Week 6)
7	VDU display, operator dialogs, mimic diagrams, printing facilities	CO-2	Explain briefly about VDU display, operator dialogs, mimic diagrams, printing facilities in power system control	▫ Lecture ▫ Discussion	Quiz (Week 1-7) Seminar (Week 7)
8	Real time software – Classification of programs	CO-3	Classify and explain the real time software programs	▫ Lecture ▫ Discussion	Assignment (Week 7-8) Seminar (Week 8)
9	**Mid-Test 1**				
10	Structure of real time programs, construction techniques and tools	CO-3	Explain the structure of real-time programs with suitable explains.	▫ Lecture ▫ Discussion	Mid-Test 2 (Week 18) Seminar (Week 10)
11	Programming language requirements for process control	CO-3	Describe the requirements of programming language for process control.	▫ Lecture ▫ Discussion	Mid-Test 2 (Week 18) Seminar (Week 11)
12	Computer control of power systems	CO-4	Explain the evolution of computer	▫ Lecture	Mid-Test 2

			control of power systems	▫ Discussion	(Week 18) Seminar (Week 12)
13	online control, Software for state estimation, Generation and load control	CO-4	Explain the process of online control in power systems. Explain about the software for state estimation in a power system.	▫ Lecture ▫ Discussion	Mid-Test 2 (Week 18) Seminar (Week 13)
14	security analysis, Software coordination	C0-4	Describe briefly about Security analysis and software coordination in power systems.	▫ Lecture ▫ Discussion	Mid-Test 2 (Week 18) Seminar (Week 14)
15	Application functions- real time network modeling, security management: system security, security analysis functions	CO-5	Explain the security analysis functions in power system.	▫ Lecture ▫ Discussion	Mid-Test 2 (Week 18) Seminar (Week 15)
16	security modeling; production control: load prediction, local control	CO-5	Explain how to predict load in a power system.	▫ Lecture ▫ Discussion	Quiz (Week 10-16) Seminar (Week 16)
17	automatic generation control, economic dispatch, training simulators	CO-5	Explain the generation control and economic dispatch in a power system.	▫ Lecture ▫ Discussion	Assignment (Week 16-17) Seminar (Week 17)
18	**Mid-Test 2**				
19/20	**END EXAM**				