GALGOTIAS UNIVERSITY

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

# B.Tech- Electrical and Electronics Engineering

## Vision and Mission of 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 Electrical and Electronics Engineering Department

**Vission**

To be known globally as a premier Department offering value-based education in Electrical and Electronics Engineering inculcating the spirit of interdisciplinary research and innovation.

**Mission**

- Create a strong foundation on fundamentals in the areas of Electrical and Electronics Engineering through outcome-based teaching learning process.
- Establish state-of-the-art facilities for design and simulation.
- Provide opportunities to students to work on real world problems and develop sustainable ethical solutions.
- Involve the students in group activities, including those of professional bodies to develop leadership and communication skills.

## PROGRAM OUTCOMES

Engineering Graduates will be able to

1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

2. Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

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3. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

## Program Educational Objectives

- Electrical and Electronics Engineering graduates will have successful careers in core engineering, academia, research organizations.
- The graduates will be well prepared to adapt usage of modern tools & emerging technologies and contribute to interdisciplinary research with innovative practices.
- The graduates will be academically prepared to become leaders in their organizations, become professional engineers, as necessary, and will contribute effectively to the growth and development of their organization.
- The graduates will engage in professional activities with ethical practices in the field of Electrical Engineering to enhance their own stature and simultaneously contribute to the profession and society at large

## Program Specific Outcomes

- Electrical and Electronics Engineering students will be equipped to handle complex electrical engineering problem of industry and society with latest technology in power system simulation, power quality and control systems.
- Using modern tools and simulators students will be able to analyze and optimize the performance of the electrical systems, which include power systems and electrical machines.

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- Electrical and Electronics Engineering students will be able to optimize conventional and nonconventional energy sources for benefit of industry, perform energy audit and society in all respect and capable to innovate and do the research accordingly.

**Sample Course Outcomes**

| EEE327 | Control System | L | T | P | C |
|---|---|---|---|---|---|
| Version 1.0 | Date of Approval: Jun 06, 2013 | 3 | 0 | 0 | 3 |
| Pre-requisites//Exposure | EEE216 | | | | |
| co-requisites | | | | | |

**Course Objectives:**

1. To understand and develop the Mathematical Modeling of dynamic systems using classical techniques.
2. To apply analytical /graphical techniques in time/frequency domain to determine stability.
3. To understand and use applications of feedback control theory to a variety of real world problems.

**Course Outcomes:**

On completion of this course, the students will be able to

1. Demonstrate the fundamentals of open loop and close loop control system.
2. Develop the transfer function of a system.
3. Examine the order of systems in the time domain.
4. Categorize stability of a system using components like Routh Hurwitz and Root locus.
5. Analyze the system in frequency domain.
6. Design a closed loop system using compensation techniques.

**Catalog Description**

Study of Open loop & closed control; servomechanism, Transfer functions, Block diagram algebra, Signal flow graph, time response of first and second order systems, time response specifications, dynamics of linear systems, and frequency domain analysis and design techniques. Constructional and working concept of ac servomotor, synchronous and stepper motor, their characteristics, performance. The Routh-Hurwitz, root-locus, Bode, and Nyquist techniques. Design and compensation of feedback control systems. diagonalization, Controllability and observability and their testing.

**Text Books**

1. Nagrath&Gopal, "Control System Engineering", 4th Edition, New age International.
2. K. Ogata, "Modern Control Engineering", Prentice Hall of India.
3. B.C. Kuo&FaridGolnaraghi, "Automatic Control System" Wiley IndiaLtd, 2008.
4. D.RoyChoudhary, "Modern Control Engineering", Prentice Hall of India.

**Reference Books**

1. Norman S. Mise, Control System Engineering 4th edition, Wiley Publishing Co.
2. Ajit K Mandal, "Introduction to Control Engineering" New Age International, 2006.
3. R.T. Stefani, B.Shahian, C.J.Savant and G.H. Hostetter, "Design of Feedback Control Systems"Oxford University Press.
4. N.C. Jagan, "Control Systems", B.S. Publications,2007.

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**Course Content**

**Unit I: Introduction to Control System** **6 lecture hours**

Open loop & closed control; servomechanism, Physical examples. Transfer functions, Block diagram algebra, Signal flow graph, Mason's gain formula Reduction of parameter variation and effects of disturbance by using negative feedback.

**Unit II: Time Response analysis** **7 lecture hours**

Standard test signals, time response of first and second order systems, time response specifications, steady state errors and error constants Design specifications of second order systems: Derivative error, derivative output, integral error and PID compensations, design considerations for higher order systems, performance indices.

**Unit III: Control System Components** **9 lecture hours**

Constructional and working concept of ac servomotor, synchronous and stepper motor Stability and Algebraic Criteria concept of stability and necessary conditions, Routh-Hurwitz criteria and limitations, root locus concepts, construction of root locus.

**Unit IV: Frequency response Analysis** **9 lecture hours**

Frequency response, correlation between time and frequency responses, polar and inverse polar plots, Bode plots Stability in Frequency Domain: Nyquist stability criterion, assessment of relative stability: gain margin and phase margin, constant M&N circles.

**Unit V: Introduction to Design of control systems** **9 lecture hours**

The design problem and preliminary considerations lead, lag and lead-lag networks, design of closed loop systems using compensation techniques in time domain and frequency domain. Review of state variable technique: Review of state variable technique, conversion of state variable model to transfer function model and vice-versa, diagonalization, Controllability and observability and their testing.

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# B.Tech -Electrical and Electronics Engineering

## Program Educational Objectives

Graduate shall

**PEO1:** Develop skills and proficiency in core areas of Electrical and Electronics and related multidisciplinary Engineering fundamentals.

**PEO2:** Demonstrate technical competence to tackle problems in the field of industry using emerging technologies, innovation and entrepreneur skill.

**PEO3:** Pursue higher education, research and development in electrical and electronics engineering and allied areas of science and technology.

## Program Specific Outcome

**PSO1:** Apply the technical skills in the design and development of IOT based device to contribute towards digital India and smart city.

**PSO2:** Demonstrate their knowledge in analysis and design of industrial drives for utilizing renewable energy sources.

## Sample Course Outcomes

| | | | | | |
|---|---|---|---|---|---|
| Name of The Course | Network Analysis and Synthesis | | | | |
| Course Code | BTEE2002 | | | | |
| Prerequisite | Basic Electrical and Electronics Engineering | | | | |
| Co-requisite | | | | | |
| Anti-requisite | | | | | |
| | L | T | P | C | |
| | 3 | 0 | 0 | 3 | |

Course Objectives

1. To learn the concepts of network analysis in electrical and electronics engineering.
2. To learn linear circuit analysis, graph theory and network theorems.
3. Analyze two port networks using Z, Y, ABCD and h parameters.

Course Outcomes

| | |
|---|---|
| CO1 | Apply the knowledge of graph theory with basic circuital laws and simplify the network using reduction techniques |
| CO2 | Analyze the circuit using Kirchhoff's law and Network simplification theorems |
| CO3 | Infer and evaluate transient response, Steady state response, network functions |
| CO4 | Evaluate two-port network parameters and explain the inter-relationship among parameters for network analysis. |
| CO5 | Synthesize one port network using Foster and Cauer Forms and |

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|---|---|
| CO6 | Examine active filter configurations for possible applications in network theory. |

| |
|---|
| Unit-1GraphTheory 6 hours |
| Graph of a Network, definitions, tree, co tree , link, basic loop and basic cut set,Incidence matrix, cut set matrix, Tie set matrix Duality, Loop and Nodal methods of analysis. |
| Unit-2Network Theorems (Applications to ac networks) 9 hours |
| Super-position theorem, Thevenin's theorem, Norton's theorem, maximum power transfer theorem, Reciprocity theorem. Millman'stheorem, compensation theorem, Tellegen's theorem. |
| Unit-3Network Functions and Transient analysis 11 hours |
| Transform Impedances Network functions of one port and two port networks, concept of poles and zeros, properties of driving point and transfer functions, time response and stability from pole zero plot, transient analysis of ac & dc systems. |
| Unit-4Two Port Networks 10 hours |
| Characterization of LTI two port networks ZY, ABCD and h parameters, reciprocity and symmetry. Inter-relationships between the parameters, inter-connections of two port networks, T & Π Representation. |
| Unit-5Network Synthesis & Filters 9 hours |
| Positive real function; definition and properties; properties of LC, RC and RL driving point functions, synthesis of LC, RC and RL driving point immittance functions using Foster and Cauer first and second forms. Image parameters and characteristics impedance, |
| Unit-6 Filters |
| Passive and active filter fundamentals, low pass, high pass, (constant K type) filters, and introduction to active filters. |

Suggested Reading

1. M. E. Van Valkenburg, "Network Analysis", Prentice Hall, 2006.
2. D. Roy Choudhury, "Networks and Systems", New Age International Publications, 1998.
3. W. H. Hayt and J. E. Kemmerly, "Engineering Circuit Analysis", McGraw Hill Education, 2013.
4. C. K. Alexander and M. N. O. Sadiku, "Electric Circuits", McGraw Hill Education, 2004.
5. K. V. V. Murthy and M. S. Kamath, "Basic Circuit Analysis", Jaico Publishers, 1999.A.Chakrabarti, "Circuit Theory" DhanpatRai& Co

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