Priyadarshini College of Engineering, Nagpur
Department of Electrical Engineering

COURSE OUTCOME STATEMENT

Course Name : BEEE301T   Electrical Engineering Mathematics

Student will be able to
CO1. Solve Partial Differential Equations of First Order First Degree, Numerical Solution to Ordinary differential equations
CO2. Formulate and Solve the systems with complex variables
CO3. Explain the basics of various Transforms and Convert the functions into required transforms, Laplace Transforms analysis and its application to solve differential equations
CO4. Apply Differential equations and Laplace Transform for mathematical model formulation of the physical systems and Understand the concept of transfer function
CO5. Explain the concepts of Stochastic analysis and its application

Course Name : BEEE302T   Network Analysis

Student will be able to
CO1. Apply mesh current and node voltage methods to analyze electrical circuits.
CO2. Apply network theorems for the analysis of networks.
CO3. Obtain transient and steady-state responses of electrical circuits.
CO4. Synthesize waveforms and apply Laplace transforms to analyze networks.
CO5. Evaluate different Network Functions and understand two port network behavior

Course Name : BEEE303T   Electrical Measurement and Instrumentation

Student will be able to
CO1. Classify various measuring instruments used to measure electrical quantities
CO2. Apply methods for the measurement of resistance, capacitance and inductance
CO3. Construct the wattmeter and energy meter to measure power and energy
CO4. Choose the suitable current and potential transformers
CO5. Measure and analyze the physical quantities using transducers analog transducers and digital transducers.

Course Name : BEEE304T   Analog Devices and Circuits

Student will be able to
CO1. Design and Analyze rectifier circuits
CO2. Explain the characteristics and use of a transistor as amplifiers
CO3. Apply the knowledge of transistor for the analysis of power amplifiers and oscillators.
CO4. Explain OP-AMPs in detail.
CO5. Analyze and utilize OP-AMPs

Course Name : BEEE305T   Renewable Energy Studies

Student will be able to
CO1. Explain the fundamental of solar radiation geometry
CO2. Identify and analyze the process of power generation through solar photovoltaic
CO3. Highlighting the various applications of Solar Energy.
CO4. Outline the site requirement criteria for wind farm & compare different types of wind generators.
CO5. Identifying non-conventional Energy sources such as Geothermal, MHD, Biomass, Fuel cell, Tidal, Ocean for generating Electricity.

Course Name : BEEE306T   Introduction to Python Programming

Student will be able to
CO1. Identify different operators and execute different programs using loops
CO2. Analyse Strings, List, Tuples, Dictionary and Sets
CO3. Illustrate functions and utilise Date Time in programming language.

Course Name : BEEE401T   Signal and Systems

Student will be able to
CO1. Explain the basics of signal space theory
CO2. Explain the concepts of state space representation
CO3. Explain convolution sum of two signals
CO4. Apply Fourier and Laplace transforms, understand the duality Apply DFT, DTFT and z-transform
CO5. Explain the concept of sampling and reconstruction

Course Name : BEEE402T   Digital Electronics

Student will be able to
CO1. Explain number system, logic gates and logic families.
CO2. Design and implement combinational digital circuits.
CO3. Design and implement sequential logic circuits.
CO4. Explain the process of Analog to Digital conversion and Digital to Analog conversion.
CO5. Explain memories and PLDs to implement given logic.

Course Name : BEEE403T   Electrical Machines-I

Student will be able to
CO1. Determine Equivalent Circuit parameter, Efficiency and Regulation of Single Phase Transformer and to Explain the Phasor groups of Three Phase Transformer.
CO2. Analyze different characteristics of D. C. Motor and Speed Control of D.C. Motor.
CO3. Explain different types of Three Phase Induction Motor and Analyze the characteristics at different Value of Slip.
CO4. Know Voltage Regulation of Three Phase Synchronous Generator and Behavior of Synchronous Motor with Different Excitations
CO5. Explain Single Phase Machines and Special Machines.

Course Name : BEEE404T   Power System

Student will be able to
CO1. Understand the basic structure of power system , smart grid and microgrid.
CO2. Model and represent the power system components in its per unit value.
CO3. Learn the parameters of transmission lines and cables.
CO4. Evaluate the performance of transmission lines.
CO5. Acquaint with the method of load flow analysis and the concept of voltage stability.

Course Name : BEEE405T   Electromagnetic Fields

Student will be able to
CO1. Recognize and apply the knowledge of different co-ordinate systems.
CO2. Evaluate the physical quantities of electromagnetic fields in different media and
apply Gauss law.
CO3. Describe static electric fields boundary conditions, nature of dielectric materials and
evaluate potential fields.
CO4. Explain steady magnetic fields, their behavior in different media, associated laws and
inductance.
CO5. Explain Maxwell's equations in different forms and different media.

Course Name : BEEE406T   Simulation and Programming Techniques

Student will be able to
CO1. Learn the basics of C programming and apply the knowledge for developing small
programs including Function.
CO2. 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.
CO3. Explain the basics of C++
CO4. Acquiant with the basic of MATLAB and apply fundamental knowledge for analysis of
basic engineering problems.
CO5. Apply knowledge of MATLAB, Toolboxes and Simulink to solve matrix equations,
plot graphs, build and analyze simple electrical circuits.

Course Name : BTCHEE501T   Microprocessor & Microcontrollers

Student will be able to

CO1. Explain VLSI circuit concept.
CO2. Describe the working principle of 8085 microprocessor chip.
CO3. Classify and apply Programming instructions of 8085
CO4. Differentiate and apply 8085 Interrupts
CO5. Explain and apply various Hardware and their Interfacing with 8085.

Course Name : BTCHEE502T   Control Systems

Student will be able to
CO1. Model the linear systems and study the control system components specifications through classical approach.
CO2. Explain the time response and time response specifications and different controllers.
CO3. Analyze the absolute stability and analyze the relative stability through root locus method.
CO4. Acquiant with the frequency response tools like bode plot and nyquist plot
CO5. Explain the concepts of state variable approach

Course Name : BTCHEE503T   Power Electronics

Student will be able to
CO1. Explain the basic structure of SCR and its characteristics circuit.
CO2. Acquaint with the performance of static controllable switches and learn commutation techniques.
CO3. Know the working of line commutated single phase and three phase converter.
CO4. Explain the working of single and three phase inverter circuit and cycloconverter.
CO5. Acquaint with two and four quadrant operation of chopper and applications of power electronics.

Course Name : BTCHEE504T   Advanced Electrical Power System

Student will be able to
CO1. Apply symmetrical components concepts in fault analysis
CO2. Evaluate fault currents for different types of faults
CO3. Deduce the power system stability.
CO4. Demonstrate method to control the voltage, frequency and Power flow
CO5. Obtain economic operation of power system

Course Name : BTCHEE505T   Power Station Practice

Student will be able to
CO1. Explain various sources of electrical energy and different factors related to generating stations and connected load.
CO2. Study general layout, major equipment's and auxiliaries in thermal power station.
CO3. Explain the basic principle of hydro power station.
CO4. Learn basics of nuclear power generation.
CO5. Explain the different excitation systems, captive and cogeneration

Course Name : BTCHEE505T   Electrical Machines-II

Student will be able to
CO1. Explain speed control & electric braking in AC & DC machines
CO2. Analyses & Compare Voltage regulation method & parallel operation of alternator
CO3. Explain two reaction theory of salient pole synchronous machine & slip test.
CO4. Analyses power flow in synchronous machine, comparison, applications and working of reluctance motor & PM ac motors.
CO5. Describe Transient behavior of synchronous machine under the sudden short circuit, determination of reactance's.

Course Name : BTCHEE505T   Electrical Power Utilization

Student will be able to

CO1. Explain use of electric energy for industrial heating.

CO2. Study the use of electrical energy in electric welding

CO3. Learn basics of Illumination and design of lighting schemes for Various applications

CO4. Explain pumps and DG systems and evaluate their performance.

CO5. Explain Electric Traction system with its power supply structure.

Course Name : BTCHEE601T   Engineering Economics and Industrial Management

Student will be able to
CO1. Explain the concept of demand and supply and its relationship with the price.
CO2. Relate various factors of production with reference to different economic sectors.
CO3. Analyze the causes and effects of inflation and understand the market
structure.
CO4. Acquire knowledge of various functions of management and marketing management.
CO5. Perceive the concept of financial management for the growth of business.

Course Name : BTCHEE602T   Computer Applications in Power System

Student will be able to
CO1. Determine bus Impedance & Admittance matrix by singular transformation for power system.
CO2. Determine bus Impedance & Admittance matrix by inspection and building algorithm and able to accommodate changes in Power System
CO3. Explain the Short circuit calculation for symmetrical and unsymmetrical fault using bus impedance and admittance matrix.
CO4. Explain the load flow analysis by N-R method and Transient stability analysis by Modified
Eulers method.

Course Name : BTCHEE603T Switchgear And Protection

Student will be able to
CO1. Explain basic terminology of Protective Relaying, different types of faults and components used in Power System protection.
CO2. Apply over-current protection schemes for Medium voltage lines.
CO3. Apply various distance protection schemes for High voltage lines.
CO4. Explain differential and other protections used for Generator, Transformer and Motors
CO5. Comprehend switching phenomenon and working of various types of circuit breakers.

Course Name : BTCHEE604T   PLC and SCADA System

Student will be able to
CO1. Identify and understand components of PLCs for Automation
CO2. Select appropriate module as per application.
CO3. Develop PLC Programming for given application.
CO4. Explain SCADA System.
CO5. Develop SCADA system for various applications.

Course Name : BTCHEE604T   Solar PV System

Student will be able to
CO1. Review Solar Tracking, tracking control and find heat radiation related queries
CO2. Analyse the simple modal of PV cell and PV Modules
CO3. Analyse the balance of Solar PV Systems having battery and inverter
CO4. Demonstrate various Photovoltaic system configuration.
CO5. Apply Solar PV to Various Distributed Generation and Smart Consumption.

Course Name : BTCHEE604T Organizational Behaviour

Student will be able to
CO1. Explain the concept and importance of organizational behaviour.
CO2. Acquire the knowledge of interpersonal behaviour and transaction analysis
CO3. Know different traits and theories of personality
CO4. Analyze the importance of motivation in organization and types of leadership
CO5. Relate personal life with professional life and their management

Course Name : BTCHEE605T Advanced Control System

Student will be able to
CO1. Determine State Transition Matrix and solution of state equation for the given system.
CO2. Evaluate controllability, observability and design suitable state feedback vector for the given control system.
CO3. Evaluate Optimal Control Problem.
CO4. Describe different types of non-linearities in control system.
CO5. Solve stability problems of discrete time digital control system.

Course Name : BTCHEE605T Optimization Techniques

Student will be able to
CO1. Formulate optimization problems as mathematical programming problems.
CO2. Select proper method to solve a given optimization problem.
CO3. Apply classical optimization techniques to solve linear optimization problems.
CO4. Apply classical optimization techniques to solve non- linear optimization problems.
CO5. Apply appropriate optimization techniques to solve the engineering optimization problems

Course Name : BTCHEE605T Electrical Drives & Their Control

Student will be able to
CO1. Explain the concept of Electrical characteristics like starting, speed control and braking along with numerical
CO2. Relate various factors of industries with reference to PLC, its programming and Digital Control
CO3. Analyze the causes and effects of motor control used in Electric Vehicle.
CO4. Acquire knowledge of various electrical drives used in industries, AC & DC contactors and work on drives used in Industries
CO5. Perceive the concept of Electric traction and their control strategies used in practice.

Course Name : BEELE701T   Control System -II
Student will be able

CO1. Construct lead ,lag and lead –lag compensator in time and frequency domain.

CO2. Compute STM and solution of state equation.

CO3. Test the controllability and observability of a given system. Design state variable feedback controller for placement closed loop poles at desirable locations.

CO4. Formulate optimal control problem that minimizes the selected performance index.

CO5. Identify and analyze non-linear systems using describing function analysis

CO6. Apply all concepts to continuous and discrete time systems with Z transform.

Course Name : BEELE702T   Electrical Power System -II
Student will be able
CO1. Distinghish and analyze unbalanced and balanced operation of power system
CO2. Analyze and solve problems on symmetrical fault conditions
CO3. Identify unsymmetrical fault and analyze the faults for taking corrective actions.
CO4. Apply various mathematical tools to check the power system stability and suggest different methods to improve stability.
CO5. Determine transmission losses for optimum generation and discuss economic operation of power system.
CO6. Differentiate types of grounding and explain various shunt and series compensation.

Course Name : BEELE703T   Flexible AC Transmission System

Student will be able to

CO1. Discuss the problems and constraints related with stability of large interconnected systems and to describe their solutions using controllable parameters and classify FACTS Controller.

CO2. Describethe significance of Voltage sourced and Current sourced converters and distinguish them.

CO3. Differntiate the objectives of shunt Compensation, classify methods of Controllable VAR Generation, explain Static Var Compensators SVC and STATCOM

CO4. Differntiatethe Objectives of series Compensation and role of Switching Converter Type Series Compensators (only SSSC) also the applications of SSSC in load flow and transient stability studies.

CO5. Discuss Voltage and Phase Angle regulators and state approaches to Thyristor Controlled Voltage and Phase Angle Regulators (TCVR and TCPARs)

CO6. Describe the principles, operation and control of UPFC and IPFC

Course Name : BEELE704T   High Voltage Engineering

Student will be able to

CO1. Discuss the breakdown mechanisms in different types of insulation.

CO2. Explain causes and effects of over voltage phenomenon in power systems and their protection.

CO3. Describe the terminology of insulation co-ordination and behavior of travelling waves on transmission lines.

CO 4. Distinguish the techniques used for the generation of high voltage and currents.

CO 5. Distinguish the techniques used for measurements of high voltage and currents.

CO 6. Understand the standard non destructive and high voltage testing of electrical equipments.

Course Name : BEELE705T   Electrical Installation Design

Student will be able to

CO1. Analyze the electrical load,Evaluate tariff and select the conductor suitable to carry load current.

CO2. Calculate symmetrical short circuit current at different location and select proper switchgear.

CO3. Select types of starter for induction motor,understand its operartion and Calculate ratings of capacitor for reactive power compensation.

CO4. Explain procedure for installation testing commissioning of transformer and to design substation suitable for 11 kv and 33 kv installation.

CO5. Select and determine ratings and size of transformer,C.T, P.T, cables, circuit breaker for an industrial installation.

CO6. Explain provision for system and equipment earthing as per IS 3043 and I.E rules applicable to residential & industrial Installation.

Course Name : BEELE801T   EHVAC and DC Transmission

Student will be able to

CO1. Analyze power handeling capacity of EHV AC Transmission systems.

CO2. Summerize electrostatic and electromagnetic fields and analyze the effect of corona in EHVAC lines

CO3. Compare EHVAC and HVDC Transmission, kind of D.C. link, earth electrode, earth returns and multiterminal HVDC system.

CO4. Classify Voltage control and current control systems for power flow controls in HVDC system and to illustrate convertor control characteristics

CO5. Discuss the knowledge of design parameters of AC filters as well as DC filters and Reactive power compensation

CO6. Describe overall knowledge about the HVDC system such as MTDC, protection and substation layout of HVDC power plant.

Course Name : BEELE802T   Power Semiconductor based Electric Drives
Student will be able to

CO1. Describe the an electric drive system and functions of each component.
CO2. Explain the power electronic converter and chopper based control of DC motor.
CO3. Explain the semiconductor based control of Induction motor.
CO4. Select proper power electronic converter to control speed of synchronous motor.
CO5. Explain the use of solar power for giving supply to special purpose motors and their operating mechanisms.
CO6. Compare the electric and non electric traction system with conventional methods of operation of traction system.

Course Name : BEELE803T Switchgear and Protection

Student will be able to

CO1. Explain power system protection and discuss general philosophy of protective relaying.

CO2. Discuss medium voltage line protection using over current relay and directional over current relay.

CO3. Describe various distance and carrier current relays for protection of HV & EHV lines and discuss its advantages and limitations.

CO4. Design the protection systems for each main part of a power system.

CO5.C ompare Static and Electromechanical relays and differetiate various comparators and analyze various distance relay charactristics.

CO6. Select appropriate circuit breakers in protection.

Course Name : BEELE804T Computer Application in Power System

Student will be able to

CO1. Formulate various network matrices for power system using graph theory and establish relationship among them.

CO2. Develop algorithm for the formation of Zbus matrices and modify them for different network topology.

CO3. Transform the abc parameter into ijk parameter for symmetrical and unsymmetrical excitation system.

CO4. Determine fault currents and fault voltages under short circuit conditions for different types of fault.

CO5. Calculate bus voltages and power flows using Gauss Seidal and Newton Raphson iterative method.

CO6. Determine rotor angle using Modified Euler and Rugge Kutta 4th order method for transient stability analysis of power system.

Course Name : BEELE805 Project

Student will be able to

CO1. Identify and formulate the problems related to applications of Electrical Engineering in industries, power and environmental sector.

CO2. Apply the knowledge and fundamental of Electrical Engineering for solving/designing/ investigating the complex problems by selecting appropriate methodology, experimentation, theoretical approach and modern tool to solve the identified problems.

CO3. Work in individual and team basis to reach towards the valid conclusions following professional ethical approaches with effective communication for alloted project/dissertation so as to be useful for life long learning.

CO4. Develop fulfilling profession which may include employment in industry or academia, technology-based entrepreneurship, and postgraduate study in engineering or other disciplines.