GOVERNMENT COLLEGE OF TECHNOLOGY

(An Autonomous Institution Affiliated to Anna University)
Coimbatore - 641 013

Curriculum For

ELECTRICAL AND ELECTRONICS ENGINEERING

(PART TIME)

2023

Regulations

OFFICE OF CONTROLLER OF EXAMINATIONS

GOVERNMENT COLLEGE OF TECHNOLOGY

THADAGAM ROAD, COIMBATORE - 641 013

PHONE 0422 - 2433355

email: coegct@gmail.com

GOVERNMENT COLLEGE OF TECHNOLOGY, COIMBATORE – 641 013

B.E. ELECTRICAL AND ELECTRONICS ENGINEERING - PART TIME

2023 REGULATIONS

(Candidates admitted during 2022-2023 and onwards)

SECOND SEMESTER

Sl. No.	Course Code	Course Title	Sessional Marks	Final Exam Marks	Total Marks	Credits			
						L	T	P	C
THEORY									
1	23PTE2Z1	Applied Mathematics – II (Common to MECH, EEE & ECE)	40	60	100	3	0	0	3
2	23PTE202	Electronic Devices and Circuits	40	60	100	3	0	0	3
3	23PTE203	Field Theory	40	60	100	3	0	0	3
4	23PTE204	Digital Circuits	40	60	100	3	0	0	3
5	23PTE205	Electrical Machines-I	40	60	100	3	0	0	3
		TOTAL			500				15

23PTE2Z1	APPLIED MATHEMATICS - II (Common to MECH, EEE & ECE)	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**	**9 Periods**
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**	**9 Periods**
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**	**9 Periods**
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 ORDINARY DIFFERENTIAL EQUATIONS**	**9 Periods**
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**	**9 Periods**
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.		
Contact Periods: **Lecture: 45 Periods Tutorial: 0 Periods Practical: 0 Periods Total: 45 Periods**		

TEXT BOOK

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, 3nd Edition, Reprint 2013.*

REFERENCES

1	*B.S.Grewal, **"Higher Engineering Mathematics"**, Khanna Publishers, New Delhi, 44thEdition, 2018.*
2	*SrimantaPal, **"Numerical Methods Principles, Analyses and Algorithms"**, Oxford University Press, New Delhi, IstEdition 2009.*
3	*Raisinghania.M..D, **"Ordinary And Partial Differential Equations"**, 20th Edition, S. ChandPublishing,2020*
4	*S.S. Sastry, **"Introductory methods of numerical analysis"**, PHI, New Delhi, 5th Edition, 2015.*
5	*S.Larsson and V.Thomee, **"Partial Differential Equations with Numerical Methods"**, Springer, 2003.*

COURSE OUTCOMES: Upon completion of the course, the students will be able to:		**Bloom's Taxonomy Mapped**
CO1	Obtain the knowledge for solving higher order linear differential equation with constant and variable coefficient techniques and simultaneous differential equation.	K3
CO2	Understand the knowledge of partial differential equations (PDEs), modeling; demonstrate accurate and efficient use of Lagrange's techniques.	K3
CO3	Demonstrate and understanding of common numerical methods and how they are used to obtain approximate solutions to polynomial and transcendental equations.	K3
CO4	Construct one-step and linear multistep methods for the numerical solution of initial-value problems for ordinary differential equations.	K3
CO5	Acquire the knowledge of principles for designing numerical schemes for PDEs in particular finite difference schemes.	K3

COURSE ARTICULATION MATRIX

a) CO and PO Mapping

COs/POs	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	3	3	2	2	-	-	-	-	-	-	-	2	-	1
CO2	3	3	2	2	-	-	-	-	-	-	-	2	-	1
CO3	3	3	2	2	-	-	-	-	-	-	-	2	-	1
CO4	3	3	2	2	-	-	-	-	-	-	-	2	-	1
CO5	3	3	2	2	-	-	-	-	-	-	-	2	-	1
23PTE2Z1	3	3	2	2	-	-	-	-	-	-	-	2	-	1
1 – Slight, 2 – Moderate, 3 – Substantial														

23PTE202	ELECTRONIC DEVICES AND CIRCUITS	SEMESTER II

PREREQUISITES	L	T	P	C
NIL	3	0	0	3

Course Objectives	To impart knowledge about various electronic devices and circuits To identify the suitability of electronic devices for real time applications.

UNIT – I	DIODES,SPECIAL DIODES AND APPLICATIONS	9 Periods

PN diode: VI characteristics–transition and diffusion capacitance–reverse recovery time–diode models–Applications: Half-wave and Full-wave rectifiers and filters–power supply regulators–Clipping and clamping circuits–Avalanche and Zener breakdown-Zener diodes–varactor and optical diodes.

UNIT – II	BI-POLAR JUNCTION TRANSISTORS AND AMPLIFIERS	9 Periods

BJT: Structure–operation and characteristics– as an amplifier and switch–DC operating point –base, emitter and voltage-divider bias –Miller's theorem –BJT amplifier : operation –AC equivalent circuits–CE,CC,CB configurations-multistage–RC coupled–transformer coupled–Darlington and differential amplifiers.

UNIT – III	FIELD-EFFECT TRANSISTORS AND BIASING	9 Periods

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

UNIT – IV	AMPLIFIER ANALYSIS AND FEEDBACK TECHNIQUES	9 Periods

BJT and FET amplifiers – basics of frequency response – Low–high and total Frequency response –Power amplifiers –operation – characteristics– parameters of Class A, AB, B and C amplifiers –Operational Amplifier : inverting and non-inverting amplifiers (Quantitative) –concepts of feedbacks –Negative feedback: shunt and series feedback- Positive feedback: Wien Bridge and RC phase shift oscillators.

UNIT – V	OTHER SEMICONDUCTOR DEVICES	9 Periods

Basic constructions, characteristics curves, parameters and applications : SCR – DIAC – TRIAC – Uni-junction Transistors - programmable Uni-junction Transistors –IGBT –photo transistors and optical couplers–New semiconductor materials –SiliconCarbide- GalliumArsenide.

Contact Periods:

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

TEXT BOOK :

1	*ThomasL. Floyd, "**Electronic Devices**", 9th Edition., Prentice Hall Inc.,2012*
2	*Robert Boylestad, **"Electronic Devices and Circuit Theory"**, 9th Edition, Pearson,2010*

REFERENCES:

1	*Jacob Millman, Christos C Halkias and Satyabrata JIT, "**Electron Devices and Circuits**",2nd Ed., Tata Mc Graw Hill,2008*
2	*Allen Mottershead, "**Electronic Devices and Circuits, An Introduction**", Eastern Economy Ed., Prentice - Hall of India, 2009*

COURSE OUTCOMES: On completion of the course, the students will be able to:		**Bloom's Taxonomy Mapped**
CO1	Understand the construction and working of semiconductor devices	K2
CO2	Analyze the characteristics of the devices and their equivalent circuit models	K4
CO3	Design of electronic circuits using devices and components	K3
CO4	Explore the suitability the device for various applications	K5
CO5	Study the special semiconductor and power electronic devices	K2

COURSE ARTICULATION MATRIX :

a) CO and PO Mapping															
COs/POs	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**
CO1	2	2	2	2	2	2	2	-	-	1	1	-	3	3	1
CO2	3	3	1	2	2	-	-	-	-	-	-	2	2	3	1
CO3	3	3	1	2	2	-	-	-	-	2	3	2	2	3	2
CO4	3	2	2	2	2	-	2	-	-	1	2	-	3	2	3
CO5	3	2	2	2	2	-	2	2	-	1	3	3	2	2	2
23PTE 202	3	2	2	2	2	2	2	2	-	1	2	2	2	3	2
1 – Slight, 2 – Moderate, 3 – Substantial															

23PTE203	FIELD THEORY	SEMESTER II

PREREQUISITES	L	T	P	C
NIL	3	0	0	3

Course Objectives	To learn the concepts of static and dynamics of charges, understand electromagnetic fields and work on problem solving and application of these ideas for design

UNIT – I	ELECTROSTATIC POTENTIAL AND FIELD	9 Periods

Types of charges - Charge distribution - Coulomb's Law - Gauss' law - their applications - Potential - Electric field intensity - Boundary Conditions - Laplace and Poisson's equations – Dielectrics – Capacitance - Electrostatic energy.

UNIT – II	MAGNETIC POTENTIAL AND FIELD	9 Periods

Biot - Savart's law - Ampere's law - applications - Scalar and Vector magnetic potentials - Magnetic torque - Force - Boundary conditions – Energy density in magnetic field – Lifting power of electromagnet.

UNIT – III	ELECTRO MAGNETIC FIELDS	9 Periods

Problems in divergence and curl of vector fields in various coordinates - Faraday's laws - Maxwell's equations - Current densities - Time harmonics fields.

UNIT – IV	ELECTROMAGNETIC WAVES	9 Periods

Wave equations – Uniform plane waves in free space - Uniform plane waves in lossless dielectrics – Uniform plane waves in lossy dielectrics – Uniform plane waves in good conductor - Poynting's theorem.

UNIT – V	FIELD MODELING, EMI AND EMC	9 Periods

Field plotting - Laplace equation in rectangular coordinates – Separation of variables - Finite difference method - Finite element method - Infinite square through with lid – Infinite square through with different potentials on four sides – Moment method – EMI and EMC – Sources – Conducted and Radiated EMI – Elimination methods.

Contact Periods:

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

TEXT BOOK:

1	*John D. Kraus and Daniel A. Fleisch **"Electromagnetics with Applications"** Mc Graw Hill International Ed., 2018.*
2	*William H.Hayt **"Engineering Electromagnetics"** McGraw Hill Book Co., 2020*

REFERENCES:

1	*AshutoshPramanik, **"Electromagnetism",** Prentice Hall of India Pvt. Ltd, 2018*
2	*Gangadhar K.A., **"Field Theory",** Khanna Publishers, 2017*
3	*Joseph Edminister, **"Electromagnetics",** 2nd Ed., Tata McGraw Hill Book Co., 2019*
4	*Mathew N.D Sadiku, **"Elements of Electromagnetics",** Oxford university press, Fourth Edition., 2021*
5	*Dr.Dhananjayan.P. **"Engineering Electromagnetics",** Lakshmi Publications, 2021*

COURSE OUTCOMES: On completion of the course, the students will be able to:		**Bloom's Taxonomy Mapped**
CO1	Understand the basics of electric field	K2
CO2	Ascertain the concepts of magnetic field	K3
CO3	Master the fundamentals of electromagnetic field	K3
CO4	Illustrate the knowledge gained to analyze electromagnetic waves	K3
CO5	Estimate the field parameters for a given problem based on field modeling	K4

COURSE ARTICULATION MATRIX :

a) CO and PO Mapping															
COs/POs	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**
CO1	3	3	3	3	1	2	-	-	-	-	-	-	2	1	1
CO2	3	3	3	3	1	2	-	-	-	-	-	-	3	3	1
CO3	3	3	3	3	1	2	-	-	-	-	-	-	3	3	1
CO4	3	3	3	3	1	2	-	-	-	-	-	-	3	2	2
CO5	3	3	3	3	1	2	-	-	-	-	-	-	2	2	2
23PTE 203	3	3	3	3	1	2	-	-	-	-	-	-	3	2	1
1 – Slight, 2 – Moderate, 3 – Substantial															

23PTE204	DIGITAL CIRCUITS	SEMESTER II

PREREQUISITES	L	T	P	C
NIL	3	0	0	3

Course Objectives	To learn the fundamental concepts and design techniques used in digital electronics and also to familiarize with the basics of Hardware description language in the design of digital circuits

UNIT – I	BOOLEAN ALGEBRA AND LOGIC GATES	9 Periods

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	9 Periods

Combinational circuits - Analysis and Design Procedure- Binary adder subtractor - Decimal adder – Binary multiplier – Magnitude comparator – Decoders – Encoders – Multiplexers.

UNIT – III	SYNCHRONOUS AND ASYNCHRONOUS SEQUENTIAL LOGIC	9 Periods

Sequential circuits- Latches – Flip flops – Analysis of Clocked Sequential Circuits – State Reduction and Assignment - Design Procedure. Asynchronous Circuits - Analysis Procedure - Circuits with Latches – Reduction of State Flow Tables – Race Free State Assignment – Hazards - Design Example.

UNIT – IV	REGISTERS, COUNTERS AND MEMORY	9 Periods

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.

UNIT – V	HARDWARE DESCRIPTION LANGUAGE	9 Periods

Introduction to Verilog: Structure of Verilog module, Operators, data types, Styles of description- Data flow description, Implement logic gates, half adder and full adder using Verilog data flow description. Behavioral description: Structure, variable assignment statement, Verilog behavioral description of Multiplexers (2:1,4:1) and Encoders (8 to 3), Decoders (2 to 4).

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	*Samir Palnitkar, **"Verilog HDL- A guide to Digital Design and Synthesis"** Pearson Education, New Delhi, 2ndEd., 2003.*

REFERENCES:

1	*Ronald J. Tocci, Neal S Widmer, Gregory L Moss, **"Digital Systems: Principles and Applications",** Prentice Hall, 12thEd., 2017*
2	*Floyd Thomas L., **"Digital fundamentals"** Pearson Education, New Delhi, 11th Ed., 2015.*
3	*Charles H.Roth, **"Fundamentals of Logic Design"**7thEd., Cl-Engineering, 2013.*
4	*Nazeih M. Botros, **"HDL Programming VHDL and Verilog "**Dreamtech press , 2009.*

COURSE OUTCOMES: On completion of the course, the students will be able to:		**Bloom's Taxonomy Mapped**
CO1	Understand the fundamentals of digital electronics and logic families.	K2
CO2	Illustrate reduction of logical expressions using Boolean algebra and k-map.	K4
CO3	Use the procedures for the analysis and design of combinational circuits	K3
CO4	Analyze the design capability in synchronous and asynchronous sequential circuits	K4
CO5	Design digital logic circuits in different types of modeling using HDL	K6

COURSE ARTICULATION MATRIX :

a) CO and PO Mapping														
COs/POs	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**
CO1	3	2	2	2	-	-	-	-	-	-	-	2	3	2	2
CO2	3	3	2	3	-	-	-	-	-	-	-	-	2	2	2
CO3	3	3	3	3	-	-	-	-	-	-	-	1	3	3	3
CO4	3	3	3	3	-	-	-	-	-	-	-	2	3	3	2
CO5	3	3	3	3	3	-	-	-	-	-	-	2	3	3	3
23PTE 204	3	3	3	3	3	-	-	-	-	-	-	2	3	3	2
1 – Slight, 2 – Moderate, 3 – Substantial															

23PTE205	ELECTRICAL MACHINES - I		SEMESTER II		
PREREQUISITES		**L**	**T**	**P**	**C**
ENGINEERING PHYSICS – FIELD THEORY		**3**	**0**	**0**	**3**
Course Objectives	1.To obtain knowledge about energy in magnetic system 2.To understand the working principle of DC generators 3.To understand the working principle of DC motors 4.To know about the principle of operation of Transformers 5.To perform testing in various DC machines and transformers				
UNIT – I	**PRINCIPLES OF ELECTROMECHANICAL ENERGY CONVERSION**				**9 Periods**
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**				**9 Periods**
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**				**9 Periods**
Constructional details and principle of operation- back emf – Types of dc motors - Torque equation losses and efficiency – power flow diagram – Electrical and mechanical characteristics of different types of motors – Starters – Speed control methods – Types of Electric braking.					
UNIT – IV	**TRANSFORMERS**				**9 Periods**
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**				**9 Periods**
DC machines: Brake test, field test, Retardation test , Swinburne's test , Hopkinson's test. Transformers: Open Circuit and Short Circuit Tests-– Phasing, Identification and Polarity of 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",*** *Tata McGraw Hill, 2006*
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	*AbhijithChakrabarti, SudiptaDebnath, **"Electrical Machines",** McGraw Hill Education, NewDelhi, 2015.*
4	*Deshpande M. V., **"Electrical Machines",** Prentice Hall India, New Delhi, 2011.*
5	*Theodore Wilde, **"Electrical Machines, Drives and Power System",** Pearson Ed. Asia, 2001.*
6	*Jacek F. Gieras, **"Electrical Machines: Fundamentals of Electromechanical Energy Conversion",** CRC press,2016*

COURSE OUTCOMES: On completion of the course, the students will be able to:		**Bloom's Taxonomy Mapped**
CO1	Apply basic laws of electromagnetic principles for static and dynamic electric machines.	K1
CO2	Analyze the performance of electrical machines for the different level of utilization in Industries.	K4
CO3	Identify suitable machines for any specific application.	K6
CO4	Perform testing of the electrical machines.	K3
CO5	Evaluate the performance of electrical machines.	K5

COURSE ARTICULATION MATRIX :

a) CO and PO Mapping															
COs/POs	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**
CO1	3	2	2	2	1	-	-	-	-	1	1	2	3	2	2
CO2	3	3	3	3	1	-	-	-	-	1	1	1	3	3	3
CO3	3	2	2	2	2	-	-	-	-	-	1	1	3	2	2
CO4	2	2	2	3	1	-	-	-	-	1	1	1	2	2	2
CO5	2	2	1	3	1	-	-	-	-	-	1	2	2	2	1
23PTE 205	3	2	2	3	1	-	-	-	-	1	1	1	3	2	2
1 – Slight, 2 – Moderate, 3 – Substantial															