



GURU NANAK INSTITUTE OF TECHNOLOGY

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

PROGRAM EDUCATIONAL OBJECTIVES

PEO 1: Graduates shall have the ability to apply knowledge across the Branches and in emerging areas of CE/ME/EEE/ECE/CSE/IT for higher studies, research, employability and handle the realistic problems.

PEO 2: Graduates shall have good communication skills, to possess ethical conduct, sense of responsibility to serve the society, and protect the environment.

PEO 3: Graduates shall have strong foundation in academic excellence, soft skills, managerial skills, leadership qualities and understand the need for lifelong learning for a successful professional career.

PROGRAM SPECIFIC OBJECTIVES

PSO 1: Able to apply the knowledge gained during the course of the program from Mathematics, Basic Computing, Basic Sciences and Social Sciences in general and all electrical courses in particular to identify, formulate and solve real life problems faced in industries and/or during research work.

PSO 2: Able to provide socially acceptable technical solutions to complex electrical engineering problems with the application of modern and appropriate techniques for sustainable development.

PSO 3: Able to apply the knowledge of ethical and management principles required to work in a team as well as to lead a team



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PROGRAMME 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 science, and engineering sciences.
3. **Design / development of solutions:** Design solutions for complex engineering problems and design system components or process that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, society and environmental consideration.
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 ethics 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 an 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.



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COURSE OUTCOMES

PROGRAMME: B.TECH	DEGREE: UG	A.Y: 2019-20	SEMESTER: I&II
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S.No	Year/ Sem	Course Name	Course Outcomes (Student will be able to understand)
1	I-I	Mathematics-I	CO1: Write the matrix representation of a set of linear equations and to analyse the solution of the system of equations
			CO2: Reduce the quadratic form to canonical form using orthogonal transformations. Analyse the nature of sequence and series
			CO3: Solve the applications on the mean value theorems. Evaluate the improper integrals using Beta and Gamma functions.
			CO4: Find the extreme values of functions of two variables with/ without constraints
2	I-I	Chemistry	CO1 The knowledge of atomic, molecular and electronic changes, band theory related to conductivity
			CO2: The required principles and concepts of electrochemistry, corrosion and in understanding the problem of water and its treatments.
			CO3 The required skills to get clear concepts on basic spectroscopy and application to medical and other fields.
			CO4: The knowledge of configurational and conformational analysis of molecules and reaction mechanisms.
3	I-I	English	CO1: Use English Language effectively in spoken and written forms.
			CO2: Comprehend the given texts and respond appropriately.
			CO3: Communicate confidently in various contexts and different cultures.
			CO4: Acquire basic proficiency in English including reading and listening comprehension, writing and speaking skills.
4	I-I	Basic Electrical Engineering	CO1: Students will be able to analyze the basic concepts like ohms law, KCL, KVL, for different electrical networks and apply them to other networks reduction techniques.
			CO2: Students will be able to distinguish between AC and DC, demonstrate terminology used in AC Circuits, and able to know the advantages and applications of AC Circuits.
			CO3: Students will be able to explain in detail about Transformers.
			CO4: Students will be able to distinguish between different

			types of DC/AC machines
			CO5: Students will be obtaining knowledge of various electrical installations.
5	I-II	Mathematics-II	CO1: Identify whether the given differential equation of first order is exact or not.
			CO2: Solve higher differential equation and apply the concept of differential equation to real world problems.
			CO3: Evaluate the multiple integrals and apply the concept to find areas, volumes, centre of mass and Gravity for cubes, sphere and rectangular parallelepiped
			CO4: Evaluate the line, surface and volume integrals and converting them from one to another.
6	I-I	Applied Physics	CO1: The student would be able to learn the fundamental concepts on Quantum behaviour of matter in its micro state.
			CO2: The knowledge of fundamentals of Semiconductor physics, Optoelectronics, Lasers and fibre optics enable the students to apply to various systems like communications, solar cell, photo cells and so on.
			CO3: Design, characterization and study of properties of material help the students to prepare new materials for various engineering applications.
			CO4: The course also helps the students to be exposed to the phenomena of electromagnetism and also to have exposure on magnetic materials and dielectric materials.
7	I-II	Programming For Problem Solving	CO1: Demonstrate the basic knowledge of computer hardware and software.
			CO2: Ability to write algorithms and draw flow charts for solving problems.
			CO3: Ability to code a given logic in C programming language.
			CO4: Implementing different searching and sorting techniques for problem solving.
8	I-II	Engineering Graphics	CO1: Preparing working drawings to communicate the ideas and information.
			CO2: Read, understand and interpret engineering drawings.
9	II-I	Engineering Mechanics	CO1: Determine resultant of forces acting on a body and analyse equilibrium of a body subjected to a system of forces.
			CO2: Solve problem of bodies subjected to friction.
			CO3: Find the location of centroid and calculate moment of inertia of a given section.
			CO4: Understand the kinetics and kinematics of a body undergoing rectilinear, curvilinear, rotatory motion and rigid body motion.
			CO5: Solve problems using work energy equations for



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			translation, fixed axis rotation and plane motion and solve problems of vibration.
10	II-I	Electro Magnetic Fields	CO1: To understand the basic laws of electromagnetism
			CO2: To obtain the electric and magnetic fields for simple configurations under static conditions.
			CO3: To analyze time varying electric and magnetic fields.
			CO4: To understand Maxwell's equation in different forms and different media.
			CO5: To understand the propagation of EM waves.
11	II-I	Electrical Machines-I	CO1: Identify different parts of a DC machine & understand its operation
			CO2: Carry out different testing methods to predetermine the efficiency of DC machines .
			CO3: Understand different excitation and starting methods of DC machines
			CO4: Control the voltage and speed of a DC machines
			CO5: Analyze single phase and three phase transformers circuits
12	II-I	Electrical Circuit Analysis	CO1: Apply network theorems for the analysis of electrical circuits.
			CO2: Obtain the transient and steady-state response of electrical circuits.
			CO3: Analyze circuits in the sinusoidal steady-state (single-phase and three-phase).
			CO4: Analyze two port circuit behavior.
13	II-I	Analog Electronics	CO1: Know the characteristics, utilization of various components.
			CO2: Understand the biasing techniques
			CO3: Design and analyze various rectifiers, small signal amplifier circuits.
			CO4: Design sinusoidal and non-sinusoidal oscillators.
			CO5: A thorough understanding, functioning of OP-AMP, design OP-AMP based circuits with linear integrated circuits.
14	II-II	Power Systems-I	CO1: Understand the concepts of power systems
			CO2: Understand the operation of conventional generating stations and renewable sources of electrical power.
			CO3: Determine the electrical circuit parameters of transmission lines
			CO4: Understand the layout of substation and underground cables and corona.
			CO5: Evaluate the power tariff methods.
15	II-II	Electrical Machines-II	CO1: Understand the concepts of rotating magnetic fields.
			CO2: Understand the operation of ac machines.
			CO3: Analyze performance characteristics of ac machines.

16	II-II	Control Systems	CO1: Understand the modeling of linear-time-invariant systems using transfer function and state-space representations
			CO2: Understand the concept of stability and its assessment for linear-time invariant systems
			CO3: Design simple feedback controllers.
17	II-II	Digital Electronics	CO1: Understand working of logic families and logic gates
			CO2: Design and implement Combinational and Sequential logic circuits.
			CO3: Understand the process of Analog to Digital conversion and Digital to Analog conversion.
			CO4: Be able to use PLDs to implement the given logical problem.
18	II-II	Laplace Transforms, Numerical Methods	CO1: Use the Laplace transforms techniques for solving ODE's
			CO2: Find the root of a given equation
			CO3: Estimate the value for the given data using interpolation
			CO4: Find the numerical solutions for a given ODE's
			CO5: Analyze the complex function with reference to their analyticity, integration using Cauchy's integral and residue theorems
			CO6: Taylor's and Laurent's series expansions of complex function
19	III- I	Power Systems – II	CO1: Able to compute inductance and capacitance for different configurations of transmission lines.
			CO2: Able to analyze the performance of transmission line
			CO3: Can understand transient's phenomenon of transmission lines.
			CO4: Able to calculate sag and tension calculations.
			CO4: Will be able to understand overhead line insulators and underground cables.
20	III- I	Microprocessors And Microcontrollers	CO1: Understands the internal architecture and organization of 8086, 8051 and ARM processors/controllers.
			CO2: Understands the interfacing techniques to 8086 and 8051 and can develop assembly language programming to design microprocessor/ micro controller based systems.
21	III- I	Fundamentals Of Management	CO1: The students understand the significance of Management in their Profession.
			CO2: The various Management Functions like Planning, Organizing, Staffing, Leading, Motivation and Control aspects are learnt in this course.
			CO3: The students can explore the Management Practices in their domain area.
22	III-I	Disaster Management	CO1: Disasters, man-made Hazards and Vulnerabilities
			CO2: Understanding disaster management mechanism
			CO3: Understanding capacity building concepts and planning of disaster managements
23	III-II	Power Systems	CO1: Develop the Ybus and Zbus matrices



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		Analysis	<p>CO2: Analyze load flow for various requirements of the power system</p> <p>CO3: Analyze short circuit studies for the protection of power system</p> <p>CO4: Estimate stability and instability in power systems</p>
24	III-II	Power Electronics	<p>CO1: Choose the appropriate converter for various applications</p> <p>CO2: Design the power converters suitable for particular applications</p> <p>CO3: Develop the novel control methodologies for better performance</p>
25	III-II	Switch Gear And Protection	<p>CO1: Describe the working mechanism of circuit breakers and their selection for each of protection scheme design.</p> <p>CO2: Design different protection schemes including over current Protection scheme, differential protection scheme and distance protection scheme.</p> <p>CO3: Understand power system protection coordination.</p> <p>CO4: Learn about over-voltages due to lightening and switching surges.</p> <p>CO5: Analyze a range of electrical earthing methods and predict fault currents under balanced and unbalanced conditions.</p>
26	III-II	Linear and Digital Applications	<p>CO1: A thorough understanding of operational amplifiers with linear integrated circuits.</p> <p>CO2: Understanding of the different families of digital integrated circuits and their characteristics.</p> <p>CO3: Also students will be able to design circuits using operational amplifiers for various applications.</p>
27	III-II	JAVA	<p>CO1: Understanding of OOP concepts and basics of java programming (Console and GUI based)</p> <p>CO2: The skills to apply OOP and Java programming in problem solving</p> <p>CO3: Should have the ability to extend his/her knowledge of Java programming further on his/her own.</p>
28	IV-1	Power Semiconductor Drives	<p>CO1: Identify the drawbacks of speed control of motor by conventional methods</p> <p>CO2: Differentiate Phase controlled and chopper-controlled DC drives speed-torque characteristics merits and demerits</p> <p>CO3: Describe Slip power recovery schemes.</p> <p>CO4: Understand Ac motor drive speed–torque characteristics using different control strategies its merits and demerits</p>
29	IV-1	HVDC Transmission	<p>CO1: Compare EHV AC and HVDC system and to describe various types of DC links</p> <p>CO2: Analyze Graetz circuit for rectifier and inverter mode of operation</p>

			<p>CO3: Describe various methods for the control of HVDC systems and to perform power flow analysis in AC/DC systems</p> <p>CO4: Describe various protection methods for HVDC systems and classify Harmonics and design different types of filters</p>
30	IV-1	Power Quality	<p>CO1: Know the severity of power quality problems in distribution system</p> <p>CO2: Understand the concept of voltage sag transformation from up-stream (higher voltages) to down-stream (lower voltage).</p> <p>CO3: Concept of improving the power quality to sensitive load by various mitigating custom power devices.</p>
31	IV-1	Power Systems Operation And Control	<p>CO1: Analyze the optimal scheduling of power plants</p> <p>CO2: Analyze the steady state behavior of the power system for voltage and frequency fluctuations</p> <p>CO3: Describe reactive power control of a power system</p> <p>CO4: Design suitable controller to dampen the frequency and voltage steady state oscillations</p>
32	IV-1	FACTS	<p>CO1: Choose proper controller for the specific application based on system requirements •••</p> <p>CO2: Understand various systems thoroughly and their requirements</p> <p>CO3: Understand the control circuits of Shunt Controllers SVC & STATCOM for various functions viz. Transient stability Enhancement, voltage instability prevention and power oscillation damping</p> <p>CO4: Understand the Power and control circuits of Series Controllers GCSC, TSSC and TCSC</p>
33	IV-II	Wind, Solar Hybrid Energy Systems	<p>CO1: Understand the energy scenario and the consequent growths of the power generate renewable energy sources.</p> <p>CO2: Understand the basic physics of wind and solar power generation.</p> <p>CO3: Understand the power electronic interfaces for wind and solar generation.</p> <p>CO4: Understand the issues related to the grid-integration of solar and wind energy systems</p>
34	IV-II	Utilization of Electric Power	<p>CO1: Acquire knowledge on, electric drives characteristics and their applicability in industry based on the nature of different types of loads and their characteristics</p> <p>CO2: understands the concepts and methods of electric heating, welding, illumination and electric traction</p> <p>CO3: apply the above concepts to real-world electrical and electronics problems and applications.</p>
35	IV-II	ESBE	<p>CO1: It enables students to learn the basics of Entrepreneurship and entrepreneurial development which will help them to provide vision for their own Start-up.</p>



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