



Godavari Foundation's  
**GODAVARI COLLEGE OF ENGINEERING  
AND POLYTECHNIC, JALGAON**

**Semester – III**

**Engineering Mathematics-III (BTBS301)**

**Course Outcomes:**

CO1	Solve problems in engineering domain related to Linear Algebra using matrices.
CO2	Analyze and solve engineering problems using Laplace Series.
CO3	Analyze and solve engineering problems using Fourier Series.
CO4	Solve engineering problems using Complex Integration.

**Electrical Machines-I (BTEEC302)**

**Course Outcomes:**

CO1	Explain construction, working principle and power flow in DC Machines - Generator, Motor and AC Machines-Transformer, 3Phase Induction Motor
CO2	Classify various machines and understand - characteristics, performance parameters of DC motors, transformer, 3-Phase Induction Motor, equivalent circuit parameters
CO3	Analyze various performance parameters of above machines.
CO4	Utilize the know-how of testing work for development of final year project.
CO5	Solve complex problems in machines which is useful for competitive exams.
CO6	Use of software for analysis of electrical machines.

**Electrical and Electronic Measurement (BTEEC303)**

**Course Outcomes:**

CO1	To understand philosophy of measurement.
CO2	To understand different methods analog and digital measurement.
CO3	To study principle of construction and operation of different transducer and display methods.

## **Basic Human Rights ( BTHM304)**

### **Course Outcomes:**

CO1	Identify and evaluate the historical, philosophical, political and cultural developments establishing human rights as a set of global norms, agreements, and procedures.
CO2	Explore global human rights institutions, law, and processes, and assess the impact of their interaction with national and local cultural practices and norms.
CO3	Examine the impact of diverse geographic, cultural and theoretical contexts on the social acceptance and practical application of human rights norms.
CO4	Synthesize interdisciplinary approaches and contributions to topics such as gender, race, poverty, violence and post-colonialism within a human rights framework.
CO5	Reflectively evaluate the effectiveness of human rights practice on local, national or international humanitarian efforts.

## **Engineering Material Science (BTES305)**

### **Course Outcomes:**

CO1	To study about crystal structure.
CO2	To understand magnetic material structure.
CO3	To study about conducting and superconducting materials
CO4	To study dielectric and nano materials.

## Semester – IV

### Network Theory (BTEEC401)

#### Course Outcomes:

CO1	Explain the concept of Laplace transform & can apply to solve D.E and integral equation.
CO2	To understand principles of various network theorems and network principles.
CO3	Evaluate Fourier series and Fourier transform of function in different interval.
CO4	Solve P.D.E and apply it for initial value problems and boundary value problems

### Power System (BTEEC402)

#### Course Outcomes:

CO1	To Understand basic operation of power system, power system components and their characteristics.
CO2	Able to select proper methodologies of load flow studies for the power network
CO3	Able to develop programs for power system studies.
CO4	Able to develop mathematical models for analysis.
CO5	Able to apply concepts of Stability analysis

### Electrical Machines-II (BTEEC403)

#### Course Outcomes:

CO1	To impart knowledge on Construction and performance of salient and non – salient type synchronous generators.
CO2	To impart knowledge on Principle of operation and performance of synchronous motor
CO3	To impart knowledge on Construction, principle of operation and performance of induction machines.
CO4	To impart knowledge on Starting and speed control of threephase induction motors
CO5	To impart knowledge on Construction, principle of operation and performance of single phase induction motors and special machines

## **Analog and Digital Electronics (BTBS404)**

### **Course Outcomes:**

CO1	To review basic number system.
CO2	To understand design and characteristics of digital logic gates. To study different
CO3	To design digital systems.

## **(A) Electromagnetic Field Theory (BTEEPE405)**

### **Course Outcomes:**

CO1	Solve mathematical problems in Cartesian, cylindrical and spherical coordinate systems.
CO2	Apply basics of electrostatics in different coordinate systems and analyze behavior of electric field in conductor, dielectric and interfaces.
CO3	Solve magnetostatics of circuits using basic relations to analyze effect of magnetic forces, materials and calculate its inductance.
CO4	Ability to solve electromagnetic problems using Maxwell's equations in for time varying fields
CO5	Investigate behavior of EM waves in different media and to calculate average power density radiated.

## **(B) Signals and Systems (BTEEPE405)**

### **Course Outcomes:**

CO1	To Understand aperiodic different types of signals-continuous and discrete, odd and even, periodic and etc. Be able to classify systems based on their properties
CO2	To familiarize the concepts of transform based continuous time and discrete time analysis of signals and systems
CO3	Analyze continuous time signals and systems by using appropriate mathematical tools
CO4	Analyze sampling process and sampling of discrete time signals.
CO5	Analyze discrete time signals and systems by using appropriate mathematical tools
CO6	Determine Fourier transforms for continuous-time and discrete-time signals (or impulse-response functions), and understand how to interpret and plot Fourier transform magnitude and phase functions.

### **(C) Advance Renewable Energy sources (BTEEPE405)**

#### **Course Outcomes:**

CO1	Understand of renewable and non-renewable sources of energy
CO2	Gain knowledge about working principle of various solar energy systems
CO3	Understand the application of wind energy and wind energy conversion system
CO4	Develop capability to do basic design of bio gas plant.
CO5	Understand the applications of different renewable energy sources like ocean thermal, hydro, geothermal energy etc.

### **(D) Electronic Devices and Circuitss (BTEEPE405)**

#### **Course Outcomes:**

CO1	Comply and verify parameters after exciting devices by any stated method
CO2	Implement circuit and test the performance
CO3	Analyze small signal model of FET and MOSFET.
CO4	Explain behavior of FET at low frequency
CO5	Design an adjustable voltage regulator circuits.

## Semester – V

### **POWER SYSTEM ANALYSIS (BTEEC501)**

#### **Course Outcomes:**

CO1	To study different parameters of power system operation and control To study load flow and Diff. methods of reactive power control.
CO2	To understand diff. methods of fault analysis and stability study.

### **Microprocessor and Microcontroller (BTEEC502)**

#### **Course Outcomes:**

CO1	Understand the concept of finite automata and analyze regular expressions.
CO2	Analyze context free grammars.
CO3	Illustrate context free languages.
CO4	Illustrate push down automata.
CO5	Evaluate turing machines.

### **POWER ELECTRONICS (BTEEC503)**

#### **Course Outcomes:**

CO1	To introduce students to the basic theory of power semiconductor devices and passive components, their practical applications in power electronics.
CO2	To familiarize students to the principle of operation, design and synthesis of different power conversion circuits and their applications.
CO3	To provide strong foundation for further study of power electronic circuits and systems

### **Elective – II: Numerical Methods (BTES504)**

#### **Course Outcomes:**

CO1	Solve Algebraic and Transcendental Equation.
CO2	Solve Linear Simultaneous Equation.
CO3	Solve Finite Differences.
CO4	Solve Differentiation and Integration.
CO5	Evaluate Solution of ODE.

### **Elective – III: Economics and Management (BTHM505)**

#### **Course Outcomes:**

CO1	Understand market equilibrium and cost-volume-profit relationships.
CO2	Illustrate relevant information and decision making.
CO3	Analyze financial statements.
CO4	Understand accounting and functions of management.
CO5	Develop product.

### **Elective – III: Business Communication (BTHM505)**

#### **Course Outcomes:**

CO1	Understand the concept of business communication.
CO2	Identify the essential skills of business communication.
CO3	Communicate the organizational issues effectively.
CO4	Understand various types of communication.
CO5	Apply leadership and ethics in business communication.

## Semester – VI

### **Switchgear and Protection (BTEEC601)**

#### **Course Outcomes:**

CO1	To understand principles of protective relaying.
CO2	To understand principle of construction, operation and selection of different type of circuit breaker used in power system.
CO3	To understand different protection schemes used in power system operation.

### **Electrical Machine Design (BTEEC602)**

#### **Course Outcomes:**

CO1	Classify the materials used for construction of electrical machines
CO2	Assess the overall dimensions of a transformer.
CO3	Examine the design, performance of transformer
CO4	Develop the overall dimensions of a rotating machine.
CO5	Analyze the design and performance of rotating machines.
CO6	Submit a report on design of electrical machines

### **Control System Engineering (BTEEC603)**

#### **Course Outcomes:**

CO1	To understand the behavior of nonlinear control system. To design and analyze PID controller.
CO2	To understand and analyze state variable technique.
CO3	To design and analyze suitable control system for engineering application.

### **A) Flexible AC Transmission System (BBTEEPE604)**

#### **Course Outcomes:**

CO1	To understand importance, configuration and types of HVDC transmission
CO2	To analyst the operation of HVDC converter, system control and protection.
CO3	To understand the concept of FACTS, their role, type and functionality.
CO4	To analyze the operation of static series and shunt compensator.



## **B) Smart Grid Technology (BBTEEPE604)**

### **Course Outcomes:**

CO1	Understand the features of Smart Grid.
CO2	Assess the role of automation and digitization in the Transmission and Distribution
CO3	Analyze Smart grids and Distributed energy resources (DER) with evolutionary algorithms.
CO4	Understand the operation and importance of data acquisition devices and their location in Voltage and Frequency control

## **C) Modeling, Simulation & Control of Electric Drives (BBTEEPE604)**

### **Course Outcomes:**

CO1	Understand the basics of electric drives and fundamentals of drive dynamics.
CO2	Learn and analyze DC drive.
CO3	Learn and analyze different steady state speed control methods for Induction motors, and understand the closed loop block diagrams for different methods.
CO4	Get introduced to modern synchronous motors and drives.
CO5	An ability to use standard methods to determine accurate modeling/simulation parameters for various general-purpose electrical machines and power electronics devices required for

## **A) E-waste Management (BTEEOE605)**

### **Course Outcomes:**

CO1	Know about the environmental impacts of e-waste.
CO2	Apply various concept learned under e-waste management hierarchy
CO3	Distinguished the role of various national and internal act and laws applicable for e-waste management and handling.
CO4	Analyze the e – waste management measures proposed under national and global legislations.

## **B) Power Plant Engineering (BTEEOE605)**

### **Course Outcomes:**

CO1	To review basic components of power system, energy sources.
CO2	To understand principle of construction and operation of different conventional power plants.

## **C) Sensor Technology (BTEEOE605)**

### **Course Outcomes:**

CO1	Graduates will be engineering practitioners and leaders, who would help solve industry's technological problems
CO2	Graduates will be engineering professionals, innovators or entrepreneurs engaged in technology development, technology deployment, or engineering system implementation in industry
CO3	Graduates will function in their profession with social awareness and responsibility
CO4	Graduates will interact with their peers in other disciplines in industry and society and contribute to the economic growth of the country
CO5	Graduates will be successful in pursuing higher studies in engineering or management

## **D) Lightning Interaction with Power System (BTEEOE605)**

### **Course Outcomes:**

CO1	Students are able to understand normal and abnormal switching transients and damping. Able to design the insulation coordination in high voltage systems
CO2	Able to know the concept of power system transients in dc and ac three phase circuits.
CO3	Able to analyze the lightning phenomenon, fast switching surges in transmission lines.
CO4	Able to design the insulation coordination in high voltage systems

## Semester – VII

### **HIGH VOLTAGE ENGINEERING (BTEEC701)**

#### **Course Outcomes:**

CO1	Explain the fundamental concept of power system.
CO2	Design the mathematical model of synchronous machine.
CO3	Design the mathematical model Excitation system and speed governing system.
CO4	Analyze the transient stability of power system using swing equation and equal area criteria.
CO5	Analyze the economic operation of power system.
CO6	Explain the methods of Voltage control.

### **POWER SYSTEM OPERATION AND CONTROL (BTEEC702)**

#### **Course Outcomes:**

CO1	Illustrate the concept of electric field stresses, applications of insulating materials and methods for Non-destructive testing of equipment like transformers, insulators, isolators, bushings, lightning arrestors, cables, circuit breakers and surge diverters.
CO2	Explain the breakdown process in solid, liquid, and gaseous materials.
CO3	Analyze methods for generation and measurement of High Voltages and Currents (both ac and dc).
CO4	Describe the phenomenon of over-voltage and choose appropriate insulation co-ordination levels based on IS & IEC Standards.

### **(A) Energy Audit and Conservation (BTEEPE703)**

#### **Course Outcomes:**

CO1	Understand energy scenario and policy
CO2	Understand the significance and procedure for energy conservation and audit.
CO3	Understand causes and remedies for global energy issues.
CO4	Analyze, calculate and improve the energy efficiency and performance of electrical utilities.
CO5	Analyze, calculate and improve the energy efficiency and performance of mechanical utilities.
CO6	Understand the applications of Internet of Things (IoT) in the energy sector.

## **(B) Electrical System Design for Building (BTEEPE703)**

### **Course Outcomes:**

CO1	Illustrate various electrical design calculations in sizing and selection of electrical equipment
CO2	Formulate load estimation for given load curve or consumption
CO3	Calculate the power regulation, necessary power factor correction and evaluate the harmonics
CO4	Apply various codes, standards, regulations to be followed
CO5	Restate the importance of coordination with other discipline
CO6	Demonstrate short circuit analysis and perform relay coordination in ETAP software

## **(C) Applications of Power Electronics in Power System (BTEEPE703)**

### **Course Outcomes:**

CO1	Enhance Theoretical and practical knowledge on modern day semiconductor devices, and control.
CO2	Design various AC voltage controllers.
CO3	Design various single and three phase inverter.
CO4	Understand the simulation model of grid integration of DFIG and PMSG.

## **(D) Electrical Utilization (BTEEPE703)**

### **Course Outcomes:**

CO1	Able to maintain electric drives used in an industries
CO2	Able to identify a heating/ welding scheme for a given application
CO3	Able to maintain/ Trouble shoot various lamps and fittings in use
CO4	Able to figure-out the different schemes of traction schemes and its main components
CO5	Able to design a suitable scheme of speed control for the traction systems
CO6	Able to identify the job/higher education / research opportunities in Electric Utilization industry.

## **(A) Process Control Instrumentation (BTEEPE703)**

### **Course Outcomes:**

CO1	Determine dynamic elements and open loop characteristics of processes for design of feedback controller.
CO2	Analyze process control loops to identify its significant elements.
CO3	Evaluate closed loop control performance for PID algorithms (P, PI and PID).
CO4	Illustrate Cascade, feed-forward, feed-back-feed-forward, Ratio, Selective, Split range and Inferential Control strategies conventional single-loop PID controllers
CO5	Design of control system for two input two output process by selecting an appropriate multiloop control configuration from for enhanced process control beyond characterizing loop interactions.
CO6	Design of PID controller by direct synthesis and internal model control methods of model based techniques.

## **(B) Biomedical Instrumentation (BTEEPE703)**

### **Course Outcomes:**

CO1	Understand the physiology of biomedical system
CO2	Measure biomedical and physiological information
CO3	Discuss the application of Electronics in diagnostics and therapeutic area

## **Mechatronics (BTEEPE704C)**

### **Course Outcomes:**

CO1	Identify the functions of mechatronics system and its application in manufacturing industries.
CO2	Outline the various characteristics of sensor and transducer and to implement these in mechatronic systems.
CO3	Analyze the role of control, modelling and stability of mechatronics system.
CO4	Describe the principle and functioning of microprocessor and microcontroller and PLC programming.

