

K.D.K. College of Engineering, Nagpur

Department of Electrical Engineering



Course Outcomes

Course Code	Course Outcomes
BTCHEE301T Electrical Engineering Mathematics	
C301.1	Solution of Partial Differential Equations of First Order First Degree, Numerical Solution to Ordinary differential equations
C301.2	Formulation and solving the systems with complex variables
C301.3	Understanding the basics of various Transforms and converting the functions into required transforms, Laplace Transforms analysis and its application to solve differential equations
C301.4	Application of Differential equations and Laplace Transform for mathematical model formulation of the physical systems, Understanding the concept of transfer function
C301.5	Understanding the concepts of Stochastic analysis and its application
BTCHEE302T Network Analysis	
C302.1	Apply mesh current and node voltage methods to analyze electrical circuits.
C302.2	Apply network theorems for the analysis of networks.
C302.3	Obtain transient and steady-state responses of electrical circuits.
C302.4	Synthesize waveforms and apply Laplace transforms to analyze networks.
C302.5	Evaluate different Network Functions and understand two port network behavior
BTCHEE302P Network Analysis	
C302.1	Verify different network theorems as applicable to electric circuits.
C302.2	Measure AC power & evaluate power factor for different electrical circuits.
C302.3	Compute various network parameters.
BTCHEE303T Electrical Measurement & Instrumentation	
C303.1	Various aspects of measurement and instrumentation.
C303.2	Different active and passive components measurement methods.
C303.3	Power and Energy measurement.
C303.4	Instrument Transformers.
C303.5	Aspects and types of transducers.
BTCHEE303P Electrical Measurement & Instrumentation	
C303.1	Carry out measurement of various electrical circuit parameters using AC & DC bridges.
C303.2	Calibrate various electrical measuring instruments and measure power & energy.
C303.3	Measure various non-electrical quantities using Transducers.
BTCHEE304T Analog Devices & Circuits	
C304.1	Design and Analyze rectifier circuits

C304.2	Understand the characteristics and use of a transistor as amplifiers
C304.3	Apply the knowledge of transistor for the analysis of power amplifiers and oscillators.
C304.4	Understand OP-AMPs.
C304.5	Analyze and utilize OP-AMPs
BTCHEE304P Analog Devices & Circuits	
C304.1	Identify and analyze the various semiconductor devices.
C304.2	Analyze and distinguish various characteristics of transistor.
C304.3	Design Operation amplifier.
BTCHEE305T Renewable Energy studies	
C305.1	Memorize the fundamental of solar radiation geometry
C305.2	Identify and analyze the process of power generation through solar photovoltaic.
C305.3	Highlighting the various applications of Solar Energy.
C305.4	Outline the site requirement criteria for wind farm & compare different types of wind generators.
C305.5	Identifying non-conventional Energy sources such as Geothermal, MHD, Biomass, Fuel cell, Tidal, Ocean for generating Electricity.
BTCHEE306T Introduction to Python programming	
C306.1	Identify different operators and execute different programs using loops
C306.2	Analyze Strings, List, Tuples, Dictionary and Sets.
C306.3	Illustrate functions and utilize Date Time in programming language.
BTCHEE306P Introduction to Python programming	
C306.1	Construct Python Program using various python operators.
C306.2	To Develop python program using List, tuple, strings, dictionary.
C306.3	Construct python program using functions, loops & modules
BTCHEE307T Environmental studies	
C307.1	Understand Air pollution and its control techniques
C307.2	Understand Water pollution and its control techniques
C307.3	Understand Various Environmental Pollutions & Waste Management
C307.4	Understand Social Issues and the Environmental Laws
BTCHEE401T Signal & Systems	
C401.1	Understanding the basics of signal space theory.
C401.2	Understanding the concepts of state space representation.
C401.3	Understand convolution sum of two signals.
C401.4	Apply Fourier and Laplace transforms, understand the duality Apply DFT, DTFT and ztransform.
C401.5	Understand the concept of sampling and reconstruction.
BTCHEE402T Digital Electronics	
C402.1	Understand number system, logic gates and logic families.
C402.2	Design and implement combinational digital circuits.
C402.3	Design and implement sequential logic circuits.

C402.4	Understand the process of Analog to Digital conversion and Digital to Analog conversion.
C402.5	Understand memories and PLDs to implement given logic.
BTCHEE402P Digital Electronics	
C402.1	Demonstrate and design different basic logic gates using Diode and Transistors.
C402.2	Demonstrate and design combinational and sequential circuits.
C402.3	Demonstrate and design linear and Non-linear circuits using operational amplifier.
BTCHEE403T Electrical machines-I	
C403.1	Determine Equivalent Circuit parameter, Efficiency and Regulation of Single Phase Transformer and to Explain the Phasor groups of Three Phase Transformer. CO2. CO3. CO4. CO5.
C403.2	Analyze different characteristics of D. C. Motor and Speed Control of D.C. Motor.
C403.3	Explain different types of Three Phase Induction Motor and Analyze the characteristics at different Value of Slip.
C403.4	Know Voltage Regulation of Three Phase Synchronous Generator and Behavior of Synchronous Motor with Different Excitations.
C403.5	Understand Single Phase Machines and Special Machines.
BTCHEE403P Electrical machines-I	
C403.1	Evaluate the electrical parameters, efficiency, and regulation of transformers.
C403.2	Experiment with the operation and characteristics of DC & AC Machines.
C403.3	Analyze asynchronous machines for its operation and performance.
BTCHEE404T Power System	
C404.1	Understand the basic structure of power system , smart grid and micro grid.
C404.2	Model and represent the power system components in its per unit value.
C404.3	Learn the parameters of transmission lines and cables.
C404.4	Evaluate the performance of transmission lines.
C404.5	Acquaint with the method of load flow analysis and the concept of voltage stability.
BTCHEE405T Electromagnetic Fields	
C405.1	Recognize and apply the knowledge of different co-ordinate systems.
C405.2	Evaluate the physical quantities of electromagnetic fields in different media and apply Gauss law.
C405.3	Describe static electric fields boundary conditions, nature of dielectric materials and evaluate potential fields.
C405.4	Explain steady magnetic fields, their behavior in different media, associated laws and inductance.
C405.5	Understand Maxwell's equations in different forms and different media.
BTCHEE406T Simulation & Programming Techniques	
C406.1	Learn the basics of C programming and apply the knowledge for developing small programs including Function.

C406.2	Apply the knowledge of C language for developing simple programs using variables, arrays, structures etc. for applications like searching and sorting, use of pointers & File handling functions.
C406.3	Understand the basics of C++
C406.4	Study the basic of MATLAB and apply fundamental knowledge for analysis of basic engineering problems.
C406.5	Apply knowledge of MATLAB, Toolboxes and Simulink to solve matrix equations, plot graphs, build and analyze simple electrical circuits.
BTCHEE406P Simulation & Programming Techniques	
C406.1	Develop and execute simple programs in “C” language.
C406.2	Develop and execute programs for sorting and searching techniques using “C” language.
C406.3	Develop and execute simple MATLAB programs.
BTCHEE501T Microprocessor and Micro Controllers	
C501.1	Describe internal organization of 8085 and 8086 microprocessors and 8051 microcontrollers.
C501.2	Describe the concept of addressing modes and timing diagram of microprocessor.
C501.3	Interface 8085&8051 with keyboard / Display ADC/DAC, stepper motor etc.
C501.4	Demonstrate the concept of interrupts and its use.
C501.5	Demonstrate the concept of serial and parallel data communication.
C501.6	Describe handshaking concept and interfacing with peripheral devices, interface various hardware with microprocessor and microcontrollers.
BTCHEE501P Microprocessor and Micro Controllers	
C501.1	Describe the Components of Microprocessor development Board.
C501.2	Write program using Assembly Language.
C501.3	Describe architecture, programming and Interfacing of peripheral IC's with 8085 Microprocessor.
BTCHEE502T Control System	
C502.1	Model the linear system and study the control system components specifications through classical approach.
C502.2	Understand the time response and time response specifications and different controllers.
C502.3	Analyze the absolute stability and analyze the relative stability through root locus method.
C502.4	Frequency response tools like Bode plot and Nyquist plot
C502.5	Understand the concept of state variable approach.
BTCHEE502P Control System	
C502.1	Analyze the use of various error detectors in control systems and distinguish between each one of them.
C502.2	Comprehend and evaluate the performance of various position control systems.
C502.3	Build, simulate and analyze different control systems for their time responses and frequency responses using MATLAB.
BTCHEE503T Power Electronics	
C503.1	Knowledge of different types of semiconductor switches and their characteristics.
C503.2	Knowledge of different types of power conversion system with their operation.

C503.3	Knowledge of various rectifier circuits at loading conditions.
C503.4	Knowledge of various operating modes of inverter and control circuits.
C503.5	Knowledge of different Dc-Dc conversion circuit and four quadrant operation.
BTCHEE503P	Power Electronics
C503.1	Deduce the characteristics of Power Electronic switches with various parameters.
C503.2	Study and analyze power electronic converters.
C503.3	Study and analyze power electronic inverter circuits.
BTCHEE504T	Advanced Electrical power system
C504.1	Apply symmetrical components concepts in fault analysis.
C504.2	Evaluate fault currents for different types of faults.
C504.3	Appreciate concepts of power system stability.
C504.4	Understand methods to control the voltage, frequency and power flow.
C504.5	Understand economic operation of power system.
BTCHEE505T	Electrical Machines-II(Professional Elective-I)
C505.1	To explain speed control and electric braking in AC and DC machines.
C505.2	To analysis and compare voltage regulation method and parallel operation of alternator.
C505.3	To explain two reaction theory of salient pole synchronous machine and slip test.
C505.4	To analyses power flow in synchronous machine, comparison applications and working of reluctance motor and PM ac motor.
C505.5	To describe transient behavior of synchronous machine under the sudden short circuit, determination of reactance's.
BTCHEE505T	UTILIZATION OF ELECTRIC ENERGY(Professional Elective-I)
C505.1	Understand use of electric energy for industrial heating.
C505.2	Study the use of electrical energy in electric welding.
C505.3	Learn basics of illumination and design of lighting schemes for various applications.
C505.4	Understand pumps and DG systems and evaluate their performance.
C505.5	Understand electric traction system with its power supply structure.
BTCHEE505T	POWER STATION PRACTICE(Professional Elective-I)
C505.1	Understand various sources of electrical energy and different factors related to generating stations and connected load.
C505.2	Study general layout, major equipment's and auxiliaries in thermal power station.
C505.3	Understand the basic principle of hydro power station.
C505.4	Learn basics of nuclear, power generation.
C505.5	Understand the basic excitation system, co-generation, and captive.
BTCHEE601T	ENGINEERING ECONOMICS & INDUSTRIAL MANAGEMENT

C601.1	Understand the concept of demand and supply and its relationship with the price.
C601.2	Relate various factors of production with reference to different economic sectors.
C601.3	Analyse the causes and effects of inflation and understand the market structure.
C601.4	Acquire knowledge of various functions of Management and marketing management.
C601.5	Perceive the concept of Financial Management for the growth of business.
BTCHEE602T	COMPUTER APPLICATIONS IN POWER SYSTEM
C602.1	Students will be able to determine bus impedance and admittance matrix by singular transformation for power system
C602.2	Determine bus impedance and admittance matrix by inspection and building algorithm and able to accommodate changes in power system.
C602.3	Do the short circuit calculation for symmetrical and unsymmetrical fault using bus impedance and admittance matrix.
C602.4	Do the load flow analysis by NR method and transient stability analysis by modified Euler's method.
BTCHEE602P	COMPUTER APPLICATIONS IN POWER SYSTEM
C602.1	Construct programs using MATLAB to obtain different power system matrices.
C602.2	Develop programs using MATLAB to study power flow of system.
C602.3	Construct programs to assess the performance of synchronous machines .
BTCHEE603T	SWITCH GEAR AND PROTECTION
C603.1	Understand basic terminology of protective relaying, different types of faults and component used in power system protection
C603.2	Apply overcurrent protection schemes for medium voltage lines.
C603.3	Apply various distance protection schemes for high voltage lines.
C603.4	Understand Differential and other protections used for generator, transformer and motors.
C603.5	Comprehend switching phenomenon and working of various types of circuit breakers.
BTCHEE603P	SWITCH GEAR AND PROTECTION
C603.1	Analyze the magnetization characteristics of protective CTs and differentiate between protective CTs and measuring CTs.
C603.2	Verify standard time – current characteristic of over current relays and suggest suitable relays for different applications.
C603.3	Evaluate the performance of various static and numerical Relays.
C603.4	Examine the performance of differential relays and defend the role of percentage bias.
BTCHEE604T	Solar PV System (Open Elective-I)
C604.1	Review solar tracking, tracking control and find heat radiation related queries.
C604.2	Analyse the simple model of PV cell and PV modules.
C604.3	Analyse the balance of solar PV systems having battery and inverter.
C604.4	Demonstrate various photovoltaic system configurations.
C604.5	Apply solar PV to various distributed generation and smart consumption

BTCHEE604T PLC and SCADA System (Open Elective-I)	
C604.1	Identify and understand components of PLCs for Automation.
C604.2	Select appropriate module as per application.
C604.3	Develop PLC Programming for given application.
C604.4	Understand SCADA system.
C604.5	Develop SCADA system for various applications
BTCHEE605T ELECTRICAL DRIVES & THEIR CONTROL(Professional Elective-II)	
C605.1	Understand the concept of electrical characteristics like starting, speed control and breaking along with numerical.
C605.2	Relate various factors of industries with reference to PLC its programming and digital control.
C605.3	Analyse the causes and effects of motor control used in electric vehicles.
C605.4	Acquire knowledge of various electrical drives used in industries, ac and dc contractors and work on drives used in industries.
C605.5	Perceive the concept of electric traction and their control strategies used in practice
BTCHEE605T Advanced Control Systems(Professional Elective-II)	
C605.1	Determine state transition Matrix and solution of state equation for the given system.
C605.2	Evaluate controllability, observability and design suitable state feedback vector for the given control system.
C605.3	Evaluate optimal control problem.
C605.4	Describe different types of nonlinearities in control system.
C605.5	Solve stability problem of discrete time digital control system.
BTCHEE701T HIGH VOLTAGE ENGINEERING (Professional Elective-III)	
C701.1	Understand breakdown mechanism in solid liquid and gaseous medium.
C701.2	Knowledge of lightening and switching over-voltages.
C701.3	Analyze different methods of generation of high voltage and currents in laboratory.
C701.4	Analyze different methods of measurement of high voltage and currents in laboratory.
C701.5	Analyze different methods of nondestructive and High Voltage testing of Apparatus and cables in laboratory.
BTCHEE706P HIGH VOLTAGE ENGINEERING	
C706.1	Evaluate the performance of breakdown testing of various dielectrics, lightning arrestors.
C706.2	Analyse different methods of measurement for high voltage and current in laboratories.
C706.3	Visualize and analyze the corona effect.
C706.4	Distinguish between different types of Insulators.
BTCHEE701T ENERGY MANAGEMENT AND AUDIT(Professional Elective-III)	
C701.1	Explain present energy scenario with need of energy audit and energy conservation.
C701.2	Recommend appropriate type of Energy Audit looking into user requirements.
C701.3	Prepare process flow, material and energy balance diagrams.
C701.4	Prepare energy action plan and strategy for monitoring and targeting as expected of Energy manager.

C701.4	Select proper energy conservation mechanism for Electrical and Mechanical Systems.
BTCHEE702T FLEXIBLE AC TRANSMISSION SYSTEM (FACTS) (Professional Elective-IV)	
C702.1	Knowledge of Power Flow in AC system with different factors affecting stability.
C702.2	Knowledge of Voltage and Current Source Converters.
C702.3	Knowledge of Static Shunt Compensators.
C702.4	Knowledge of Static Series Compensators.
C702.5	Knowledge of Static Voltage and Phase angle Regulators and Basic concept of Combined Compensators.
BTCHEE702T ELECTRICAL INSTALLATION DESIGN(Professional Elective-IV)	
C702.1	Understand concept of electrical load assessment and basics of busbar and cables.
C702.2	Identify switches for smooth functioning of protective scheme utilized for short circuit calculations.
C702.3	Analyze Power and control circuit for industrial application utilizing Reactive power Management.
C702.4	Apply industrial installations and earthing system design.
C702.5	Inferring the design of 11kV and 33 kV substations for industrial installations.
BTCHEE703T ELECTRICAL MACHINE DESIGN (Professional Elective-V)	
C703.1	Design the overall dimensions of 1- phase and 3-phase core type transformer.
C703.2	Estimate the performance characteristics of the transformer as per specified design requirements and constraints.
C703.3	Design the overall dimensions of 3 Phase Induction Motor.
C703.4	Design Rotor Design of 3-phase Induction Motor.
C703.5	Design & Calculations of the volume of coolant required for the cooling of the alternator.
BTCHEE703T ELECTRIC AND HYBRID VEHICLES (Professional Elective-V)	
C703.1	Explain electric vehicle characteristics and typologies.
C703.2	Identify and analyze the process of power management system.
C703.3	Analyze various power electronics devices in electric vehicles.
C703.4	Outline the types and size of electric motors in electric and hybrid vehicles.
C703.5	Identifying electric motor and internal combustion engine match and energy management strategies.
BTCHEE704T POWER PLANT ENGINEERING (Open Elective-II)	
C704.1	Electrical energy, economic and environmental issues.
C704.2	Operation of Thermal power Plant.
C704.3	Subsystems of thermal power plants and cogeneration systems.
C704.4	Operation of Hydroelectric Power Plants.
C704.5	Operation of Nuclear Energy Conversion.
BTCHEE704T FUNDAMENTAL OF CONTROL SYSTEMS(Open Elective-II)	
C704.1	Identify the various control system components and their representations.
C704.2	Analyze the various time domain parameters.
C704.3	Analysis the various frequency response plots and its system.
C704.4	Apply the concepts of various system stability criterions.

C704.5	Analysis and Implementation of State Variable Methods.
BTCHEE706P	Electrical Drawing and Simulation
C706.1	Demonstrate the different aspects of electrical engineering software like MATLAB, VISIO for the purpose of drawing and simulation.
C706.2	Draw and simulate various electrical systems using different software.
C706.3	Develop single line diagrams of electrical layouts of industries/offices/houses.
BTCHEE707P	ELECTRICAL INSTALLATION DESIGN
C707.1	Study and understand the working of substation.
C707.2	Understand various safety devices and earthing used in electrical system.
C707.3	Organize reports based on performed experiments with effective demonstration of diagram.
C707.4	Summarize and explain the prepared report based on substation or industrial visit.
BTCHEE707P	ELECTRICAL Workshop
C707.1	Identify various symbols used in electrical engineering and construct single line diagrams of a power systems.
C707.2	Study and estimate various scheme of illumination.
C707.3	Design, fabricate and carry-out performance analysis of single phase transformers for given ratings.
BTCHEE708P	Project Phase-I
C708.1	Do literature survey using library, internet, technical journals, product Catalogue, datasheets etc. for a defined area.
C708.2	Understand & deliver the seminar topic.
C708.3	To enhance the skills of self- study and lifelong learning.
BTCHEE801T	Electrical Safety & Standards
C801.1	Understand the Indian power sector organization and Electricity rules, electrical safety in residential, commercial, agriculture, hazardous areas.
C801.2	Outline the electrical safety during installation, testing and commissioning procedure.
C801.3	Make use of specification of electrical plants and classification of safety equipment for various hazardous locations.
C801.4	Understand Safety Management & Standards in Electrical Systems.
BTCHEE802T	POWER SEMICONDUCTOR DRIVES(Professional Elective-VI)
C802.1	Understand dynamics of electric drives used in industry with steady state stability.
C802.2	Apply the knowledge of various converters control methods used for DC drives.
C802.3	Analyze control topologies used for induction motor applicable to various industrial Applications.
C802.4	Execute the basics of Industrial drives used for special applications.
C802.5	Attribute the traction drives using ac and dc motors with advanced control.
BTCHEE802T	ELECTRICAL DISTRIBUTION SYSTEM(Professional Elective-VI)
C802.1	Understand the general aspects of electrical distribution system.
C802.2	Design and analysis of distribution feeders and substations.
C802.3	Understand the need for protection and distribution automation.
C802.4	Recognize the significance of voltage drop and power loss in the distribution system.
C802.5	Understand the need for controlling the PF, Voltage and Power and the equipment used for mitigating them.

BTCHEE803T EHVAC-HVDC Transmission System(Professional Elective-VII)	
C803.1	Analyze power handling capacity of different EHVAC transmission lines
C803.2	Knowledge of Electrostatic and electromagnetic fields and corona in EHVAC lines.
C803.3	Knowledge of different types HVDC systems.
C803.4	Analyze power flow control in HVDC lines & design parameters of harmonic filters.
C803.5	Design appropriate circuit breakers and protective schemes for different HVDC systems.
BTCHEE803T Power Quality(Professional Elective-VII)	
C803.1	Explain importance of Power Quality and good grounding practices.
C803.2	Describe the causes of flickers and transient over voltages and suggest corrective measures.
C803.3	Discuss the causes and consequences of voltage sags and suggest mitigation techniques
C803.4	Discuss the causes and effects of harmonics and suggest harmonic reduction techniques.
C803.5	Explain the need, objectives and approaches of power quality monitoring and assessment
BTCHEE804P Project Phase-II	
C804.1	Students will be able to apply technical & Managerial skills for analysis, design, simulation & modelling of Engineering problems.
C804.2	To learn the time & Finance management for task completion in a group with professional ethics.
C804.3	To present their work in a professional manner.
C804.4	To enhance the skills of self-study and lifelong learning.