Course outcome statements

SECOND YEAR (SE) – SEMESTER 1

SUBJECT : Power Generation Technologies (C201)

Course Outcomes : Students will be able to

C201.1	*To identify operations of thermal power plant with all accessories and cycles.*
C201.2	*To be aware of the principle of operation, components, layout, location, environmental and social issues of nuclear, diesel and gas power plant.*
C201.3	*To identify and demonstrate components of hydro power plant and calculation of catchment area.*
C201.4	*To know the importance of wind, solar, biomass, tidal and geothermal energy generation and interconnection with grid.*

SUBJECT : Engineering Mathematics III (C202)

Course Outcomes : Students will be able to

C202.1	Solve system of higher order linear differential equation and apply it to describe Electrical circuits.
C202.2	Analyze Laplace transform and develop the tool of Laplace transform to solve system of Differential Equations.
C202.3	Analyze Fourier transform and its applications to communication theory. Analyze and apply Z-transform for solving system of Difference equations and apply Z-transform in the analysis of discrete system such as linear time invariant system, signal system etc
C202.4	Transform physical phenomena into vectors, describe gradient, curl and divergence. Understand Vector Calculus and its applications to Electromagnetic field.
C202.5	To solve Line, Surface, Volume integrals with their applications in engineering.
C202.6	To extend concept of Differential Calculus to function of Complex Variable and its applications to Potential theory, Electrostatics and Electromagnetic

engineering.

SUBJECT : : Material Science (C203)

Course Outcomes : Students will be able to

C203.1	Categorize and classify different materials from Electrical Engineering applications point of view.
C203.2	Explain and summarize various properties and characteristics of different classes of materials.
C203.3	Choose materials for application in various electrical equipment.
C203.4	Explain and describe the knowledge of nanotechnology and batteries.
C203.5	Test different classes of materials as per Indian Standards (IS).
C203.6	Explain and describe the knowledge of optical materials like photo conductive, photo emissive, photo voltaic cells.

SUBJECT: Analog and Digital Electronics (C204)

Course Outcomes : Students will be able to

C204.1	Understand conversion of number system, perform binary arithmetic and reduce Boolean expressions by K- Map.
C204.2	Demonstrate basics of various types of Flip flops, design registers and counter.
C204.3	Analyze parameter of Op-amps its applications and apply the knowledge of Op-amp as wave form generators & filters.
C204.4	Use BJT as amplifier with various configurations and ⬚able to analyze uncontrolled rectifier.

SUBJECT : Electrical Measurements and Instrumentation(C205)

Course Outcomes : Students will be able to

C205.1	Understand different systems of units, various characteristics of measuring instruments, their classification and range extension methods
C205.2	Classify resistance, apply measurement techniques for measurement of Resistance and understand the different methods to measure inductance, Capacitance
C205.3	Explain construction, working principle and use of different electrical instruments and dynamometer type wattmeter for measurement of power

	under balance and unbalance condition and comparison between different methods of power measurement
C205.4	Understand the classification of transducers and their use for measuring physical parameters in different processes.
C205.5	Gather the knowhow of lab work for development of final year project.
C205.6	Solve complex problems in Electrical measurements which is useful for competitive exams

SUBJECT : SOFT SKILLS (C206)

Course Outcomes : Students will be able to,

C206.1	Identify ,map their strengths, weaknesses and relate them to the opportunities with understanding threats
C206.2	Listen, speak, read, write, present and communicate effectively
C206.3	Set personal and career goals
C206.4	Manage stress and contribute to the teamwork for the benefit of our society
C206.5	Improve their employability skills ,seek employment or be an entrepreneur

SECOND YEAR (SE) – SEMESTER 2

SUBJECT : POWER SYSTEM 1 (C207)

CourseOutcomes : Students will be able to

C207.1	*To recognize different patterns of load curve, calculate different factors associated with it and tariff structure for LT and HT consumers..*
C207.2	*To aware of features, ratings, application of different electrical equipment in power station and selection of overhead line insulators.*
C207.3	*To analyze and apply the knowledge of electrical and mechanical design of transmission lines.*
C207.4	*To identify and analyze the performance of transmission lines.*

SUBJECT : ELECTRICAL MACHINES I (C208)

Course Outcomes : Students will be able to

C208.1	Explain construction, working principle and power flow in DC Machines - Generator, Motor and AC Machines-Transformer,3Phase Induction Motor
C208.2	Classify various machines and understand - characteristics, performance parameters of DC motors, transformer, 3-Phase Induction Motor, equivalent circuit parameters
C208.3	Analyze various performance parameters of above machines.
C208.4	Utilize the know-how of testing work for development of final year project.
C208.5	Solve complex problems in machines which is useful for competitive exams.
C208.6	Use of software for analysis of electrical machines.

SUBJECT : NETWORK ANALYSIS (C209)

Course Outcomes : Students will be able to

C209.1	Develop strong basics of network theory.
C209.2	Develop the problem solving techniques for networks by application of theorem.
C209.3	Understand the behavior of networks by analyzing its transient response.
C209.4	Apply their knowledge of network theory for designing special circuits like filters.

SUBJECT : NUMERICAL METHOD AND COMPUTER PROGRAMMING (C210)

Course Outcomes: Students will be able to

C210 .1	Develop algorithms and implement programs using C language for various numerical methods..
C210.2	Demonstrate types of errors in computation and their causes of occurrence and

	apply concepts of roots of equations for solution of polynomial equation.
C210.3	Identify various types of equations and apply appropriate numerical method to solve different equations and draw the curve of best fit for the given data points.
C210.4	Apply different numerical methods for interpolation, differentiation and numerical integration.
C210.5	Apply and compare various numerical methods to solve first and second order ODE.
C210.6	Apply and compare various numerical methods to solve linear simultaneous equations.

SUBJECT : FUNDAMENTALS OF MICROCONTROLLER AND APPLICATIONS C211)

Course Outcomes: Students will be able to

C211.1	To provide understanding of architecture of 8051 microcontroller.
C211.2	To Develop ability to Write and Interpret Assembly language programs for 8051 microcontroller
C211.3	Introduce the students to Timers, Interrupts and their programming
C211.4	To provide understanding of interfacing of various devices with 8051 microcontroller.

THIRD YEAR (TE) SEMESTER 1

SUBJECT: INDUSTRIAL AND TECHNOLOGY MANAGEMENT (301)

Course Outcomes : Students will be able to

C301.1	Recall the basic definition, laws and concepts of managerial economics and state its importance.
C301.2	Differentiate between different types of business organization, business ownership and discuss the levels of management.
C301.3	Discuss the interdisciplinary nature of management of technology and explain management of technology at various levels.
C301.4	Explain the quality management assistance tools, 5S principle, need of Six Sigma

	for process improvement and the ISO Quality Management Standards.
C301.5	Analyze and apply the knowledge of technology, industrial, quality, marketing and financial management in his day to day life.
C301.6	Recognize the importance of human resource management, motivation, group dynamics, team work, leadership skills, entrepreneurship, intellectual property rights, patents and laws and implement them in his day to day work efficiently and effectively.

SUBJECT : ADVANCED MICROCONTROLLER AND ITS APPLICATION (302)

Course Outcomes : Students will be able to

C302.1	To describe the internal organization and instructions of PIC18F458 microcontroller.
C302.2	To write programs for PIC microcontroller in assembly level language and C using an IDE.
C302.3	To interface PIC microcontroller with different peripheral devices.
C302.4	To design and implement microcontroller based embedded systems

SUBJECT : ELECTRICAL MACHINES 2 (C303)

Course Outcomes : **Students will be able to**

C303.1	Classify Various Machines and understand performance characteristics and equivalent circuit for it.
C303.2	Explain construction working principal and power flow in AC machines-Alternator Synchronous Motor, Single phase Induction motor,AC series motor.
C303.3	Analyze various performance parameters of AC machines.
C303.4	Apply the know-how of testing work for development of final year project.
C303.5	Solve complex problems in machines which is useful for competitive exams.

SUBJECT : POWER ELECTRONICS (C304)

Course Outcomes : Students will be able to

C304.1	Develop characteristics of different power electronic switching devices
C304.2	Reproduce working principle of power electronic converters for different types of loads
C304.3	Analyze the performance of power electronic converters
C304.4	Use Computer-aided techniques for the design of power converter circuits.
C304.5	Communicate effectively, think critically and creatively.

SUBJECT : ELECTRICAL INSTALLATION, MAINTENANCE AND TESTING (C305)

Course Outcomes : Students will be able to

C305.1	To estimate economics of power transmission, energy losses in feeders and conductor size of internal wiring for residential and commercial establishments
C305.2	To classify and design distribution system, substation and earthing system.
C305.3	To select and apply practical aspects of Condition Monitoring and Maintenance to different electrical equipment's.
C305.4	To test various electrical equipment's and apply electrical safety.

SUBJECT : SEMINAR AND TECHNICAL COMMUNICATION (C306)

Course Outcomes : **Students will be able to**

C306.1	Relate with the current technologies and innovations in Electrical engineering.
C306.2	Improve presentation and documentation skill.
C306.3	Apply theoretical knowledge to actual industrial applications and research activity.
C306.4	Communicate effectively.

THIRD YEAR (TE) SEMESTER 2

SUBJECT : POWER SYSTEM-II (C307)

Course Outcomes : **Students will be able to**

C307.1	Analyze power flow in transmission line its performance and its compensation technique.
C307.2	Demonstrate HVDC transmission systems and its control.
C307.3	Describe EHVAC transmission systems and analyze Corona and its effects.
C307.4	Calculate pu system and its application to load flow with computational technique
C307.5	Analyze power system network under symmetrical fault condition.
C307.6	Analyze power system network under Unsymmetrical fault condition.

SUBJECT : : CONTROL SYSTEM I (C308)

Course Outcomes : Students will be able to

C308.1	Model physical systems mathematically.
C308.2	Determine time response of linear system.
C308.3	Analyze stability of LTI system in time and frequency domain.
C308.4	Design PID controller for LTI System.

SUBJECT : UTILIZATION OF ELECTRICAL ENERGY (C309)

Course Outcomes : **Students will be able to**

C309.1	*Get knowledge of principle of electric heating, welding and its applications and To design simple resistance furnaces.*
C309.2	*Get Knowledge of electrochemical processes and applications of these in practical world, electrical circuits used in different appliances.*
C309.3	*Design residential illumination schemes.*
C309.4	*Understand technical information about Electric Traction and delivery of this technical information through presentations*
C309.5	*Calculate tractive effort, power, acceleration and velocity of traction.*
C309.6	*Get knowledge of electric braking methods, control of traction motors, train lighting and signaling system.*

SUBJECT : : DESIGN OF ELECTRICAL MACHINES (C310)

Course Outcomes : Students will be able to

C310.1	Explain the construction, principle of operation and performance of transformer and three phase induction motor and Calculate main dimensions and Design of single phase and three phase transformer.
C310.2	Design the distribution type transformer and three phase squirrel cage and slip ring induction motor. Calculate main dimensions of three phase squirrel cage and slip ring induction motor.
C310.3	Calculate the heat losses, core losses and mechanical losses of induction motor and transformer. and Determine the parameters of transformer and three phase Induction motor
C310.4	Develop the optimum design of machine and also use differentsoftware's suchas AUTOCAD , TESTO , EXCEL etc for the design.

SUBJECT : ENERGY AUDIT AND MANAGEMENT (C311)

Course Outcomes : Students will be able to

C311.1	To explore various energy resources and strategies implemented to address the related environmental issues
C311.2	To understand the energy consumption patterns and various aspects of energy management
C311.3	To understand the various aspects of demand side management and supply side management
C311.4	To aware the students about various energy intensive processes in different industries and to find out the energy conservation opportunities
C311.5	To prepare the students for energy auditing and managing the energy demand.
C311.6	To formulate various financial analysis methods for calculation of profit gained by implementation of energy conservation

SUBJECT : ELECTRICAL WORKSHOP (C312)

Course Outcomes : Students will be able to	
C312.1	Integrate electrical/electronic circuits for useful applications, testand debug circuits.
C312.2	Acquire hardware and simulation skills to fabricate circuits design.
C312.3	Read data manuals/data sheets of different items involved in the circuits.
C312.4	Produce the results of the testing in the form of report.

FINAL YEAR (BE) SEMESTER1

SUBJECT : POWER SYSTEM OPERATION AND CONTROL (C401)

Course Outcomes : Students will be able to	
C401.1	Identify and analyze the dynamics of power system and suggest means to improve stability of system
C401.2	Suggest the appropriate method of reactive power generation and control
C401.3	Analyze the generation-load balance in real time operation and its effect on frequency and develop automatic control strategies with mathematical relations.
C401.4	Formulate objective functions for optimization tasks such as unit commitment and economic load dispatch and get solution using computational techniques.
C401.5	Utilize different software tools to analyze the various problems
C401.6	Utilize technical resources, prepare and give oral presentations.

SUBJECT : PLC AND SCADA APPLICATIONS (C402)

Course Outcomes : Students will be able to	
C402.1	Reproduce block diagram representation of industrial applications using PLC and SCADA.
C402.2	Design automation system for an industrial application that meets desired specifications and requirements.
C402.3	Execute, debug and test the programs developed for digital and analog operations.

| C402.4 | Develop the confidence for self-learning by doing Projects in Automation. |

SUBJECT : POWER QUALITY (ELECTIVE I) (C403B)

Course Outcomes Students will be able to

C403b .1	Distinguish between the various categories of power quality problems.
C403b .2	Explain the voltage sag phenomenon and investigate the voltage sag problems.
C403b .3	Classify various transients, apply techniques for over voltage protection and quantify flicker
C403b .4	Perform power quality analysis and use monitoring and various modern tools for the same
C403b .5	Apply appropriate solution/ techniques for power quality mitigation based on the type of problem.
C403b .6	Review the technical literature and summarize/present it.

SUBJECT : : RESTRUCTURING AND DEREGULATION (ELECTIVE II) (C404A)

Course Outcomes : Students will be able to

C404a.1	Describe the process of restructuring & reformation and state the function of various key entities in India.
C404a.2	Explain the phase of tariff determination and list the various components of tariff.
C404a.3	Compare the different methods of regulation.
C404a.4	Explain different trading models and different types of markets and compare electricity reforms in different countries.
C404a.5	Analyze pricing and transmission rights of Electricity and discuss congestion management and its issues.
C404a.6	Students will demonstrate the ability to utilize technical resources, prepare and give oral presentations.

SUBJECT CONTROL SYSTEM II (C405)

Course Outcomes : Students will be able to

C405.1	Design and realize a compensator for a physical system.
C405.2	Represent a physical system in state space format, analyze the same and realize a controller using state space technique.
C405.3	Analyze, understand the various nonlinearities in a physical system and use computer-aided techniques for the design of control circuits.
C405.4	Realize digital control schemes. Appreciate the latest developments in power electronics.
C405.5	Develop communication skills and do presentations.
C405.6	Analyze and design a digital control system including realization of digital controllers.

SUBJECT : PROJECT I (C406)

Course Outcomes : Students will be able to

C406.1	Apply the knowledge of mathematics, science and engineering fundamentals to the solution of complex engineering problems.
C406.2	Implement practically, ideas/real time industrial problems/current application of respective/multidisciplinary engineering branches.
C406.3	Apply project management skill to design system/product by taking into consideration different issues such as safety, ethics, social, and health, legal, cultural and cost standards.
C406.4	Use different modern tools and equipment like EDSA, PSIM, LabView, MATLAB, Keil, Lightpack, Proteus, DipTrace, RSLogix500 Factory Talk View Studio, PLC, Power analyzer etc.
C406.5	Participate in National/International paper presentation/publication/ project competition activities.
C406.6	Prepare Project Report (proposals) and present their project work in English.

FINAL YEAR (BE) SEMESTER 2

SUBJECT : SWITCHGEAR & PROTEECTION (C407)

Course Outcomes : Students will be able to

C407.1	Understand need, qualities, principles and basic terminology in switchgear and protection.
C407.2	Identify, specify, select and test, find characteristics of various LT switchgears.
C407.3	Design different protective schemes for transformer, alternators etc.
C407.4	Design different protective schemes for transmission lines and busbars.

SUBJECT : POWER ELECTRONICS CONTROLLED DRIVES (C408)

Course Outcomes : Students will be able to

C408.1	Analyze the operation and performance of the converter, chopper fed dc drive.
C408.2	Analyze the operation of both classical and modern induction motor drives.
C408.3	Use Computer-aided techniques for the design of the current and speed controllers for a closed loop solid-state DC motor drive
C408.4	Able to Select the drives for any Industrial application.

SUBJECT HIGH VOLTAGE ENGINEERING (ELECTIVE III) (C409A)

Course Outcomes : Students will be able to

C409A.1	State the different breakdown theories applicable to gaseous, solid and liquid insulating materials.
C409A.2	Explain the causes of lightning and switching surges and the methods to control them
C409A.3	Describe and design various methods of generation of high voltage ac, and impulse.
C409A.4	Explain the different measurement techniques used for high voltage ac, dc and impulse.
C409A.5	Carry out high voltage testing of isolators, circuit breakers, transformers, cables and surge arresters.

C409A.6	Design and plan layout of high voltage laboratory

SUBJECT : SMART GRID (ELECTIVE IV)(C410 A)

Course Outcomes: Students will be able to

C410a .1	Differentiate Conventional and Smart Grid.
C410a .2	Identify the Smart Grid components (RTU, IED, PMU) - and describe technologies - Micro Grid, Smart Substations Smart storage, Hybrid Vehicles
C410a .3	Summarize Smart Meters, Advanced Metering Infrastructure, Smart Sensors, Smart Appliances, Home & Building Automation, (GIS).
C410a .4	Distinguish different aspects of micro grid and Outline power quality aspects in smart grid.
C410a .5	Explain different communication technologies used in Smart Grid
C410a .6	Review the technical literature related to smart grid and summarize/present it.

SUBJECT : PROJECT II (C411)

Course Outcomes: Students will be able to

C411.1	Apply the knowledge of mathematics, science and engineering fundamentals to the solution of complex engineering problems.
C411.2	Implement practically, ideas/real time industrial problems/current application of respective/multidisciplinary engineering branches.
C411.3	Apply project management skill to design system/product by taking into consideration different issues such as safety, ethics, social, health, legal, cultural and cost standards.
C411.4	Use different modern tools and equipment like EDSA, PSIM, LabView, MATLAB, Keil, Lightpack, Proteus, DipTrace, RSLogix500 Factory Talk View Studio, PLC, Power analyzer etc.
C411.5	Participate in National/International paper presentation/publication/ project competition activities.
C411.6	Prepare Project Report (proposals) and present their project work in English.