



# MANAKULA VINAYAGAR INSTITUTE OF TECHNOLOGY

Kalitheerthalkuppam, Madagadipet, Puducherry - 605 107

## DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

### REGULATION 2014-15

I SEMESTER	
Course Code	Name of the Subjects
C101	Mathematics – I
C102	Physics
C103	Chemistry
C104	Basic Civil and Mechanical Engineering
C105	Engineering Mechanics
C106	Communicative English
C107	Physics Laboratory
C108	Chemistry Laboratory
C109	Workshop Practice
II SEMESTER	
C110	Mathematics – II
C111	Material Science
C112	Environmental Science
C113	Basic Electrical and Electronics Engineering
C114	Engineering Thermodynamics
C115	Computer Programming
C116	Computer Programming Laboratory
C117	Engineering Graphics
C118	Basic Electrical and Electronics Laboratory
C119	NSS / NCC *
III SEMESTER	
C201	Mathematics – III
C202	Electric Circuit Analysis
C203	Electrical Machines – I



C204	Electronic Devices and Circuits
C205	Electromagnetic Theory
C206	Fluid and Thermal Machines
C207	Electrical Machines Lab-I
C208	Electronics Lab –I
C209	Fluid and Thermal Machines Lab
<b>IV SEMESTER</b>	
C210	Mathematics – IV
C211	Electrical Machines – II
C212	Electronic Circuits
C213	Linear Control Systems
C214	Pulse and Digital Circuits
C215	Object Oriented Programming
C216	Electrical Machine Lab – II
C217	Electronics Lab – II
C218	Object Oriented Programming Lab
C219	Physical Education
<b>V SEMESTER</b>	
C301	Communication Engineering
C302	Analog and Digital Integrated Circuits
C303	Transmission and Distribution
C304	Power Electronics
C305	Measurements and Instrumentation
C306	Energy Engineering
C307	Electronics Lab – III
C308	Measurements and Control Lab



C309	General Proficiency – I
<b>VI SEMESTER</b>	
C310	Power System Analysis
C311	Utilization of Electrical Energy
C312	Microprocessors and Microcontrollers
C313	Electrical Machine Design
C314	Digital Signal Processing
C315	Electrical Safety
C316	Power Electronics Lab
C317	Micro Processor and Microcontroller Lab
C318	General Proficiency – II
<b>VII SEMESTER</b>	
C401	Industrial Management
C402	Solid State Drives
C403	Power system operation and control
C404	Power system restructuring and Deregulation
C405	Renewable Energy resources
C406	Power system simulation Lab
C407	Project Phase – I
C408	Seminar
C409	Training/Industrial Visit
<b>VIII SEMESTER</b>	
C410	Protection and Switchgear
C411	HVDC Transmission
C412	Smart Grid
C413	Project Phase –II

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C414	Comprehensive Viva
C415	Professional Ethical Practice

## COURSE OUTCOMES

### SEMESTER - I

<b>Course Name: C101 MATHEMATICS - I</b>		<b>YR/SEM: I/I</b>
<b>COURSE OUTCOME NO</b>	<b>COURSE OUTCOMES</b>	
<b>CO101.1</b>	Apply knowledge of mathematics to solve functions of several variables.	
<b>CO101.2</b>	Identify, formulate, and solve engineering problems like multiple integrals and their usage.	
<b>CO101.3</b>	To solve differential equations that model physical processes using effective mathematical tools	
<b>CO101.4</b>	Able to find equation of straight line of shortest distance, equation of plane, angle between straight lines.	
<b>CO101.5</b>	Gain the knowledge to solve first order differential equation arising in Engineering	

<b>Course Name: C102 PHYSICS</b>		<b>YR/SEM: I/I</b>
<b>COURSE OUTCOME NO</b>	<b>COURSE OUTCOMES</b>	
<b>CO102.1</b>	Apply knowledge of science and engineering to understand physics and its significant contributions in the advancement of technology and invention of new products that dramatically transform modern-day society.	
<b>CO102.2</b>	Identify different areas of physics which have direct relevance and applications to different Engineering disciplines.	
<b>CO102.3</b>	Apply fundamental knowledge to understand applications of Ultrasonics, optics and some optical devices, Lasers and Fiber optics, Nuclear energy sources and wave mechanics.	
<b>CO102.4</b>	Understand the basic operating principles of laser, its applications, optical fiber, and its types, transmission characteristics, applications of optical fibers.	
<b>CO102.5</b>	Understand the basic operating principles of laser, its applications, optical fiber, and its types, transmission characteristics, applications of optical fibers.	



<b>Course Name: C103 CHEMISTRY</b>		<b>YR/SEM: I/I</b>
<b>COURSE OUTCOME NO</b>	<b>COURSE OUTCOMES</b>	
<b>CO103.1</b>	Apply knowledge of science and engineering to understand the importance of Chemistry in Engineering domain	
<b>CO103.2</b>	Identify different Electrochemical cells and their usage for industrial process	
<b>CO103.3</b>	Apply fundamental knowledge of chemistry and build an interface of theoretical concepts with industrial applications / engineering applications.	
<b>CO103.4</b>	Guide the students to gain the knowledge about the cooling curves, phase diagrams, alloys and their practical importance.	
<b>CO103.5</b>	Strengthen the fundamentals of chemistry and then build an interface of theoretical concepts with their industrial/engineering applications.	

<b>Course Name: C104 BASIC CIVIL AND MECHANICAL ENGINEERING</b>		<b>YR/SEM: I/I</b>
<b>COURSE OUTCOME NO</b>	<b>COURSE OUTCOMES</b>	
<b>CO104.1</b>	Get an idea about construction procedure and steps involved in component design of the building.	
<b>CO104.2</b>	Understand the manufacturing processes such as casting, forming, joining, and machining	
<b>CO104.3</b>	Apply the Functions of Prime movers, working of IC engines and refrigerator Understand.	
<b>CO104.4</b>	Understand the basic operation and function of logic gates flip flops, registers and counters.	
<b>CO104.5</b>	Gain knowledge on various communication systems and network models.	

<b>Course Name: C105 ENGINEERING MECHANICS</b>		<b>YR/SEM: I/I</b>
<b>COURSE OUTCOME NO</b>	<b>COURSE OUTCOMES</b>	
<b>CO105.1</b>	Apply knowledge of mathematics, science and engineering to analyze the vector and scalar representation of forces and moments, static equilibrium of particles and rigid bodies in two dimensions	
<b>CO105.2</b>	Design and conduct experiment, as well as to analyze the effect of friction on equilibrium and the laws of motion, the kinematics of motion and the interrelationship and analyze dynamic equilibrium equation	
<b>CO105.3</b>	Design, construct and analyze Engineering Mechanics through solved examples	
<b>CO105.4</b>	Can able to understand the role of refrigeration as energy system. Students gain the in depth knowledge of working of various refrigeration system and use of refrigerant in	



	refrigeration system. Ability to analyse the efficiency of different types of refrigeration system.
<b>CO105.5</b>	To develop an intuitive understanding of underlying physical mechanism and a mastery of solving practical problems in real world.

<b>Course Name: C106 COMMUNICATIVE ENGLISH</b>		<b>YR/SEM: I/I</b>
<b>COURSE OUTCOME NO</b>	<b>COURSE OUTCOMES</b>	
<b>CO106.1</b>	Apply fundamental knowledge to improve the LSRW skills of 1 year B.Tech students.	
<b>CO106.2</b>	To enable the students to communicate with ease.	
<b>CO106.3</b>	Apply basic knowledge to equip the students with the necessary skills and develop their language prowess.	
<b>CO106.4</b>	Know about pre-processors, command line arguments and various file operations.	
<b>CO106.5</b>	How programming can be applied to real math problems.	

<b>Course Name: C107 PHYSICS LABORATORY</b>		<b>YR/SEM: I/I</b>
<b>COURSE OUTCOME NO</b>	<b>COURSE OUTCOMES</b>	
<b>CO107.1</b>	An ability to understand, explain and use instrumental techniques for intensity pattern analysis.	
<b>CO107.2</b>	Ability to operate optical equipment like Spectrometer, Polarimeter to find the optical properties like dispersive power, Resolving power and specific rotatory power.	
<b>CO107.3</b>	Capable of handling screw gauge, vernier caliper and travelling microscope to calculate the required parameters.	
<b>CO107.4</b>	Acquire basic knowledge about thermal conduction and magnetic field due to a current carrying coil.	
<b>CO107.5</b>	The students can able to understand the different phenomenon of optics such as interference, polarization that correlates between the theory and practical Students will understand about the thermal conductivity ,magnetism and also the determination of pressure coefficient of air at constant volume.	

<b>Course Name: C108 CHEMISTRY LABORATORY</b>		<b>YR/SEM: I/I</b>
<b>COURSE OUTCOME NO</b>	<b>COURSE OUTCOMES</b>	
<b>CO108.1</b>	The students will be outfitted with hands-on knowledge in the quantitative chemical analysis of water quality related parameters.	
<b>CO108.2</b>	Fundamentals and formation of polymers with its properties and engineering applications	



	of polymers such as conducting polymers can be understood.
<b>CO108.3</b>	Students are able to Illustrate the practical importance of electrochemistry for solving challenges and design of batteries.
<b>CO108.4</b>	This unit implicit the concept of corrosion and insist the students to apply their knowledge for protection of different metals from corrosion.
<b>CO108.5</b>	Guide the students to gain the knowledge about the cooling curves, phase diagrams, alloys and their practical importance.

<b>Course Name: C109 WORKSHOP PRACTICE</b>		<b>YR/SEM: I/I</b>
<b>COURSE OUTCOME NO</b>	<b>COURSE OUTCOMES</b>	
<b>CO109.1</b>	To acquire skills in basic engineering practice.	
<b>CO109.2</b>	To identify the hand tools and instruments.	
<b>CO109.3</b>	To acquire measuring skills.	
<b>CO109.4</b>	To acquire practical skills in the trades.	
<b>CO109.5</b>	To provides the knowledge of job materials in various shops.	

### SEMESTER – II

<b>Course Name: C110 MATHEMATICS - II</b>		<b>YR/SEM: I/II</b>
<b>COURSE OUTCOME NO</b>	<b>COURSE OUTCOMES</b>	
<b>CO110.1</b>	Apply knowledge of mathematics to solve matrix algebra techniques for practical applications and Curl, Divergence and integration of vectors in vector calculus for many application problems.	
<b>CO110.2</b>	Identify, formulate, and solve engineering problems like Laplace transform which is a useful technique in solving many application problems and to solve differential and integral equations.	
<b>CO110.3</b>	Apply formulae and analyze problems of Fourier transform techniques.	
<b>CO110.4</b>	etermine the Fourier Transform, Fourier Cosine and Sine Transform of elementary functions, properties of transforms and its applications in engineering.	
<b>CO110.5</b>	Acquire knowledge of matrix algebra technique, vector calculus, Laplace and Fourier Transform which are very much essential to solve the problems occurring in the areas of Engineering and Technology.	



<b>Course Name: C111 MATERIAL SCIENCE</b>		<b>YR/SEM: I/II</b>
<b>COURSE OUTCOME NO</b>	<b>COURSE OUTCOMES</b>	
<b>CO111.1</b>	Apply core concepts in Materials Science to solve engineering problems.	
<b>CO111.2</b>	Knowledgeable of contemporary issues relevant to Materials Science and Engineering.	
<b>CO111.3</b>	Understand about the ferrites and its application to magnetic materials.	
<b>CO111.4</b>	Select materials for design and construction.	
<b>CO111.5</b>	Understand the importance and properties of materials.	

<b>Course Name: C112 ENVIRONMENTAL SCIENCE</b>		<b>YR/SEM: I/II</b>
<b>COURSE OUTCOME NO</b>	<b>COURSE OUTCOMES</b>	
<b>CO112.1</b>	Apply fundamental knowledge to understand about the environment.	
<b>CO112.2</b>	Identify environmental pollution through science.	
<b>CO112.3</b>	Apply basic knowledge to solve various environmental issues and problems.	
<b>CO112.4</b>	Ability to consider issues of environment and sustainable development in his personal and professional undertakings.	
<b>CO112.5</b>	Provides a comprehensive knowledge in environmental science, environmental issues and the management from an interdisciplinary perspective.	

<b>Course Name: C113 BASIC ELECTRICAL AND ELECTRONICS ENGINEERING</b>		<b>YR/SEM: I/II</b>
<b>COURSE OUTCOME NO</b>	<b>COURSE OUTCOMES</b>	
<b>CO113.1</b>	Will gain basic knowledge about magnetic and electrical circuits, single phase and three phase power measurement and the operating principles of stationary and rotating machines.	
<b>CO113.2</b>	Will gain basic knowledge on instruments for measurements, communication systems and network models.	
<b>CO113.3</b>	Student will be able know Non-Conventional Energy Systems.	
<b>CO113.4</b>	Student will be able to know types Metal Joining.	
<b>CO113.5</b>	Students can able to gain skills about construction and building components provided with various principles and also about various engine, Energy & joints.	





<b>Course Name: C114 ENGINEERING THERMODYNAMICS</b>		<b>YR/SEM: I/II</b>
<b>COURSE OUTCOME NO</b>	<b>COURSE OUTCOMES</b>	
<b>CO114.1</b>	Apply knowledge of mathematics, science and engineering to understand the basics of the thermodynamic principles and establish the relationship of these principles to thermal system behaviours.	
<b>CO114.2</b>	Design and conduct experiment, as well as to analyze and develop methodologies for predicting the system behaviour and understand the importance of laws of thermodynamics applied to energy systems.	
<b>CO114.3</b>	Identify and analyze role of refrigeration and heat pump as energy systems and develop an intuitive understanding of underlying physical mechanism and a mastery of solving practical problems in real world.	
<b>CO114.4</b>	The student will able to analyse the laws of motion for rigid bodies.	
<b>CO114.5</b>	The student will able to analyse the effects of forces acting on the bodies in practical situation.	

<b>Course Name: C115 COMPUTER PROGRAMMING</b>		<b>YR/SEM: I/II</b>
<b>COURSE OUTCOME NO</b>	<b>COURSE OUTCOMES</b>	
<b>CO115.1</b>	Know concepts in problem solving.	
<b>CO115.2</b>	To do programming in C language.	
<b>CO115.3</b>	To write diversified solutions using C language.	
<b>CO115.4</b>	To know about structures, pointers and its manipulation.	
<b>CO115.5</b>	Have a deeper knowledge on the evolution of computers, components and its applications, have an awareness of internet, role of information technology, word processing and worksheets.	

<b>Course Name: C116 COMPUTER PROGRAMMING LABORATORY</b>		<b>YR/SEM: I/II</b>
<b>COURSE OUTCOME NO</b>	<b>COURSE OUTCOMES</b>	
<b>CO116.1</b>	Know concepts in problem solving.	
<b>CO116.2</b>	To do programming in C language.	
<b>CO116.3</b>	To write diversified solutions using C language.	
<b>CO116.4</b>	To solve problems of arithmetic and logical expressions.	
<b>CO116.5</b>	Can develop programs for searching and sorting using arrays and pointers.	



**Course Name: C117 ENGINEERING GRAPHICS**

**YR/SEM: I/II**

<b>COURSE OUTCOME NO</b>	<b>COURSE OUTCOMES</b>
<b>CO117.1</b>	Perform freehand sketching of basic geometrical constructions and multiple views of objects.
<b>CO117.2</b>	Project orthographic projections of lines and plane surfaces.
<b>CO117.3</b>	Draw projections and solids and development of surfaces.
<b>CO117.4</b>	Visualize and to project isometric and perspective sections of simple solids.
<b>CO117.5</b>	Students will be able to draw orthographic projections and isometric projections.

**Course Name: C118 BASIC ELECTRICAL AND ELECTRONICS LABORATORY YR/SEM: I/II**

<b>COURSE OUTCOME NO</b>	<b>COURSE OUTCOMES</b>
<b>CO118.1</b>	Know about basic electrical tools, applications and precautions.
<b>CO118.2</b>	Perform different types of wiring used in domestic and industrial applications.
<b>CO118.3</b>	Measurements of voltage and phase using CRO, basic operation and applications of devices such as PN junction diode and transistor.
<b>CO118.4</b>	Understand the functions and application of basic logic gates and flip flops.
<b>CO118.5</b>	Gain knowledge in domestic wiring and application of electronics device in the field of electrical engineering.

**Course Name: C119 NSS / NCC**

**YR/SEM: I/II**

<b>COURSE OUTCOME NO</b>	<b>COURSE OUTCOMES</b>
<b>CO119.1</b>	To create awareness in social and environmental issues.
<b>CO119.2</b>	To participate in relief and rehabilitation work during natural calamities.
<b>CO119.3</b>	To develop some proposals for local slum area development and waste disposal.
<b>CO119.4</b>	To create team work among students and produce efficient results.
<b>CO119.5</b>	The students were taught to operate scientific instruments or advanced software.



### SEMESTER –III

<b>Course Name: C201 MATHEMATICS - III</b>		<b>YR/SEM: II/III</b>
<b>COURSE OUTCOME NO</b>	<b>COURSE OUTCOMES</b>	
<b>CO201.1</b>	Identify complex variable function. Apply C.R equations for testing of Analyticity of the complex function.	
<b>CO201.2</b>	Construct conformal mappings between regions. Solve problems on bilinear transformation and find the Taylor's and Laurent's series.	
<b>CO201.3</b>	Analyze the complex functions with reference to their analyticity, integration using Cauchy's integral theorem and Cauchy's Residue theorem.	
<b>CO201.4</b>	Express any periodic function as Fourier series, Fourier Sine and Cosine series.	
<b>CO201.5</b>	Finding Fourier series for numerical values of any function. Interpret and use the basic concepts of analytic function, Taylor and Laurent series, Singularities, residues, conformal mapping, Fourier series and harmonic analysis.	

<b>COURSE NAME: C202 ELECTRIC CIRCUIT ANALYSIS</b>		<b>YR/SEM: II/III</b>
<b>COURSE OUTCOME NO</b>	<b>COURSE OUTCOMES</b>	
<b>CO202.1</b>	Analyse the electrical theorem by using mesh and nodal analysis for Thevenin's, Norton's, Superposition, Compensation, Tellegan's, Reciprocity, Maximum power transfer theorems, Millman's theorem which is applicable to DC circuits.	
<b>CO202.2</b>	Analyse the electrical theorem by using mesh and nodal analysis for Thevenin's, Norton's, Superposition, Compensation, Tellegan's, Reciprocity, Maximum power transfer theorems, Millman's theorem which is applicable to AC circuits	
<b>CO202.3</b>	Analyse the Three phase balanced/unbalanced voltage sources for three phase 3-wire and 4-wire circuits with star and delta connected Balanced & unbalanced loads. Analyse the Basic concepts of graph theory such as Graph, directed graph, branch, chord, Tree for two port networks, incidence and reduced incidence matrices, Link current for tie set, tree branch voltage for cut set, duality and dual networks which is applicable to find Network solutions.	
<b>CO202.4</b>	Analyse the Transient response of RL, RC and RLC circuits to DC and AC excitation, Natural and forced oscillations by using Laplace transform application to transient conditions.	
<b>CO202.5</b>	Analyse the series, parallel, series and parallel circuits' Resonant circuits effect of variation of Q on resonance. Discuss the Relations between circuit parameters Q factor,	



	resonant frequency and bandwidth for the circuit. Analyse the Coupled circuits by variations of self inductance, mutual inductance, coefficient of coupling, dot convention analysis of simple coupled circuits and also for Inductively coupled circuits for single tuned and double tuned circuits.
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COURSE NAME: C203 ELECTRICAL MACHINES – I		YR/SEM: II/III
COURSE OUTCOME NO	COURSE OUTCOMES	
CO203.1	Analyze simple magnetic circuit calculations-H Relationship, Magnetically induced emf and force , Explain AC operation of magnetic circuits , Hysteresis and Eddy current losses ,Energy in magnetic system , Field energy and mechanical force ,Energy conversion via electric field.	
CO203.2	Discuss about basic concepts of rotating machines , mmf of distributed winding and Explain about DC Generator Construction ,Lap and wave winding,emf equation and Analyze the excitation and types of generators Characteristics, armature reaction,methods of improving commutation, testing and power flow diagram and its Applications .	
CO203.3	Describe the functioning of DC Motor, torque equation, types of dc motor, back emf and voltage equations , Analyze the performance characteristics, Starting and Speed control, direct and indirect test ,regenerative tests, Power flow and efficiency, separation of losses, retardation test, Braking ,DC machines dynamics and its Applications.	
CO203.4	Explain about Single phase transformers , Principle, Construction and No load operation ,Ideal transformer and Analyze the performance and parameter of Vector diagram, no load and on load,Equivalent circuit ,Discuss about Parallel operation and load sharing of single-phase transformers,Testing, Losses, Efficiency, voltage regulation and all day efficiency and its Applications .	
CO203.5	Describe about Auto-transformer, construction and saving in copper ,Explain Three phase transformers Principle ,Construction and Poly phase connections such as Star, Zig, Open-delta, Scott connection, three-phase to single phase conversion ,On load tap changing ,variable frequency transformer ,Voltage and Current Transformers, Audio frequency transformer.	

COURSE NAME: C204 ELECTRONIC DEVICES AND CIRCUIS		YR/SEM: II/III
COURSE OUTCOME NO	COURSE OUTCOMES	
CO204.1	Classify the semiconductor materials and describe the construction and working of PN junction diodes with its characteristics. Analyze the current equations and switching characteristics of diode.	
CO204.2	Discuss the construction, operating principle and characteristics of transistors. Analyze	



	the transistor biasing circuits with its stability factor.
<b>CO204.3</b>	Discuss the construction, operating principle of Field effect transistor devices with its V-I Characteristics curves. Analyze the FET biasing circuits with its stability factor.
<b>CO204.4</b>	Discuss the construction, operating principle of various electronics switching devices – SCS, SCR, TRIAC, DIAC, GTO, and schokkely diode with its characteristics. Analyze the performance of rectifiers and voltage regulator circuit's.
<b>CO204.5</b>	Discuss the construction and operating principle of special purpose diodes and Photo and opto electronics devices with its characteristics.

<b>COURSE NAME: C205 ELECTROMAGNETIC THEORY</b>		<b>YR/SEM: II/III</b>
<b>COURSE OUTCOME NO</b>	<b>COURSE OUTCOMES</b>	
<b>CO205.1</b>	Demonstrate the force, electrostatic field intensity, flux density for a point charge and group charges in free space using vector calculus and apply Gauss law for estimating the above parameters.	
<b>CO205.2</b>	Employ the dielectric characteristics of dipole charges and solve the Capacitance of parallel plate, Spherical and Cylindrical Capacitors with the knowledge of Laplace and Poisson boundary condition and continuity equation.	
<b>CO205.3</b>	Apply Biot Savart law for the straight and circular conductor to examine the Magnetic Flux and field intensity. Demonstrate the effect of magnetic field intensity on the Torque of closed coil, and to find force between two conductors.	
<b>CO205.4</b>	Compute the Self inductance of solenoid, toroid, coaxial cable, and twin conductors by employing the Faraday's law over a varying Magnetic field. Describe the electromagnetic wave behavior using Maxwell's and Poynting Theorem and discuss the behavior of waves in Boundary conditions.	
<b>CO205.5</b>	Summarize the wave impedance, attenuation, phase Properties of an Electromagnetic wave in the Dielectric and conductor mediums. Recognize the Polarization and Reflection behavior of uniform plane waves in dielectric and Conducting mediums	



<b>COURSE NAME: C206 FLUID AND THERMAL MACHINES</b>		<b>YR/SEM: II/III</b>
<b>COURSE OUTCOME NO</b>	<b>COURSE OUTCOMES</b>	
<b>CO206.1</b>	Students will be able to apply Euler's, Bernoulli's equations and the conservation of mass to determine velocities, pressures, and accelerations for incompressible and in viscid fluids.	
<b>CO206.2</b>	Provide information about the different types of pump and hydraulic turbine and its efficiency.	
<b>CO206.3</b>	Providing knowledge about the working of steam turbine, efficiency and its working cycle.	
<b>CO206.4</b>	Students can understand the concepts of engine and air conditioning system.	
<b>CO206.5</b>	Providing knowledge about the various gas cycles and its efficiency and can able to know the working principles of air compressor and its selections process	

<b>COURSE NAME: C207 ELECTRICAL MACHINES LAB-I</b>		<b>YR/SEM: II/III</b>
<b>COURSE OUTCOME NO</b>	<b>COURSE OUTCOMES</b>	
<b>CO207.1</b>	Determine the performance characteristics of DC machine by conducting direct and Indirect tests by DC motor and DC generators and Implement the speed control techniques for a separately excited DC motor.	
<b>CO207.2</b>	Determine the performance characteristics of single phase transformer, parallel operations of single phase transformer and three phase transformer by conducting load tests and also conduct indirect test in AC machines.	

<b>COURSE NAME: C208 ELECTRONICS LAB -I</b>		<b>YR/SEM: II/III</b>
<b>COURSE OUTCOME NO</b>	<b>COURSE OUTCOMES</b>	
<b>CO208.1</b>	Demonstrate the Characteristics of PN Junction diode, Zener diode diode, BJT in CE configuration, BJT in CB configuration, FET, UJT, SCR, and TRIAC.	
<b>CO208.2</b>	Demonstrate the Characteristics of clippers and clampers, half wave and full wave rectifiers using CRO and designing the series and shunt regulators using zener diodes, transistor biasing circuits.	



COURSE NAME: C209 FLUID AND THERMAL MACHINES LAB		YR/SEM: II/III
COURSE OUTCOME NO	COURSE OUTCOMES	
CO209.1	Design, organize and conduct an experiment to collect field data, calculate, interpret and analyze the results.	
CO209.2	Demonstrate the performance characteristics of prime movers and thermal machines which are coupled with electrical machines.	

### SEMESTER –IV

COURSE NAME: C210 MATHEMATICS – IV		YR/SEM: II/IV
COURSE OUTCOME NO	COURSE OUTCOMES	
CO210.1	Formulate and solve partial differential equation.	
CO210.2	Derive and obtain the solution of wave equation and boundary value problems.	
CO210.3	Derive and obtain the solution of heat equation and boundary value problems.	
CO210.4	Apply least square method to fit various curves for the given data Investigate the validity of Hypothesis by Z - distribution techniques.	
CO210.5	Calculation of Analysis of Variance and explain the use of the Chi-squared test and its calculation.	

COURSE NAME: C211 ELECTRICAL MACHINES – II		YR/SEM: II/IV
COURSE OUTCOME NO	COURSE OUTCOMES	
CO211.1	Describe the construction and working principle of Three phase induction motor. Classify the types of induction motor, derive the torque equations. Analyse the equivalent circuit and circle diagrams.	
CO211.2	Analyse the starting methods, Speed control mechanisms and braking schemes of three phase induction motor. Describe about Cogging and crawling – Speed control methods and influence on speed-torque curve– Double cage rotor – Induction generator – types – Induction machine dynamics – Synchronous induction Motor.	
CO211.3	Describe the construction and working principle of synchronous generator .Derive the EMF equations of synchronous generator and procedures for connecting synchronous machine to infinite bus bars. Analyse the characteristics of parallel operation	
CO211.4	Describe the construction, operation and starting methods of synchronous motor. Calculate power developed by Synchronous motor and plot phasor diagrams , torque angle characteristics and V curves. Differentiate the Induction motor and Synchronous	



	motor.
<b>CO211.5</b>	Describe the construction, working principle and plotting the speed – torque characteristics of Single phase induction motors, Reluctance motor, Two phase Servo motor, Stepper motors, Universal motor, linear induction motor and permanent magnet DC motor.

<b>COURSE NAME: C212 ELECTRONIC CIRCUITS</b>		<b>YR/SEM: II/IV</b>
<b>COURSE OUTCOME NO</b>	<b>COURSE OUTCOMES</b>	
<b>CO212.1</b>	Compute the different biasing circuits of BJT, JFET and solve low frequency and high frequency response of an amplifier using hybrid parameter and pi model.	
<b>CO212.2</b>	Interpret the cascade, cascode, Darlington amplifiers and tuned amplifier's gain and output characteristics	
<b>CO212.3</b>	Compute the efficiency of different power amplifier circuits by their design and its uses in electronics and communication circuits.	
<b>CO212.4</b>	Discuss the effect of negative feedback on parameters of an Amplifier and types of negative feedback topologies.	
<b>CO212.5</b>	Illustrate the effect of positive feedback to design the working of different Oscillators using BJTS and frequency responses calculations with the help of mathematical expressions.	

<b>COURSE NAME: C213 LINEAR CONTROL SYSTEMS</b>		<b>YR/SEM: II/IV</b>
<b>COURSE OUTCOME NO</b>	<b>COURSE OUTCOMES</b>	
<b>CO213.1</b>	Discuss the mathematical modeling of MTS and MRS and derive the transfer function, find the TF by using block diagram reduction technique and Signal flow graph approach.	
<b>CO213.2</b>	Analysis the transient response of first and second order systems using standard test signals, estimate the time domain specifications and find the steady state error.	
<b>CO213.3</b>	Describe the concept of Root locus, analysis the response of frequency using Polar plot and Bode plot. Identify the condition for all-pass and minimum-phase systems.	
<b>CO213.4</b>	Analysis of stability using Routh's stability criterion, Nyquist stability criterion and Nichol's chart in terms of phase margin and gain margin	
<b>CO213.5</b>	Discuss the modeling of dynamic systems using physical variable, phase variable and canonical variable approaches, derive the transfer function from state space model, find the solution of state equation for homogenous system and forced system. Identify the properties state transition matrix; realize the concept of controllability and observability	





COURSE NAME: C214 PULSE AND DIGITAL CIRCUITS		YR/SEM: II/IV
COURSE OUTCOME NO	COURSE OUTCOMES	
CO214.1	Describe the concepts of linear wave shaping circuits such as RC, RL & RLC circuits and explain the operation of pulse transformer. Describe the switching characteristics of diodes and transistors and explain the operation of clipping and clamping circuits.	
CO214.2	Explain the operation of bistable, monostable, astable multi-vibrators & Schmitt trigger circuit using BJT. Describe the concepts of voltage and current sawtooth, fixed amplitude and constant current sweep circuit using UJT. Explain the operation of sawtooth miller and bootstrap time base circuits. Explain how multivibrators using negative resistance devices.	
CO214.3	Solve binary arithmetic system and code converters with examples. Design of combinational circuits using NAND and NOR gates. Design of encoders, decoders, multiplexers, de-multiplexers with logic gates and explain the serial adders and binary multiplier. Explain the various flip flops and simplify its Boolean expression using K-map.	
CO214.4	Design of counters such as synchronous and asynchronous UP/DOWN counters, decade counters using Flip-flops. Explain different types of shift registers with its output table and describe various memory types and its terminology.	
CO214.5	Design of synchronous sequential circuits with the help of model selection, state transition diagram, state synthesis table and state reduction technique. Design of logical equation and circuit diagram of synchronous circuit using example problems. Analysis of asynchronous sequential circuits with example problems. Design of asynchronous sequential circuits with the help of state transition diagram, primitive table, state reduction, state assignment and design equations.	

COURSE NAME: C215 OBJECT ORIENTED PROGRAMMING		YR/SEM: II/IV
COURSE OUTCOME NO	COURSE OUTCOMES	
CO215.1	<b>Discuss</b> about programming principles, create and analyzing the program. <b>Explain</b> about array and types of arrays and <b>Implement</b> the array in sorting and searching problems.	
CO215.2	<b>Discuss</b> about linear data structure, representation of Stack, operations of stack and its application and <b>Discuss</b> about queue, circular queue, double ended queue and its application and also <b>Explain</b> about linked lists Singly Linked List, Doubly Linked List, Circular Linked List, linked stacks, Linked queues, Applications of Linked List.	
CO215.3	<b>Describe</b> the concept of non linear data structures Trees, binary tree terminology, Tree Representation, Tree Operations, Traversals and its application. <b>Discuss</b> about Graphs and its Terminology, Representation, Traversals, spanning trees, shortest path Algorithm, Transitive closure, Hash tables, Applications. <b>Discuss</b> about Graphs and its Terminology, Representation, Traversals, spanning trees, shortest path Algorithm, Transitive closure, Hash tables, Applications.	



<b>CO215.4</b>	<b>Discuss</b> difference between structures oriented programming and object oriented programming. <b>Explain</b> about object oriented programming language C++ and associated libraries to develop object oriented programs. <b>Apply</b> concepts of operator -overloading, constructors and destructors to problem. object oriented programs. Apply concepts of operator -overloading, constructors and destructors to problem.
<b>CO215.5</b>	<b>Explain</b> about templates and Demonstrate the use of exception handling mechanisms and apply the exception handling technique for writing user defined exceptions in C++. <b>Apply</b> object oriented features inheritance, data abstraction, encapsulation and polymorphism to solve various computing problems using C++ language. Solve various computing problems using C++ language.

<b>COURSE NAME: C216 ELECTRICAL MACHINE LAB – II</b>		<b>YR/SEM: II/IV</b>
<b>COURSE OUTCOME NO</b>	<b>COURSE OUTCOMES</b>	
<b>CO216.1</b>	Analyze the performance of different types of induction motor under no load and load conditions.	
<b>CO216.2</b>	Demonstrate the predetermination methods for finding the losses and efficiencies of AC motors and Generators	

<b>COURSE NAME: C217 ELECTRONICS LAB – II</b>		<b>YR/SEM: II/IV</b>
<b>COURSE OUTCOME NO</b>	<b>COURSE OUTCOMES</b>	
<b>C217.1</b>	With the help of design principles practice different types of amplifiers CE amplifiers, common Emitter amplifiers and also demonstrate low frequency and high frequency oscillators, and multivibrators.	
<b>C217.2</b>	Discuss the combinational circuit as Adder, Subtractor, and Magnitude comparator. Multiplexers, Encoders, Decoders and Demultiplexers using basic logic gates, counters using ICs.	

<b>COURSE NAME: C218 OBJECT ORIENTED PROGRAMMING LAB</b>		<b>YR/SEM: II/IV</b>
<b>COURSE OUTCOME NO</b>	<b>COURSE OUTCOMES</b>	
<b>CO218.1</b>	Implement The Linear and non linear Data Structure concept in c language.	
<b>CO218.2</b>	Implement and understand the object oriented programming concept in c++	

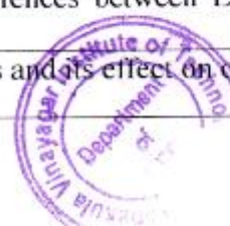


<b>COURSE NAME: C219 PHYSICAL EDUCATION</b>		<b>YR/SEM: II/IV</b>
<b>COURSE OUTCOME NO</b>	<b>COURSE OUTCOMES</b>	
<b>C219.1</b>	Physical education majors demonstrate understanding of how individuals learn and develop and can provide opportunities that support students physical, cognitive, social and emotional development.	
<b>C219.2</b>	Physical education majors demonstrate understanding of individual and group motivation and behaviour by creating safe learning environments that encourage positive social interaction, active engagement in learning and self-motivation.	
<b>C219.3</b>	To create team work among students and produce efficient results.	
<b>C219.4</b>	The students were taught to operate advanced playing kits.	
<b>C219.5</b>	To motivate the students to prepare the professional and scientific reports.	

### SEMESTER V

<b>Course Name: C301 COMMUNICATION ENGINEERING</b>		<b>YR/SEM: III/V</b>
<b>COURSE OUTCOME NO</b>	<b>COURSE OUTCOMES</b>	
<b>CO301.1</b>	To understand the concept of analog and digital modulation techniques and to study various analog modems.	
<b>CO301.2</b>	To Study (i) The pulse code modulation system and understand the concept of ASK, PSK, FSK. (ii) To calculate the bit error rate performance of ASK, PSK, FSK	
<b>CO301.3</b>	To get in depth knowledge of basics of spread spectrum systems and compare the multiple access techniques.	
<b>CO301.4</b>	Ability to understand the wireless networks and protocol architecture in practical manner.	
<b>CO301.5</b>	To understand the design the communication network of smart grid technology and uses of power lines for communication.	

<b>COURSE NAME: C302 ANALOG AND DIGITAL INTEGRATED CIRCUITS</b>		<b>YR/SEM: III/V</b>
<b>COURSE OUTCOME NO</b>	<b>COURSE OUTCOMES</b>	
<b>CO302.1</b>	Analysis the performance of integrated circuits and identify the classifications and various applications of the Integrated Circuits. Learn the basic planar process of IC fabrication and apply it for BJT, FET, MOSFET and CMOS. Discuss the various Logic digital families and its comparison and to know the differences between Linear and Digital Integrated IC's	
<b>CO302.2</b>	Infer the DC and AC characteristics of operational amplifiers and its effect on output and	



	their compensation techniques. Ability to use OP Amp as Summer, Subtractor, Differentiator and Integrator. Derive the concept of V-I Converter and I-V Converter Analysis the Log, Antilog and Instrumentation Amplifier
<b>CO302.3</b>	Discuss the function of application specific ICs as Voltage regulators. Analyze and design of analog to digital converters. Analysis and design of digital to analog converters, V/F & F/V Converters
<b>CO302.4</b>	Realize analog filter circuits. Design and analysis of active filters of state variable filter and switched capacitor filter. Analysis and design oscillators to generate sine waveform, Square wave form, Triangular wave forms
<b>CO302.5</b>	Discuss the function and application specific ICs as PLL. Analysis the circuit operation of the 555 timer IC. Design and analysis of multivibrator using IC 555, learn the concept of Schmitt trigger and missing pulse detector using IC 555

<b>COURSE NAME: C303 TRANSMISSION AND DISTRIBUTION</b>		<b>YR/SEM: III/V</b>
<b>COURSE OUTCOME NO</b>	<b>COURSE OUTCOMES</b>	
<b>CO303.1</b>	Acquire knowledge about basic requirements of transmission and distribution system design and installation. They can calculate economic Size of conductors and will know which transmission voltage is best suitable for a particular distance and area for economic consideration.	
<b>CO303.2</b>	Understand constructive details of overhead and underground transmission lines such as different types of conductors, supporting structures for transmission line considering geographical conditions and weather. They will also understand about problems in the overhead lines and can calculate the errors	
<b>CO303.3</b>	Analyze and calculate different parameters of single phase and three phase lines and will know how to improve the efficiency of transmission lines by parameters. Students will be able to describe different transmission lines in the form of circuits and can evaluate their respective equations and constants.	
<b>CO303.4</b>	Acquire knowledge about the types of insulators used in transmission lines and know about the voltage distribution in insulators which is very important is maintaining string efficiency and stress in insulators and lines. Also know about the dielectric stress and capacitance calculation in UG cables.	
<b>CO303.5</b>	Illustrate the current scenario of Indian transmission Systems and its advances in equipments used in transmission lines such as the STATCOM, DVR, UPFC etc. And also gives you an introduction about the HVDC systems and its comparisons with the EHVAC systems with the economical aspects of transmission system.	



COURSE NAME: C304 POWER ELECTRONICS		YR/SEM: III/V
COURSE OUTCOME NO	COURSE OUTCOMES	
CO304.1	List the different types of semiconductor devices and remember their ideal & real switching operating characteristics. Explain working principle of different semiconductor devices are power diode, BJT, SCR, TRIAC, MOSFET, GTO, IGBT.	
CO304.2	Analysis the operation of single and three phase rectifiers under half and fully controlled converters with R, RL and RLE loads with and without freewheeling diodes.	
CO304.3	Analysis the working principles and operation of high power chopper circuits are buck, boost, buck boost regulators, and class A, B, C, D, E choppers with voltage commutated, and current commutated chopper.	
CO304.4	Explain the working principles and operation of high power VSI and CSI inverters analysis for three phase inverter circuits with star and delta loads.	
CO304.5	Analysis the working principles and operation AC voltage controller and cycloconverters for single phase and three-phase circuits. Illustrate the various concepts of power electronics applications like UPS, HVDC and reactive power compensation.	

COURSE NAME: C305 MEASUREMENTS AND INSTRUMENTATION		YR/SEM: III/V
COURSE OUTCOME NO	COURSE OUTCOMES	
CO305.1	Acquire knowledge on the characteristics of measuring instruments and their classification and explain the various errors in measurements and its elimination procedure.	
CO305.2	Explain the construction, working of A.C / D.C meters and their proficient use.	
CO305.3	Acquire knowledge in bridge comparison methods for R, L and C measurement. Explain the various methods of magnetic measurement.	
CO305.4	Acquire knowledge on construction and working principle of various types of display devices and recorders	
CO305.5	Demonstrate the various types of transducers used for physical measurements.	

COURSE NAME: C306 ENERGY ENGINEERING		YR/SEM: III/V
COURSE OUTCOME NO	COURSE OUTCOMES	
CO306.1	Describe the forms of energy, energy reserves of India, conventional and Non conventional energy resources, current energy scenario, energy parameters, Energy	



	Intensity, Gross domestic Product.
<b>CO306.2</b>	Describe the working of coal fired steam thermal power plant, gas turbine power plant and nuclear power plant.
<b>CO306.3</b>	Describe the extraction of energy from Hydro and Ocean Energy sources.
<b>CO306.4</b>	Describe the working of wind turbine, solar plant and DG set.
<b>CO306.5</b>	Develop Conceptual knowledge on energy conservation and energy management techniques.

<b>COURSE NAME: C307 ELECTRONICS LAB – III</b>		<b>YR/SEM: III/V</b>
<b>COURSE OUTCOME NO</b>	<b>COURSE OUTCOMES</b>	
<b>CO307.1</b>	Demonstrate the analog electronic circuits like voltage regulators, amplifiers, oscillators, filters and multivibrators.	
<b>CO307.2</b>	Develop digital circuits like counters, code converters, multiplexers, demultiplexers, encoders, decoders and digital to analog converters.	

<b>COURSE NAME: C308 MEASUREMENTS AND CONTROL LAB</b>		<b>YR/SEM: III/V</b>
<b>COURSE OUTCOME NO</b>	<b>COURSE OUTCOMES</b>	
<b>CO308.1</b>	Demonstrate and understand the operation of bridge circuits, verification of theorems and calibration of energy meter	
<b>CO308.2</b>	Demonstrate and understand the various applications of operational amplifier, application of transducer, magnetic measurement and extend the range of meters. Time response, frequency response and stability analysis of control system using MATLAB/Simulink	

<b>COURSE NAME: C309 GENERAL PROFICIENCY-I</b>		<b>YR/SEM: III/V</b>
<b>COURSE OUTCOME NO</b>	<b>COURSE OUTCOMES</b>	
<b>C309.1</b>	Make effective presentations.	
<b>C309.2</b>	Participate confidently in Group Discussions.	



C309.3	Attend job interviews and be successful in them.
C309.4	Develop adequate Soft Skills required for the workplace.
C309.5	Improve verbal and numerical aptitude.

### SEMESTER VI

COURSE NAME: C310 POWER SYSTEM ANALYSIS		YR/SEM: III/VI
COURSE OUTCOME NO	COURSE OUTCOMES	
CO310.1	Model the power system components of synchronous machines, induction machines, transformers, transmission lines, and loads under steady state analysis using Per unit, bus impedance and bus admittance matrices	
CO310.2	Illustrate the load flow equations in power system by considering voltage controlled buses, tap changing transformers, phase shift control and line flow analysis using Gauss, Gauss-Seidel, Newton-Raphson and Jacobian & Fast Decoupled methods.	
CO310.3	Analysis of symmetrical components in power system transformation matrices used in resolution of unbalanced voltages and currents sequence networks of power system components.	
CO310.4	Use of symmetrical (Thevenin's theorem) and unsymmetrical (L.G, L.L., LLG) faults analysis in power system to form the sequence networks.	
CO310.5	Analysis of power system equivalents circuit and stability analysis using swing equation (transient voltage dip / sag criteria, current practices and voltage stability margin), equal area criterion and critical clearing angle problem methods.	

COURSE NAME: C311 UTILIZATION OF ELECTRICAL ENERGY		YR/SEM: III/VI
COURSE OUTCOME NO	COURSE OUTCOMES	
CO311.1	Employ the illumination parameters and principles to design the lighting schemes, explain about incandescent, Arc and Gaseous discharge lamps and select most efficient source for street & factory. Also construct the Rousseau's plot for determining the MHCP and MSCP parameters.	
CO311.2	Employ the process of Resistance, Inductance, Arc, Dielectric heating techniques in furnaces. Also Analyze the Characteristics of arc and resistance welding techniques.	
CO311.3	Classify the electrical drives based on operating requirements; and discuss the selection factors of drives for given industrial applications. Also employ the starting and running characteristics to choose a motor for a particular drive.	
CO311.4	Classify the various systems of electric traction based on the supply scheme / speed time curves. Calculate the tractive effort of Series and parallel connected D.C motors and also discuss the operational features of tramways and trolley bus.	



<b>CO311.5</b>	Describe electrolysis process and employ it for electro plating applications, Ni- iron and Ni-cadmium batteries. Apply the energy Audit concepts / tools to locate the energy Conservation opportunities in domestic and industries.
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<b>COURSE NAME: C312 MICROPROCESSORS AND MICROCONTROLLERS</b>		<b>YR/SEM: III/VI</b>
<b>COURSE OUTCOME NO</b>	<b>COURSE OUTCOMES</b>	
<b>CO312.1</b>	Describe features and architecture of 8085 microprocessor , Registers, Arithmetic and logic section, Timing and Control section and Interface and Explain about the Machine cycles and their timing diagram with Wait states of 8085 microprocessor and Introduction to architecture of Z80 and MC6800 microprocessors.	
<b>CO312.2</b>	Discuss about addressing modes,Instruction sets of a typical 8085 microprocessor and develop Assembly level programs such as, Arithmetic and logic operations on 8/16 bit binary/BCD numbers,Counter & time delay programs,Stack and subroutines and Code conversion.	
<b>CO312.3</b>	Discuss about the memory Interfacing and I/O devices interfacing of a typical 8085 microprocessors, Compatibility between memory and microprocessor unit, Address space and partitioning of address space of a microprocessors and Explain about the Data transfer such as programmed data transfer and Direct memory access , Interrupt structure, vectored interrupts ,Interfacing data converters in 8085	
<b>CO312.4</b>	Describe the functioning of different peripheral Ics are Programmable Peripheral device (8255), Timer/ Counter (8253), Programmable keyboard display interfaces (8279), Programmable interrupt controller (8259), USART (8251). Design a microprocessor based system for controlling speed of stepper motor , traffic light control ,temperature control using 8085 microprocessor.	
<b>CO312.5</b>	Describe features and architecture of 8051 microcontroller and develop assembly language program and Explain memory and I/O ports ,counters and timer operations and interrupts with 8051 microcontroller and interfacing keyboard, LCD, ADCand DAC.	

<b>COURSE NAME: C313 ELECTRICAL MACHINE DESIGN</b>		<b>YR/SEM: III/VI</b>
<b>COURSE OUTCOME NO</b>	<b>COURSE OUTCOMES</b>	
<b>CO313.1</b>	Analysis the fundamentals design of air-gap, MMF, heating and cooling curves, leakage flux of electrical machines.	
<b>CO313.2</b>	Analysis the output equation, main dimensions, overall designs, armature design, and design of commutator and brushes of dc machines.	
<b>CO313.3</b>	Analysis the knowledge of output equation, main dimensions, overall designs, number of turns and length of mean turns of windings, resistance of windings and no load current calculation of Single phase and three phase transformer.	
<b>CO313.4</b>	Analysis the knowledge of output equation, main dimensions, overall designs, design of squirrel cage rotor, selecting rotor slots of squirrel cage machines, design of rotor bars & slots, design of end rings and design of wound rotor of Induction motor.	
<b>CO313.5</b>	Analysis the knowledge of design of salient pole machines , design of stator, design of rotor, design of damper winding, design of turbo alternators. benefits of CAD and	





flowchart representation of synchronous machines.
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COURSE NAME: C314 DIGITAL SIGNAL PROCESSING		YR/SEM: III/VI
COURSE OUTCOME NO	COURSE OUTCOMES	
CO314.1	Discuss the basic elements of signal processing, sampling of analog signals, aliasing. Explore the standard discrete time Signals, manipulations on discrete time signals and representation of discrete time signals. Analysis the Linear Time Invariant systems and convolution sum.	
CO314.2	Analysis the properties of Z-transform and inverse z-transform. Explore the z-transform application to discrete systems, stability analysis, frequency response, convolution, discrete time fourier Series and discrete time fourier transform	
CO314.3	Analysis the Discrete Fourier Transform properties, IDFT, analysis of signal using radix2 algorithms using Decimation in Time, Decimation in Frequency and Computation of IDFT using FFT.	
CO314.4	Design a FIR filter using linear phase, Fourier series and windowing techniques. Design an IIR filter using Butterworth and Chebyshev Approximations. Design a digital filter using impulse invariant technique and bilinear transformation method, warping, prewarping and Frequency transformation.	
CO314.5	Derive the structures for FIR systems using direct form, cascade and linear phase structures. Derive the structures for IIR systems using direct form, parallel, and cascade and ladder structures. Analysis the representation of numbers- in terms of rounding and truncation, product quantization error and overflow limit cycle oscillations.	

COURSE NAME: C315 ELECTRICAL SAFETY		YR/SEM: III/VI
COURSE OUTCOME NO	COURSE OUTCOMES	
CO315.1	Comprehensive of compliance with the standards on electrical safety, rules and responsibilities. Discuss the ground clearances and section clearances, standards on electrical safety safe limits of Current, voltage, Earthing of system neutral, Rules regarding first aid and fire fighting facility.	
CO315.2	Analyse the electrical appliances in residents during various aspects of installation in Domestic appliances of water tap giving shock, shock from wet wall, fan Firing shock, multi-storied building, Temporary installations, Agricultural pump installation. Discuss the Do's and Don'ts for safety in the use of domestic electrical appliances.	
CO315.3	Identify safety during installation, testing and commissioning, operation and maintenance in power plants. Explore the safety documentation is prepare for Preliminary preparations, safe sequence while risk of plant and equipment, safety documentation for field quality and safety for personal protective equipment. Interpret the safety clearance notice, safety precautions and safe guards for operators safety.	
CO315.4	Compare the Electrical Safety In Hazardous Areas where the classifications of Hazardous zones class 0, 1 and 2. Analyse the spare, flash overs, corona discharge and	



	functional requirements in transmission system. Describe the specifications of electrical plants, equipments utilized for hazardous locations. Classify the equipment enclosure for various hazardous gases and vapour equipment/enclosure for hazardous locations.
<b>CO315.5</b>	Describe the Total quality control and management for power plant and write the Importance of high load factor and Disadvantages of low power facto. Discuss the Causes of low P.F and recognize the techniques to improve power factor, equipments used and its importance of P.F. improvement.

<b>COURSE NAME: C316 POWER ELECTRONIC LAB</b>		<b>YR/SEM: III/VI</b>
<b>COURSE OUTCOME NO</b>	<b>COURSE OUTCOMES</b>	
<b>CO316.1</b>	Demonstrate and understand the operation of various power converter circuits namely controlled rectifiers, choppers, AC voltage regulators and inverters and finds applications of these converters.	
<b>CO316.2</b>	Demonstrate and understand the simulation of power converters circuits using MATLAB/Simulink and experimentally verify the simulation results in the hardware lab.	

<b>COURSE NAME: C317 MICRO PROCESSOR AND MICROCONTROLLER LAB</b>		<b>YR/SEM: III/VI</b>
<b>COURSE OUTCOME NO</b>	<b>COURSE OUTCOMES</b>	
<b>CO317.1</b>	Demonstrate and understand the operation of various power converter circuits namely controlled rectifiers, choppers, AC voltage regulators and inverters and finds applications of these converters.	
<b>CO317.2</b>	Demonstrate and understand the simulation of power converters circuits using MATLAB/Simulink and experimentally verify the simulation results in the hardware lab.	

<b>Course Name: C318 GENERAL PROFICIENCY – II</b>		<b>YR/SEM: III/VI</b>
<b>COURSE OUTCOME NO</b>	<b>COURSE OUTCOMES</b>	
<b>C318.1</b>	Make effective presentations.	
<b>C318.2</b>	Participate confidently in Group Discussions.	
<b>C318.3</b>	Attend job interviews and be successful in them.	
<b>C318.4</b>	Develop adequate Soft Skills required for the workplace.	
<b>C318.5</b>	Apply the logical reasoning skills for solving problems.	



### SEMESTER VII

<b>COURSE NAME: C401 INDUSTRIAL MANAGEMENT</b>		<b>YR/SEM: IV/VII</b>
<b>COURSE OUTCOME NO</b>	<b>COURSE OUTCOMES</b>	
<b>CO401.1</b>	Comprehensive of compliance with the Economics deals with Flow in an Economy, Law of Demand & Supply, Concept of Engineering Economics with Engineering Efficiency, Economic Efficiency, Scope of Engineering Economics, Elements of Costs, Marginal Cost, Marginal Revenue, Sunk Cost ,Opportunity cost. Analyse the Break-Even Analysis, P/V ratio, Elementary Economics Analysis and its Structure of Market, and Pricing.	
<b>CO401.2</b>	Discuss the Make or Buy Decision, Value Engineering with Function, Aims, Value Engineering Procedure, Interest formulas and their applications. Analyse the Time Value of Money, Single-Payment Compound Factor, Single Payment Present Worth factor, Equal Payment Series Compound Amount Factor, Equal Payment Series Sinking Fund Factor, Equal Payment Series Present worth Factor, Equal Payment Series Capital Recovery Factor, Uniform Gradient Series Annual Equivalent Factor, Effective Interest Rate and Examples in all the methods.	
<b>CO401.3</b>	Analyse the Methods of Comparison of Alternatives–Present Worth Method of Comparison (Revenue Dominated Cash flow Diagram, Cost Dominated Cash Flow Diagram), Future Worth Method Comparison (Revenue Dominated Cash Flow Diagram, Cost Dominated Cash Flow Diagram), Annual Equivalent Method of Comparison (Revenue Dominated Cash Flow Diagram, Cost Dominated Cash Flow Diagram), Rate of Return Method and Examples in all the methods.	
<b>CO401.4</b>	Discuss the Principles of management in that Basic concept of management, scientific management, Henry Fayol’s Principles of management Types and functions of management. Describe the Types of Organisation characteristics and industrial ownership Characteristics, with their merits and demerits.	
<b>CO401.5</b>	Discuss the Financial management in which Sources of finance (Internal and External),Types of Working capital, Types of investment, Preparation of Trading, Profit and Loss Account and Balance Sheet and Types of Accounting and significance of each type.	

<b>COURSE NAME: C402 SOLID STATE DRIVES</b>		<b>YR/SEM: IV/VII</b>
<b>COURSE OUTCOME NO</b>	<b>COURSE OUTCOMES</b>	
<b>CO402.1</b>	Describe the Electric Drive components, Torque Equation, Classification of drives and develop the capability to choose a suitable drive for a particular application based on power rating	
<b>CO402.2</b>	Analyze the performance of electrical drives fed by single phase/three phase converters and DC chopper circuits.	
<b>CO402.3</b>	Analyze the performance of stator side controlled induction motor drives by variable voltage, variable frequency and V/F, Stator current control techniques.	
<b>CO402.4</b>	Analyze the performance of rotor side controlled induction motor drives by rotor resistance control techniques and slip power recovery systems.	



<b>CO402.5</b>	Analyze the performance of synchronous motor drives by self control, separate control and vector control techniques.
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<b>COURSE NAME: C403 POWER SYSTEM OPERATION AND CONTROL</b>		<b>YR/SEM: IV/VII</b>
<b>COURSE OUTCOME NO</b>	<b>COURSE OUTCOMES</b>	
<b>CO403.1</b>	Explain the power system security under different operating states of power systems using energy control centers and its functions. Illustrate the necessity of frequency and voltage regulation for P-F and Q-V control system using SCADA.	
<b>CO403.2</b>	Analysis the power system load forecasting by the method of least square fit under base load and optimum unit commitment for a power system uses priority ordering load dispatching and dynamic programming methods.	
<b>CO403.3</b>	Explain the mathematical model of speed governing mechanism under speed load characteristics and analysis the power system in uncontrolled static and dynamic conditions with proportional plus integral controller under single, two and multi-area system.	
<b>CO403.4</b>	Analysis the incremental cost curve by co-ordination equations with losses, without losses and $B_{mn}$ co-efficient solutions by iteration methods in base point and participation factors under economic dispatch controller added to LFC.	
<b>CO403.5</b>	Analysis the fundamental characteristics of excitation system with block diagram. Describe the voltage control compensating methods for transmission systems using static shunt capacitor/inductor, VAR compensator and tap changing transformer.	

<b>COURSE NAME: C404 POWER SYSTEM RESTRUCTURING AND DEREGULATION</b>		<b>YR/SEM: IV/VII</b>
<b>COURSE OUTCOME NO</b>	<b>COURSE OUTCOMES</b>	
<b>CO404.1</b>	Explore about the fundamentals of restructured power market and also to explore about the deregulation and the components or its entities in power market.	
<b>CO404.2</b>	To offer an introduction to the architecture of power markets and to discuss the technical challenges such as TTC and congestion management in the restructured power market.	
<b>CO404.3</b>	Discuss about the concept of congestion management and method to reduce congestion in restructured environment. And also to discuss various ancillary services used in rescheduling the power markets.	
<b>CO404.4</b>	To elucidate the various pricing mechanism available in the transmission lines and also to discuss about various tracing methods available to charge the transmission line according to the usage of the lines.	



<b>CO404.5</b>	Illustrate the current scenario of Indian Power market and also to discuss about the Regulatory and Policy development in Indian Power sector. Explore the structure of electrical tariff and the impact of depreciation on the power system components.
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<b>COURSE NAME: C405 RENEWABLE ENERGY RESOURCES</b>		<b>YR/SEM: IV/VII</b>
<b>COURSE OUTCOME NO</b>	<b>COURSE OUTCOMES</b>	
<b>CO405.1</b>	An ability to understand the availability of conventional energy sources in India and its limitation.	
<b>CO405.2</b>	An ability to formulate, design and analyse any distribution generation system using renewable energy resources using solar.	
<b>CO405.3</b>	An ability to formulate, design and analyse any distribution generation system using renewable energy resources using wind	
<b>CO405.4</b>	An ability to formulate, design and analyse any distribution generation system using renewable energy resources using Ocean&Tidal Energy	
<b>CO405.5</b>	The students will be able to formulate, design and analyse any distribution generation system using renewable energy resources using biogas and geothermal power generation.	

<b>COURSE NAME: C406 POWER SYSTEM SIMULATION LAB</b>		<b>YR/SEM: IV/VII</b>
<b>COURSE OUTCOME NO</b>	<b>COURSE OUTCOMES</b>	
<b>CO6.1</b>	Demonstrate the programming and simulation of power systems using computer package MATLAB	
<b>CO6.2</b>	Develop MATLAB programs for computation of power system components in per units, formulation of the bus admittance and impedance matrices, load dispatch, load flow, short circuit and transient stability studies.	

<b>COURSE NAME: C407 PROJECT WORK-I</b>		<b>YR/SEM: IV/VII</b>
<b>COURSE OUTCOME NO</b>	<b>COURSE OUTCOMES</b>	
<b>C407.1</b>	On Completion of the project work students will be in a position to take up any challenging practical problems and find solution by formulating proper methodology.	
<b>C407.2</b>	Formulate a real world problem in the food processing sector, identify the requirement and develop project.	
<b>C407.3</b>	Identify technical ideas, strategies and methodologies to find solution to the proposed project.	



C407.4	Utilize new tools and techniques that contribute to obtain solution to the project.
C407.5	Prepare report and present oral demonstrations.

COURSE NAME: C408 SEMINAR		YR/SEM: IV/VII
COURSE OUTCOME NO	COURSE OUTCOMES	
C408.1	Analyze critically chosen seminar topic for substantiated conclusions	
C408.2	Apply the concepts of design and modeling learnt to be seminar topic chosen and explore possible new ideas.	
C408.3	Use the appropriate techniques, resources and modern engineering tools necessary for conducting seminar work.	
C408.4	Explore possible avenues where information technology solutions may yield social benefit.	
C408.5	Communicate clearly, fluently, and cogently both in written and spoke contexts and Analyze critically chosen seminar topic for substantiated conclusions.	

COURSE NAME: C409 INDUSTRIAL VISIT/TRAINING		YR/SEM: IV/VII
COURSE OUTCOME NO	COURSE OUTCOMES	
C409.1	Learn field experience and hands on training in food industry.	
C409.2	Identify problems faced by the food industry.	
C409.3	Find solutions to solve the problems identified in the industry.	
C409.4	Understand the processes and man power management in food industry.	
C409.5	Acquire skills in maintaining a food industry.	

### SEMESTER -VIII

COURSE NAME: C410 PROTECTION AND SWITCHGEAR		YR/SEM: IV/VIII
COURSE OUTCOME NO	COURSE OUTCOMES	
CO410.1	Employ the General Philosophies such as the basic objectives of the system protection, functions of protective relay, relay terminologies, essential qualities, basic operating principle of relay and classify the different types of relays	
CO410.2	Explain the Construction and working principle of Differential relay, Over current, Directional Scheme, Distance Relays, Under frequency and Negative sequence Relays. Explain the Static relay circuits using analog and digital ICs for over current, differential, generator field loss, under frequency, distance, impedance and reverse power relays.	
CO410.3	Illustrate the Generator Capability Curve, Short circuit Calculations, Ground fault and unbalanced current Protection.	



	Describe the theory and applications of the main components used in power system protection for electric machines, transformers and bus bars. Concept of Wide Area Monitoring and Protection
<b>CO410.4</b>	Apply the basic considerations for the design. Arcing Phenomena and Arc Quenching. Make use of the properties of Arc and Interruption theories and Circuit Breaker Rating-RRR. Analyze the Testing of Circuit Breakers, Recent Developments in Circuit Breaker Design and its Operation
<b>CO410.5</b>	Analyze the Construction and Operating Principles of Oil Circuit Breakers, Air Blast Circuit Breakers, Vacuum Circuit Breaker, SF6 Circuit Breakers, DC Circuit Breakers. Fuse Characteristics, Operation of HRC and Photovoltaic fuses.

<b>COURSE NAME: C411 HVDC TRANSMISSION</b>		<b>YR/SEM: IV/VIII</b>
<b>COURSE OUTCOME NO</b>	<b>COURSE OUTCOMES</b>	
<b>CO411.1</b>	Summarize the Evolution of HVDC Systems Distinguish between EHV AC and HVDC systems and various types of DC links.	
<b>CO411.2</b>	Analysis of Three phase bridge converter wave forms with and without overlap, Current and voltage relations. Explain the principle of DC link control and its Control characteristics Explain Constant ignition angle control, Constant current and extinction angle control.	
<b>CO411.3</b>	Outline about Converter faults, commutation failure, axis fire and Disturbances caused by over current and over Voltage. Elucidate about the Protection against over current and over voltage and the role of Surge arrestors, smoothing reactors in dc link protection.	
<b>CO411.4</b>	Outline about Sources of reactive power such as static VAR system, TCR, SVC etc. and its Reactive power control during transients. Design of various harmonic reduction AC filters, DC filters and their effects.	
<b>CO411.5</b>	Explicate the types of MTDC system and compare series and parallel MTDC system. Explain about HVDC insulation, DC line insulators , DC breakers and its Characteristics.	

<b>COURSE NAME: C412 SMART GRID</b>		<b>YR/SEM: IV/VIII</b>
<b>COURSE OUTCOME NO</b>	<b>COURSE OUTCOMES</b>	
<b>CO412.1</b>	Explain the evolution of electric grid and need for smart grid to compare the conventional & smart grid. Demonstrate the enabling technologies in smart grid architecture. Illustrate the international experience in smart grid deployment efforts and smart grid road map for India.	
<b>CO412.2</b>	Explain the fundamentals of synchrophasor technology with concept and benefits of wide area monitoring system. Illustrate the structure and functions of Phasor Measuring Unit (PMU) and Phasor Data Concentrator (PDC) with road map for	



	synchrophasor applications (NAPSI)
<b>CO412.3</b>	Explain the features and functions of smart meters with specification. Illustrate AMR and AMI drivers, benefits and protocol in Demand Side Integration with Peak load, Outage and Power Quality management
<b>CO412.4</b>	Explain the overview of smart grid communication system with Modulation and Demodulation techniques. Explain the Radio communication, Mobile communication, Power line communication and Optical fiber communication with communication protocol for smart grid
<b>CO412.5</b>	Outline the overview and concept of renewable integration with protective relaying in smart grid. Inter House Area Network with Advanced Energy Storage Technology in Flow battery, Fuel cell, SMES, Super capacitors and Plug-in Hybrid electric Vehicles. Explain Smart grid information model with cyber security.

<b>Course Name: C413 PROJECT WORK - II</b>		<b>YR/SEM: IV/VIII</b>
<b>COURSE OUTCOME NO</b>	<b>COURSE OUTCOMES</b>	
<b>CO413.1</b>	Students will be in a position to take up any challenging practical problems and find solution by formulating proper methodology.	
<b>CO413.2</b>	Formulate a real world problem in the food processing sector, identify the requirement and develop project.	
<b>CO413.3</b>	Identify technical ideas, strategies and methodologies to find solution to the proposed project.	
<b>CO413.4</b>	Utilize new tools and techniques that contribute to obtain solution to the project.	
<b>CO413.5</b>	Prepare report and present oral demonstrations.	

<b>COURSE NAME: C415 COMPREHENSIVE VIVA</b>		<b>YR/SEM: IV/VIII</b>
<b>COURSE OUTCOME NO</b>	<b>COURSE OUTCOMES</b>	
<b>C414.1</b>	Demonstrate knowledge in the program domain.	
<b>C414.2</b>	Present his views cogently and precisely. Exhibit professional etiquette suitable for career progression	
<b>C414.3</b>	Exhibit the strength and grip on the fundamentals of the subjects studied in the previous semesters	
<b>C414.4</b>	Demonstrate an understanding of advanced topics	
<b>C414.5</b>	Comprehend for all the courses studied in the entire programme and also Ability to understand in-depth concepts of all the courses in curriculum	





**Course Name: C415 PROFESSIONAL ETHICS**

**YR/SEM: IV/VIII**

<b>COURSE OUTCOME NO</b>	<b>COURSE OUTCOMES</b>
C415.1	Upon completion of the course, the student should be able to apply ethics in society, discuss the ethical issues related to engineering and realize the responsibilities and rights in the society.
C415.2	Articulate engineering ethics theory with sustained lifelong learning.
C415.3	Adopt a good character and follow high professional ethical life.
C415.4	Confront and resolve moral issues occurred during technological activities.
C415.5	Resolve moral and ethical problems through exploration and assessment by established experiments.



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