GALGOTIAS UNIVERSITY

(Established under Galgotias University Uttar Pradesh Act No. 14 of 2011)

M.Tech – Power Systems and Engineering

Vision and Mission of the University

Vision

To be known globally for value-based education, research, creativity and innovation"

Mission

- Establish state-of-the-art facilities for world class education and research.
- Collaborate with industry and society to align the curriculum,
- Involve in societal outreach programs to identify concerns and provide sustainable ethical solutions.
- Encourage life-long learning and team-based problem solving through an enabling environment.

Vision and Mission of the Department

Vision

To be known globally as a premier Department offering value-based education in Electrical Engineering through interdisciplinary research and innovation.

Mission

- To provide high quality education in the field of *Electrical Engineering.*
- Establish state-of-the-art facilities for design and simulation.
- To provide effective solution to the industries in Energy and allied areas through research and consultancy.
- Immunize the students with knowledge and experience in their field of specialization to contribute in the making of professional leaders.

Program Outcomes

PO1	*Investigation and development of the solution*	An ability to independently carry out research /investigation and development work to solve practical problems
PO2	*Technical report/document*	An ability to write and present a substantial technical report/document

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PO3	*Engineering Knowledge*	Students should be able to demonstrate a degree of mastery over the area as per the specialization of the program. The mastery should be at a level higher than the requirements in the appropriate bachelor program
PO4	*Individual and team work*	An ability to function effectively as an individual or as a member or leader in a team
PO5	*Life-long Learning*	An ability to keep abreast with state of art technologies through lifelong learning

Program Educational Objectives

PEO1: Post graduates will demonstrate their knowledge in the field of Power System designing and allied engineering.

PEO2: Post graduates will contribute to interdisciplinary research with the use of modern tools & emerging technologies.

PEO3: Post graduates will become successful leaders through effective project management and contribute to the growth & development of the organization and society.

PEO4: The post graduates will be involved in promoting professional and societal activities.

Program Specific Outcome

PSO1: Demonstrate their knowledge in analysis and design of industrial drives for utilizing renewable energy sources.

Sample Course Outcomes

		L	T	P	C
MPSE1501	Power System Operation and Control	3	0	0	3
Version No.	1.0				
Prerequisite	Power System Engineering				
Objectives	1. To have an overview of power system operation and control. 2. To model power - frequency dynamics and to design power-frequency controllers. 3. To model reactive power - voltage interaction and the control actions to be implemented for maintaining voltage				

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	profile against varying system load.
Course Outcome	1. Identify various load driving parameters and review various forecasting methods for efficient power system operation. 2. Analyze the relationship between various power system variables in terms of mathematical modelling. 3. Model the steady state and dynamic performance of power system control. 4. Apply the knowledge of Unit Commitment and economic Dispatch to numerical problems based on real time situations. 5. Explain various functional aspects of SCADA/ECC along with various operating states of power system.
Module I	Introduction
System load – variation, load characteristics – load curves and load-duration curves, load factor, diversity factor, load forecasting, simple techniques of forecasting, basics of power system operation and control, reserve margin, load-frequency control, voltage control.	
Module II	Real Power - Frequency Control
Speed governing mechanism and modelling, speed-load characteristics, load sharing, control area concept, LFC control of a single-area system, static and dynamic analysis, integration of economic dispatch control with LFC, two-area system – modelling – static analysis of uncontrolled case, tie line with frequency bias control of two-area system.	
Module III	Reactive Power – Voltage Control
Reactive power control, excitation systems – modelling, static and dynamic analysis, stability compensation, generation and absorption of reactive power, relation between voltage, power and reactive power at a node, method of voltage control, tap changing transformers, tap setting of OLTC transformer and MVAR injection of switched capacitors.	
Module IV	Economic Load Dispatch
Economic dispatch problem – cost of generation, incremental cost curve, co-ordination equations, solution by direct method and λ- iteration method, unit Commitment problem – constraints, solution methods – Priority-list methods – forward dynamic programming approach (Numerical problems only in priority-list method using full-load average production cost).	
Module V	Computer control of power systems
Need of computer control of power systems, concept of energy control centre (or) load dispatch centre and the functions, system monitoring, data acquisition and control, system hardware configuration, SCADA and EMS functions, network topology, state estimation,	

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security analysis and control, operating states (Normal, alert, emergency, in-extremis and restorative).	
Reference Books	

1. Allen. J. Wood and Bruce F. Wollenberg, "Power Generation, Operation and Control", John Wiley & Sons, Inc., 2003.
2. D.P. Kothari and I.J. Nagrath, „Modern Power System Analysis", Third Edition, Tata McGraw Hill Publishing Company Limited, New Delhi, 2003.
3. Chakrabarti & Halder, "Power System Analysis: Operation and Control", PHI, 2004 Edition.
4. L.L. Grigsby, „The Electric Power Engineering, Hand Book", CRC Press & IEEE Press, 2001.
5. Olle. I. Elgerd, "Electric Energy Systems theory: An introduction", Tata McGraw Hill Publishing Company Ltd. New Delhi, Second Edition 2003.

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M.Tech – Power Systems and Engineering

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	frequency controllers. 3. To model reactive power - voltage interaction and the control actions to be implemented for maintaining voltage profile against varying system load.
Course Outcome	1. Identify various load driving parameters and review various forecasting methods for efficient power system operation. 2. Analyze the relationship between various power system variables in terms of mathematical modelling. 3. Model the steady state and dynamic performance of power system control. 4. Apply the knowledge of Unit Commitment and economic Dispatch to numerical problems based on real time situations. 5. Explain various functional aspects of SCADA/ECC along with various operating states of power system.
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Reference Books	

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2. D.P. Kothari and I.J. Nagrath, „Modern Power System Analysis", Third Edition, Tata McGraw Hill Publishing Company Limited, New Delhi, 2003.
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