GOVERNMENT COLLEGE OF TECHNOLOGY

(An Autonomous Institution Affiliated to Anna University)

Coimbatore - 641 013

Curriculum & Syllabi

B. E. ELECTRICAL AND ELECTRONICS ENGINEERING

(Working Professionals)

2025

Regulations

OFFICE OF THE CONTROLLER OF EXAMINATIONS
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GOVERNMENT COLLEGE OF TECHNOLOGY, COIMBATORE – 641 013
B.E.ELECTRICAL AND ELECTRONICS ENGINEERING – WORKING PROFESSIONALS
2025 REGULATIONS
(Candidates admitted during 2025-2026 and onwards)

FIRST SEMESTER

Sl. No.	Course Code	Course Title	Sessional Marks	Final Exam Marks	Total Marks	Credits			
						L	T	P	C
THEORY									
1	25WPE1Z1	Applied Mathematics I (Common to Civil, Mech & ECE Branches)	40	60	100	3	0	0	3
2	25WPE1Z2	Environmental Science and Engineering (Common to Civil, Mech & ECE Branches)	40	60	100	3	0	0	3
3	25WPE103	Programming in C	40	60	100	3	0	0	3
4	25WPE104	Electric Circuit Theory	40	60	100	3	0	0	3
PRACTICAL									
5	25WPE105	Programming in C Laboratory	60	40	100	0	0	3	1.5
		TOTAL			500	12	0	3	13.5

SECOND SEMESTER

Sl. No.	Course Code	Course Title	Sessional Marks	Final Exam Marks	Total Marks	Credits			
						L	T	P	C
THEORY									
1	25WPE2Z1	Applied Mathematics II (Common to Mech & ECE Branches)	40	60	100	3	0	0	3
2	25WPE202	Electronic Devices and Circuits	40	60	100	3	0	0	3
3	25WPE203	Digital Circuits	40	60	100	3	0	0	3
4	25WPE204	Electrical Machines-I	40	60	100	3	0	0	3
PRACTICAL									
5	25WPE205	Electric Circuits and Electronic Devices Laboratory	60	40	100	0	0	3	1.5
		TOTAL			500	12	0	3	13.5

25WPE1Z1	APPLIED MATHEMATICS I *(Common to Civil, Mech & ECE* Branches*)*	SEMESTER I			
PREREQUISITES		**L**	**T**	**P**	**C**
NIL		**3**	**0**	**0**	**3**

Course Objectives	This course mainly deals with topics such as linear algebra, single variablecalculus and numerical methods and plays an important role in the understanding of engineering science.	
UNIT – I	**LINEAR ALGEBRA**	**9 Periods**
Consistency of System of Linear Equations, Eigenvalues and eigenvectors, Diagonalization ofmatrices by orthogonal transformation, Cayley-Hamilton Theorem, Quadratic form to canonical forms.		
UNIT – II	**DIFFERENTIAL CALCULUS**	**9 Periods**
Radius of curvature, Centre of curvature, Circle of curvature, Evolutes of a curve, Envelopes		
UNIT – III	**INTEGRAL CALCULUS**	**9 Periods**
Evaluation of definite and improper integrals, Applications: surface area and volume ofrevolution (Cartesian coordinates only).		
UNIT – IV	**NUMERICAL SOLUTION OF EQUATIONS**	**9 Periods**
Algebraic and Transcendental equation: Fixed point iteration method, Bisection method,Newton-Raphson method, Simultaneous equation: Gauss elimination method, Gauss-Jordan method, Gauss Seidal method.		
UNIT – V	**NUMERICAL INTERPOLATION**	**9 Periods**
Equal interval: Newton's forward and Backward difference interpolation formulae, Gaussforward and Backward difference interpolation formulae, Unequal interval: Lagrange's interpolation, Newton's divided difference interpolation.		
Contact Periods: **Lecture: 45 Periods Tutorial: 0 Periods Practical: 0 Periods Total: 45 Periods**		

TEXT BOOK

1	*Veerarajan T., "**Engineering Mathematics I"**, Tata McGraw-Hill Education (India)Pvt. Ltd, New Delhi, Edition 1, 2017.*
2	*P. Kandasamy, K. Thilagavathy, K. Gunavathi, "**Numerical Methods"**, S. Chand & Company, 3rd Edition, Reprint , 2013.*

REFERENCE BOOK

1	*B.S.Grewal, " **Higher Engineering Mathematics", Khanna Publishers, 44th Edition, 2021.*
2	*David C.Lay, **"Linear Algebra and Its Application", Pearson Publishers, 6thEdition, 2021.*
3	*Howard Anton, **"Elementary Linear Algebra",11th Edition, Wiley Publication, 2013.*
4	*Narayanan.S and Manicavachagom Pillai. T.K. – **Calculus Vol I and Vol II,** S.chand & Co, Sixth Edition, 2016.*
5	*S.S. Sastry, "**Introductory methods of numerical analysis", PHI, New Delhi, 5th Edition, 2015.*
6	*Ward Cheney, David Kincaid, **"Numerical Methods and Computing",** Cengage Learning**,** Delhi, 7th Edition 2013.*
7	*Jain R.K. and Iyengar S.R.K., - **Advanced Engineering Mathematics**, Narosa Publications, Eighth Edition, 2012.*

COURSE OUTCOMES: Upon completion of the course, the students will be able to:		**Bloom's Taxonomy Mapped**
CO1	Use the essential tool of matrices and linear algebra in a comprehensive manner.	K3
CO2	Explain the fallouts of circle of curvature, evolute and envelops that is fundamental to application of analysis to Engineering problems.	K3
CO3	Interpret the integral calculus to notions of definite and to improper integrals. Apart from some other applications they will have a basic understanding of Beta and Gamma functions.	K3
CO4	Demonstrate understanding of common numerical methods and how they are used to obtain approximate solutions to polynomial and transcendental equations.	K3
CO5	Derive numerical methods for various mathematical operations and tasks, such as interpolation, differentiation, integration, the solution of linear and nonlinear equations.	K3

25WPE1Z2	**ENVIRONMENTAL SCIENCE AND ENGINEEREING** *(Common to CIVIL, MECH & ECE Branches)*	**SEMESTER I**

PREREQUISITES	**L**	**T**	**P**	**C**
NIL	**3**	**0**	**0**	**3**

Course Objectives	The course is aimed at creating awareness among the students and also inseminates the critical ideas of preserving environment.	
UNIT – I	**ENVIRONMENTAL ENERGY RESOURCES**	**9 Periods**
Food-effects of modern agriculture, fertilizers, pesticides, eutrophication & biomagnifications-Energy resources: renewable resources - Hydro Energy, Solar & Wind. Non-renewable resources – Coal and Petroleum - harnessing methods.		
UNIT – II	**ECO SYSTEM AND BIODIVERSITY**	**9 Periods**
Eco system and its components - biotic and abiotic components. Biodiversity: types and values of biodiversity, hot spots of biodiversity, endangered and endemic species, conservation of biodiversity: In situ and ex situ conservation. Threats to biodiversity-destruction of habitat, habit fragmentation, hunting, over exploitation and man-wildlife conflicts. The IUCN red list categories.		
UNIT – III	**ENVIRONMENTAL POLLUTION**	**9 Periods**
Air pollution, classification of air pollutants – sources, effects and control of gaseous pollutants SO_2, NO_2, H_2S, CO, CO_2 and particulates. Water pollution - classification of water pollutants, organic and inorganic pollutants, sources, effects and control of water pollution. Noise pollution - decibel scale, sources, effects and control.		
UNIT – IV	**ENVIRONMENTAL THREATS**	**9 Periods**
Global warming-measure to check global warming - impacts of enhanced Greenhouse effect, Acid rain- effects and control of acid rain, ozone layer depletion- effects of ozone depletion, disaster management - flood, drought, earthquake and tsunami.		
UNIT – V	**SOCIAL ISSUES AND ENVIRONMENT**	**9 Periods**
Water conservation, rain water harvesting, e-waste management, Pollution Control Act, Wild life Protection Act. Population growth- exponential and logistic growth, variation in population among nations, population policy. Women and Child welfare programs. Role of information technology in human and health, COVID-19 - effects and preventive measures.		
Contact Periods: **Lecture:45 Periods** **Tutorial: 0 Periods** **Practical: 0 Periods** **Total:45 Periods**		

TEXT BOOK:

1	*Sharma J.P., **"Environmental Studies"**, 4th Edition, University Science Press, New Delhi, 2016.*
2	*Anubha Kaushik and C.P.Kaushik, **"Environmental Science and Engineering"**, 7th Edition, New age international publishers, New Delhi, 2021.*

REFERENCES:

1	*A k de, **"Environmental Chemistry"**, 8th edition, New age international publishers, 2017.*
2	*G. Tyler miller and scott e. Spoolman, **"Environmental Science"**, cengage learning india pvt. Ltd., delhi, 2014.*
3	*Erach Bharucha, **"Textbook of Environmental Studies"**, Universities press (I) pvt, Ltd., Hydrabad, 2015.*
4	*Gilbert M. Masters, **"Introduction to Environmental Engineering and Science"**, 3rd Edition, Pearson Education, 2015.*

COURSE OUTCOMES: Upon completion of the course, the students will be able to:		**Bloom's Taxonomy Mapped**
CO1	Recognize and understand about the various environmental energy resources and the effective utility of modern agriculture.	K2
CO2	Acquire knowledge about the interaction of biosphere with environment and conservation methods of bio diversity.	K2
CO3	Be aware of the sources of various types of pollution, their ill effects and preventive methods.	K2
CO4	Identify and take the preventive measures to control the environmental threats and effects of Global warming, Ozone depletion, Acid rain, and natural disasters.	K2
CO5	Demonstrate an idea to save water and other issues like COVID -19.	K2

25WPE103	PROGRAMMING IN C	SEMESTER I			
PREREQUISITES		**L**	**T**	**P**	**C**
NIL		**3**	**0**	**0**	**3**

Course Objectives	1. To Familiarize with Computer and Programming fundamentals 2. To understand Data types in C and Flow control statements 3. To outline Functions, Arrays, Pointers and Strings 4. To recognize Bitwise Operators, Pre-processor Directives, Structures and Unions 5. To build Structures, Unions, List Processing, Input and Output functions.	
UNIT – I	**COMPUTER AND PROGRAMMING FUNDAMENTALS**	**9 Periods**
Computer fundamentals –Anatomy of a computer: CPU, Memory, I/O – Introduction to software – Generation and classification of programming languages – Compiling – Linking and loading a program – Translator – loader – linker – develop a program – software development – Introduction to OS –Types of OS – Algorithms – Structured programming concept.		
UNIT – II	**DATA TYPES AND FLOW OF CONTROL**	**9 Periods**
An overview of C – Programming and Preparation – Program Input /Output – Variables – Expressions, and Assignment, The use of #include, printf(), scanf() – Lexical elements, operators - The fundamental data types – Flow of control		
UNIT – III	**FUNCTIONS, ARRAYS, POINTERS AND STRINGS**	**9 Periods**
Functions and storage classes - Arrays – Pointers – Call by reference – Relationship between Arrays and Pointers – Pointer arithmetic and element size – Arrays as function argument – Dynamic memory allocation – Strings – String handing functions – Multidimensional Arrays.		
UNIT – IV	**ARRAY OF POINTERS, BITWISE OPERATORS, PREPROCESSOR DIRECTIVES**	**9 Periods**
Arrays of Pointers – Arguments to main () - Functions as Arguments – Array of Pointers to Functions - Type qualifiers. -Bitwise operators and expressions – Masks – Software tools – Packing and unpacking – Enumeration types – The preprocessor directives.		
UNIT – V	**STRUCTURES AND UNIONS, I/O AND FILE OPERATIONS**	**9 Periods**
Structures and Unions – Operator precedence and associativity – Bit fields – Accessing bits and bytes - Input and Output functions – File Processing Functions – Environment variables – Use of make and touch.		
Contact Periods: **Lecture: 45 Periods Tutorial: 0 Periods Practical: 0 Periods Total: 45 Periods**		

TEXT BOOK:

1	*Pradip Dey, Manas Ghosh, "**Computer Fundamentals and Programming in C**", Second Edition, Oxford University Press, 2013.*
2	*Ashok H. Kamthane, Amit Ashok Kamthane, "**Programming in C**", Third Edition, Pearson, 2015.*

REFERENCES:

1	*Stephen G. Kochan, "**Programming in C-A complete introduction to the C programming language"**, Third Edition, Sams Publication, 2004.*
2	*Yashavant P. Kanetkar, "**Let Us C**", 13th edition, BPB Publications, 2013.*
4	*Stephen Prata, "**C Primer Plus**", Fifth Edition, Sams Publishing, 2005.*
3	*Brian W. Kernighan and Dennis Ritchie, "**The C Programming Language**", Second Edition, Prentice Hall Software Series, 1988.*

COURSE OUTCOMES: On completion of the course, the students will be able to:		**Bloom's Taxonomy Mapped**
CO1	Explain the fundamentals of computer systems, programming concepts, C language structure, data types, and control flow, including the role of compilers, linkers, operating systems, and structured programming principles.	K2
CO2	Apply C programming constructs such as variables, operators, control statements, functions, arrays, and basic I/O operations to develop simple and modular C programs following structured programming practices.	K3
CO3	Analyze the use of functions, pointers, arrays, strings, storage classes, and dynamic memory allocation in C.	K4
CO4	Demonstrate the use of advanced C features such as arrays of pointers, function pointers, bitwise operators, preprocessor directives, and enumeration types to implement efficient and optimized programs.	K5
CO5	Design and develop complete C applications by integrating algorithms, control structures, functions, pointers, structures, file operations, and software development tools.	K6

25WPE104	ELECTRIC CIRCUIT THEORY	SEMESTER I

PREREQUISITES	L	T	P	C
NIL	3	0	0	3

Course Objectives	To gain knowledge in basic concepts of circuit theory and finally be able to analyze and synthesize electric circuits	
UNIT – I	**DC AND AC CIRCUIT ANALYSIS**	**9 Periods**
Ohm's law and Kirchhoff's Laws –Form Factor and Peak Factor derivation for alternating waveforms - R, L, C series-parallel circuits - Star-delta transformation - Source transformations - Mesh and nodal methods –Power factor - Real, reactive and apparent powers.		
UNIT – II	**NETWORK THEOREMS AND POLYPHASE CIRCUITS**	**9 Periods**
Superposition theorem – Thevenin's and Norton's theorems - Maximum power transfer theorem - Reciprocity theorem. Three phase system - Interconnection of three- phase sources and loads - Balanced and unbalanced circuits - Power measurement.		
UNIT – III	**RESONANCE AND COUPLED CIRCUITS**	**9 Periods**
Resonance in series and parallel circuits – frequency response - derivation of bandwidth - Introduction to coupled circuits – Mutual inductance – Coefficient of coupling - Dot rule - Problems.		
UNIT – IV	**TRANSIENTS**	**9 Periods**
Transient response of RL, RC and RLC circuits with DC excitation – Sinusoidal response of RL, RC, RLC circuits.		
UNIT – V	**TWO PORT NETWORKS**	**9 Periods**
Two port networks - Impedance and Admittance parameters – Transmission and inverse transmission parameters – Hybrid and inverse hybrid parameters - Application.		
Contact Periods: **Lecture: 45 Periods Tutorial: 0 Periods Practical: 0 Periods Total: 45 Periods**		

TEXT BOOK:

1	*Sudakar A. and Shyam Mohan S.Palli,* ***"Circuits and Networks (Analysis and Synthesis)",*** *Tata McGraw Hill Book Co., New Delhi, III Ed., 2017.*
2	*Charles K. Alexander, Matthew N.O. Sadiku,* ***"Fundamentals of Electric Circuits",*** *McGraw Hill Book Co., 7 Ed. 2020.*

REFERENCES:

1	*Hayt W.H and Kemmerley J.E,* ***"Engineering Circuit Analysis"****, Tata McGraw Hill Book Co., V Ed., 2019.*
2	*C.P. Kuriakose,* ***"Circuit Theory: Continuous and Discrete – time systems – Elements of Network Synthesis",*** *PHI, Delhi, 2018.*
3	*Gangadhar K.A.,* ***"Circuit Theory"****, Khanna Publishers, II Ed., 2019.*
4	*M.E.VanValkenburg,* ***"Network Analysis"****, PHI, Delhi, 2019.*

COURSE OUTCOMES: On completion of the course, the students will be able to:		**Bloom's Taxonomy Mapped**
CO1	Explain the fundamental laws and concepts of electric circuits, including Ohm's law, Kirchhoff's laws, AC waveform parameters, resonance, transient behavior	K2
CO2	Apply circuit analysis techniques such as mesh and nodal analysis, network theorems, resonance conditions, and transient response equations to solve DC, AC, and three-phase circuit problems	K3
CO3	Analyze single-phase and polyphase circuits to determine voltage, current, power, power factor, resonance characteristics, and transient responses under various operating conditions.	K4
CO4	Evaluate the suitability of network theorems, source transformations, and two-port network parameters for simplifying complex circuits and optimizing power transfer and system performance.	K5
CO5	Design and model electrical networks involving resonance, transient conditions, three-phase systems, and two-port networks to meet specified electrical performance criteria.	K6

25WPE105	PROGRAMMING IN C LABORATORY	SEMESTER I

PREREQUISITES	L	T	P	C
NIL	0	0	3	1.5

Course Objectives	Upon completion of this course, the Students will be familiar with 1.Data types in C and Flow control statements 2. Functions, Arrays, Pointers and Strings 3. Dynamic memory allocation and command line arguments 4.Bitwise Operators, Preprocessor Directives, Structures and Unions 5. Structures, List Processing, Input and Output.

PRACTICALS EXERCISES ILLUSTRATING THE FOLLOWING CONCEPTS:

1 Operators, Expressions and I/O formatting
2 Decision Making and Looping
3 Arrays and Strings
4 Functions and Recursion
5 Pointers
6 Dynamic Memory Allocation
7 Structures
8 Unions
9 Files
10 Command line arguments

Contact Periods:
Lecture: 0 Periods Tutorial: 0 Periods Practical: 15 Periods Total: 45 Periods

COURSE OUTCOMES: On completion of the course, the students will be able to:		**Bloom's Taxonomy Mapped**
CO1	Apply operators, expressions, formatted input/output, decision-making statements, and looping constructs to develop basic C programs for solving computational problems.	K3
CO2	Develop C programs using arrays, strings, and functions, including recursion, to process data efficiently and modularize program logic.	K4
CO3	Evaluate the effectiveness of structures, unions, and file handling techniques in organizing data, storing records, and performing persistent data operations.	K5
CO4	Design and implement complete C applications integrating functions, pointers, dynamic memory allocation, structures, file operations, and command-line arguments to solve real-world programming problems.	K6
CO5	Use modern programming tools such as IDEs, debuggers, and online learning resources to design, implement, test, and continuously improve C programs, demonstrating self-learning ability and adaptability to emerging technologies.	K3

25WPE2Z1	APPLIED MATHEMATICS II *(Common to Mech & ECE Branches)*	SEMESTER II

PREREQUISITES	L	T	P	C
NIL	3	0	0	3

Course Objectives	To focus on differential equations and Numerical Techniques which is important for comprehending engineering science.	
UNIT–I	**ORDINARY DIFFERENTIAL EQUATIONS**	**9Periods**
Higher order linear differential equations with constant coefficients – variable coefficients: Cauchy Euler equation, Cauchy-Legendre equation-Method of variation of parameters.		
UNIT–II	**PARTIAL DIFFERENTIAL EQUATIONS**	**9Periods**
Formation of partial differential equations – First order partial differential equations: Standard types and Lagrange's linear equation – Homogeneous linear partial differential equations of second and higher order with constant coefficients.		
UNIT–III	**NUMERICAL DIFFERENTIATION AND INTEGRATION**	**9Periods**
Numerical Differentiation(using Newton's interpolation formula) – Numerical integration: Trapezoidal rule and Simpson's rules (Both single and double integrals).		
UNIT–IV	**NUMERICAL SOLUTION OF FIRST ORDER ORDINARY DIFFERENTIAL EQUATIONS**	**9Periods**
Single Step Methods: Taylor's series Method-Euler's and modified Euler's methods–Runge– Kutta method of fourth order Multi Step methods - Milne's and Adam's predicator-corrector methods		
UNIT–V	**NUMERICAL SOLUTION OF PARTIAL DIFFERENTIAL EQUATIONS**	**9Periods**
Finite difference solution of two-dimensional Laplace equation and Poisson equation- Implicit and explicit methods for one dimensional heat equation (Bender-Schmidt and Crank-Nicholson methods) –Finite difference explicit method for one dimensional wave equation.		

ContactPeriods:

Lecture:45PeriodsTutorial:0Periods **Practical:0Periods Total:45 Periods**

TEXTBOOK

1	*Veerarajan.T,* ***"Engineering Mathematics"****, Tata McGraw Hill Education (India) Private Limited, New Delhi, 2018*
2	*P. Kandasamy, K. Thilagavathy, K. Gunavathi,* ***"Numerical Methods"****, S. Chand & Company, 3rd Edition, Reprint 2013.*

REFERENCES

1	*B.S.Grewal,* ***"Higher Engineering Mathematics"****, Khanna Publishers, New Delhi, 45th Edition, 2024*
2	*SrimantaPal,* ***"Numerical Methods Principles, Analyses and Algorithms"****, Oxford University Press, New Delhi, IEdition 2012.*
3	*Raisinghania.M..D,* ***"Ordinary And Partial Differential Equations"****, 20th Edition, S. ChandPublishing,2020*
4	*S.Larsson and V.Thomee,* ***"Partial Differential Equations with Numerical Methods"****, Springer, 2003, 2nd printing 2008 Edition*

COURSEOUTCOMES: Upon completion of the course, the students will be able to:		**Bloom's Taxonomy Mapped**
CO1	Solve higher order linear differential equation with constant and variable coefficients and simultaneous differential equation.	K3
CO2	Form partial differential equations and find solutions of first and higher order partial differential equations	K3
CO3	Obtain approximate solutions for transcendental equations and problems on interpolation, differentiation, integration.	K3
CO4	Find the numerical solutions of first order ordinary differential equations using single and multi-step techniques.	K3
CO5	Solve second order partial differential equations using explicit and implicit methods.	K3

25WPE202	ELECTRONIC DEVICES AND CIRCUITS	SEMESTER II

PREREQUISITES	L	T	P	C
NIL	3	0	0	3

UNIT – I	BASIC SEMICONDUCTOR DEVICES AND APPLICATIONS	9Periods

PN diode: VI characteristics–transition and diffusion capacitance–reverserecovery time–Applications: Half-wave and Full-wave rectifiers with filters–Clipping and clamping circuits–Avalanche and Zener breakdown-Zener diodes– Applications.

UNIT – II	BI-POLAR JUNCTION TRANSISTORS	9Periods

BJT: Structure–operation and characteristics– as an amplifier and switch–DC operating point – base, emitter and voltage-divider bias – Stability factor –Miller's theorem.

UNIT - III	BJT AMPLIFIERS	9Periods

BJT amplifier: operation –AC equivalent circuits–CE,CC,CB configurations-multistage–RC coupled–transformer coupled–Darlington and differential amplifiers– basics of frequency response – Low–high and total Frequency response –Power amplifiers –operation – characteristics– parameters of Class A, AB, B and C amplifiers

UNIT – IV	FIELD-EFFECT TRANSISTORS	9Periods

JFET: Structure, operation and characteristics with parameters–biasing configurations – MOSFET: Structure–types (Depletion and Enhancement)–operation and characteristics–biasing configurations– Stability factor - VMOSFET–CMOS technology.

UNIT – V	FEEDBACK TECHNIQUES AND OSCILLATORS	9Periods

Concepts of feedbacks –Negative feedback: shunt and series feedback- Positive feedback: Wien Bridge and RC phase shift oscillators.

Contact Periods:
Lecture: 45 PeriodsTutorial: 0 Periods Practical: 0 Periods Total: 45 Periods

TEXT BOOK :

1	*ThomasL.Floyd, "**ElectronicDevices**",10th Edition.,Prentice Hall Inc.,2018.*
2	*RobertBoylestad, **"ElectronicDevicesandCircuitTheory"**,11th Edition, Pearson,2014.*

REFERENCES:

1	*Jacob Millman,Christos C Halkias and SatyabrataJIT,"**ElectronDevicesand Circuits**", 4th Ed.,TataMcGrawHill,2015.*
2	*Allen Mottershead, "**Electronic Devices and Circuits, An Introduction**", Eastern Economy Ed.,Prentice-HallofIndia,2009.*

COURSEOUTCOMES: Upon completion of the course, the students will be able to:		**Bloom's Taxonomy Mapped**
CO1	**Explain** the basic operation and characteristics of semiconductor devices such as diodes, BJTs, JFETs, and MOSFETs.	K2
CO2	**Apply** appropriate biasing methods to set and analyze the operating point of transistor circuits.	K3
CO3	**Analyse** the performance and frequency response of BJT and FET amplifiers, including power amplifiers.	K4
CO4	**Apply** feedback principles to determine changes in amplifier performance and identify the conditions required for oscillations in practical circuits.	K3
CO5	**Apply** standard circuit design techniques to construct rectifiers, clipping / clamping circuits, amplifiers, feedback circuits, and oscillators for given specifications.	K3

25WPE203	DIGITALCIRCUITS	SEMESTER II			
PREREQUISITES		**L**	**T**	**P**	**C**
NIL		**3**	**0**	**0**	**3**

UNIT – I	**BOOLEAN ALGEBRA AND LOGIC GATES**	**9Periods**
Binary Systems, Boolean Algebra and Logic gates – Boolean functions - Canonical and Standard Forms - Digital Logic gates – Integrated circuits. Gate level minimization – Map methods- NAND and NOR Implementation.		
UNIT – II	**COMBINATIONAL LOGIC**	**9Periods**
Combinational circuits - Analysis and Design Procedure- Binary adder subtractor - Decimal adder – Binary multiplier – Magnitude comparator – Decoders – Encoders – Multiplexers.		
UNIT – III	**SYNCHRONOUS SEQUENTIAL LOGIC**	**9Periods**
Sequential circuits- Latches – Flip flops – Analysis of Clocked Sequential Circuits – State Reduction and Assignment - Design Procedure.		
UNIT - IV	**ASYNCHRONOUS SEQUENTIAL LOGIC**	**9Periods**
Asynchronous Circuits - Analysis Procedure - Circuits with Latches – Reduction of State Flow Tables – Race Free State Assignment – Hazards - Design Example.		
UNIT – V	**REGISTERS, COUNTERS AND MEMORY**	**9Periods**
Registers, Shift Registers, Ripple Counters, Synchronous Counters, Random Access Memory, Memory Decoding, Error Detection and Correction, Read Only Memory, Programmable Logic Array. Register Transfer Level Introduction, Algorithmic State Machines, Binary Multiplier.		
Contact Periods: **Lecture: 45 Periods Tutorial: 0 Periods Practical: 0 Periods Total: 45 Periods**		

TEXT BOOK:

1	*Morris Mano. M,**"Digital Design"** Pearson Education, New Delhi, 6th Ed., 2018.*
2.	*Floyd Thomas L., **"Digital fundamentals"** Pearson Education, New Delhi, 11th Ed., 2017.*

REFERENCES:

1	*Ronald J. Tocci, Neal S Widmer, Gregory L Moss, **"Digital Systems: Principles and Applications",** Prentice Hall, 12th Ed., 2017*
2	*Floyd Thomas L., **"Digital fundamentals"** Pearson Education, New Delhi, 11th Ed.,2015.*
3	*Charles H.Roth, **"Fundamentals of Logic Design"** 7th Ed., Cl-Engineering, 2013.*

COURSEOUTCOMES: Upon completion of the course, the students will be able to:		**Bloom's Taxonomy Mapped**
CO1	Explain Boolean algebra, logic gates, and methods for simplifying logic functions.	K2
CO2	Apply combinational logic design techniques to implement arithmetic and data-handling circuits.	K3
CO3	Analyze sequential circuits using latches, flip-flops, and state diagrams to determine system behavior.	K4
CO4	Apply design procedures to develop asynchronous circuits and identify hazards and race conditions.	K3
CO5	Analyze and interpret the operation of registers, counters, and memory systems.	K4

25WPE204	ELECTRICAL MACHINES - I	SEMESTER II

PREREQUISITES	L	T	P	C
NIL	3	0	0	3

UNIT – I	PRINCIPLES OF ELECTROMECHANICAL ENERGY CONVERSION	9Periods

Energy in magnetic system – Field energy and co energy - Force and torque equations- eddy currents and eddy current losses – flux distribution curve in the air gap – Singly and multiply excited magnetic field systems - mmf of distributed ac windings – Winding Inductances - Rotating Magnetic Field and mmf waves - Magnetic saturation and leakage fluxes.

UNIT – II	DC GENERATORS	9Periods

Constructional details and principle of operation – Armature winding -Emf equation – Types- Armature reaction: Effects - demagnetizing & cross magnetizing ampere-turns – compensating windings – interpoles; Commutation – Characteristics of DC generators - losses and efficiency -Parallel operation of dc generators- Applications.

UNIT – III	DC MOTORS	9Periods

Constructional details and principle of operation- back emf – Types of dc motors - Torque equation, power flow diagram, losses and efficiency – Electrical and mechanical characteristics of different types of motors – Starters – Speed control methods – Types of Electric braking.

UNIT – IV	TRANSFORMERS	9Periods

Principle of operation – Types and constructional features of single phase and three phase transformers –EMF equation - Phasor diagram – Transformers on load - Equivalent circuit – Voltage Regulation and efficiency- All day efficiency - Three phase transformer connections – Scott connection – Parallel operation of three phase transformers – Inrush current phenomenon and its prevention - Auto transformers, Off-load and on-load tap changing transformer-Isolation Transformers.

UNIT – V	TESTING OF DC MACHINES AND TRANSFORMERS	9Periods

DC machines: Brake test, field test, Retardation test, Swinburne's test, Hopkinson's test. Transformers: – Phasing, Identification and Polarity test on transformer winding - Sumpner's test.

Contact Periods:
Lecture:45 Periods Tutorial: 0 Periods Practical: 0 Periods Total: 45 Periods

TEXT BOOK:

1	*Nagrath J. and D. P. Kothari,* ***"Theory of Electric Machines",*** *5th edition, Tata McGraw Hill, 2017.*
2	*Fitzgerald A. E., C. Kingsley and S. Umans,* ***"Electric Machinery",*** *7/e, McGraw Hill, 2020.*

REFERENCES:

1	*Bimbra P. S.,* ***"Electrical Machinery",*** *7/e, Khanna Publishers, 2021.*
2	*Theraja B. L.,* ***"A Textbook of Electrical Technology",*** *S.Chand, New Delhi. Reprint 2019.*
3	*Abhijith Chakrabarti, Sudipta Debnath,* ***"Electrical Machines",*** *McGraw Hill Education, New Delhi, 2015.*
4	*Deshpande M. V.,* ***"Electrical Machines",*** *Prentice Hall India, New Delhi, 2011.*

COURSEOUTCOMES: Upon completion of the course, the students will be able to:		**Bloom's Taxonomy Mapped**
CO1	Explain the principles of electromechanical energy conversion and the operation of DC Machines and Transformers.	K2
CO2	Derive the expressions for Emf, Torque and speed of different types of DC Machines.	K3
CO3	Apply basic principles to calculate emf, regulation and efficiency of different types of transformers	K3
CO4	Analyze the performance characteristics of different types of DC Machines and Transformers.	K4
CO5	Obtain the performance of different DC machines and Transformers by conducting suitable tests.	K3

25WPE205	ELECTRIC CIRCUITS AND ELECTRONIC DEVICES LABORATORY	SEMESTER II

PREREQUISITES	L	T	P	C
NIL	0	0	3	1.5

ListofExperiments:

1. Verification of Ohm'sLaw and Kirchhoff's laws.
2. Verification of network theorems.
3. Analysis of First order R-Land R-C Circuits / Second order RLC Circuits
4. Measurement of average, rms, form and peak factor of time varying signals
5. Three Phase power measurement
6. Semiconductor diode characteristics.
7. Zener diode characteristics and voltage regulation.
8. Transistor characteristics –common emitter mode and common basemode.
9. Characteristics of UJT and generation of sawtooth waveforms.
10. Characteristics of FET.

Contact Periods:
Lecture:0Periods Tutorial:0Periods Practical:45Periods Total:45Periods

COURSEOUTCOMES: Upon completion of the course, the students will be able to:		**Bloom's Taxonomy Mapped**
CO1	Verify the basic laws of circuit the ory and various net work theorems.	K4
CO2	Infer the characteristics of basic semiconductor devices.	K4
CO3	Measure the real and reactive power in three phase net works.	K4
CO4	Analyze the circuits and devices using simulation tool.	K4
CO5	Determine the parameters of electronic circuits.	K4