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	**: Power system operation and control**		

Course Outcomes (COs):

After completion of the course student acquire knowledge in

1	Describe various activities of operator and Supervisory control and data acquisition system.
2	Describe about disturbance data collection and analysis and Man-machine communication.
3	Classify various structures of real time programs and describe programming language requirements for process control.
4	Describe computer control of Power systems.
5	Describe about real time network modeling.

Program Outcomes (POs):

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

1	Acquire in depth knowledge in the area of power system control and automation.
2	Analyze the models with respect to any kind of problem on hand and try to solve related to power system control and automation.
3	Develop the capability of problem solving and original thinking to arrive at feasible and optimal solutions considering societal and environmental factors.
4	Interpret and demonstrate sufficient knowledge base, to apply the techniques and tools either individually or in groups to solve power system problems.
5	Select state-of-the-art tools for modeling, simulation and analysis of problems related to power systems.
6	Recognize positively any collaborative and multidisciplinary research to achieve common goals.
7	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	Communicate confidently, make effective presentations and write good reports to engineering community and society.
9	Recognize the need for life-long learning and have the ability to do it independently.
10	Understand Social responsibilities and follow ethical practices to contribute to the community for sustainable development.
11	Predict and self examine critically the outcomes of actions, reflect on to make corrective measures and move forward positively.

Course Outcome Versus **Program Outcomes:**

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

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	▫ Lecture ▫ Discussion	Mid-Test 2 (Week 18)

			process control.		Seminar (Week 11)
12	Computer control of power systems – Evolution, time scale of system control	CO-4	Explain the evolution of computer control of power systems	▫ Lecture ▫ Discussion	Mid-Test 2 (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**				