2.6.1
PROGRAMME AND COURSE OUTCOMES FOR ALL PROGRAMMES

SEMESTER - III		
S.NO	**Subject code**	**Subject name**
1.	MA3354	Discrete Mathematics
2.	CS3351	Digital Principles and Computer Organization
3.	CS3352	Foundations of Data Science
4.	CS3301	Data Structures
5.	CS3391	Object Oriented Programming
6.	CS3311	Data Structures Laboratory
7.	CS3381	Object Oriented Programming Laboratory
8.	CS3361	Data Science Laboratory
9.	GE3361	Professional Development
SEMESTER -IV		
1.	CS3452	Theory of Computation
2.	CS3491	Artificial Intelligence and Machine Learning
3.	CS3492	Database Management Systems
4.	CS3401	Algorithms
5.	CS3451	Introduction to Operating Systems
6.	GE3451	Environmental Sciences and Sustainability
7.		NCC Credit Course Level 2#
8.	CS3461	Operating Systems Laboratory
9.	CS3481	Database Management Systems Laboratory

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Dr.G. RANGANATHAN B.E.,M.E.,Ph.D,
PRINCIPAL
SREE SAKTHI ENGINEERING COLLEGE
COIMBATORE - 641 104.

SEMESTER - III		
S.NO	**Subject code**	**Subject name**
1.	MA3354	Discrete Mathematics
2.	CS3351	Digital Principles and Computer Organization
3.	CS3352	Foundations of Data Science
4.	CS3301	Data Structures
5.	CS3391	Object Oriented Programming
6.	CS3311	Data Structures Laboratory
7.	CS3381	Object Oriented Programming Laboratory
8.	CS3361	Data Science Laboratory
9.	GE3361	Professional Development

SUBJECT CODE: MA3354 SUBJECT NAME: DISCRETE MATHEMATICS

COURSE OUTCOMES:

At the end of the course, learners will be able to

CO1: Have knowledge of the concepts needed to test the logic of a program.
CO2: Have an understanding in identifying structures on many levels..
CO3: Be aware of a class of functions which transform a finite set into another finite set which relates to input and output functions in computer science.
CO4: Be aware of the counting principles.
CO5: Be exposed to concepts and properties of algebraic structures such as groups, rings and fields.

Cos Mapping with PO's

Course Outcomes	Programme Outcomes (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-1	PSO-3
CO-1	3	3	2	-	-	-	-	-	-	-	-	2	-	-	-
CO-2	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO-3	-	3	2	-	-	2	-	-	-	3	-	-	-	-	-
CO-4	-	2	2	2	-	-	-	-	-	-	-	-	-	-	-
CO-5	-	2	2	2	-	-	-	-	-	2	-	-	-	-	-
Maximum Appeared value	1	3	2	1	-	-	-	-	-	1	-	-	-	-	-

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Dr.G. RANGANATHAN B.E.,M.E.,Ph.D,
PRINCIPAL
SREE SAKTHI ENGINEERING COLLEGE
COIMBATORE - 641 104.

SUBJECT CODE: CS3351
SUBJECT NAME: DIGITAL PRINCIPLES AND COMPUTER ORGANIZATION
COURSE OUTCOMES:

At the end of the course the students will be able to

CO1: Design various combinational digital circuits using logic gates.
CO2: Design sequential circuits and analyze the design procedures.
CO3: State the fundamentals of computer systems and analyze the execution of an instruction.
CO4: Analyze different types of control design and identify hazards.
CO5: Identify the characteristics of various memory systems and I/O communication.

Cos Mapping with PO's

Course Outcomes	Programme Outcomes (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-1	PSO-3
CO-1	3	3	3	3	3	2	1	1	1	1	2	3	2	3	3
CO-2	3	3	3	3	3	1	1	1	1	1	2	3	1	2	2
CO-3	3	3	3	3	2	2	1	1	1	1	2	3	2	3	1
CO-4	3	3	3	3	2	1	1	1	1	1	1	2	1	2	1
CO-5	3	3	3	3	1	2	1	1	1	1	1	2	1	2	1
Maximum Appeared value	3	3	3	3	1	1.8	1.6	1	1	1	1.6	2.6	1.4	2.6	1.6

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Dr.G. RANGANATHAN B.E.,M.E.,Ph.D,
PRINCIPAL
SREE SAKTHI ENGINEERING COLLEGE
COIMBATORE - 641 104.

SUBJECT CODE: CS3352
SUBJECT NAME:FOUNDATIONS OF DATA SCIENCE
COURSE OUTCOMES:

After completion of this course, the students should be able to

CO1: Define the data science process
CO2: Understand different types of data description for data science proces
CO3: Gain knowledge on relationships between data
CO4: Use the Python Libraries for Data Wrangling
CO5: Apply visualization Libraries in Python to interpret and explore data

Cos Mapping with PO's

Course Outcomes	Programme Outcomes (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-1	PSO-3
CO-1	2	2	1	2	2	-	-	-	1	1	1	2	2	2	2
CO-2	2	1	-	1	1	-	-	-	2	1	1	2	2	3	1
CO-3	2	2	1	2	2	1	1	-	1	2	1	3	2	2	3
CO-4	3	2	2	1	2	-	-	-	1	1	2	2	3	3	2
CO-5	2	2	1	2	2	-	-	-	1	1	1	2	2	2	2
Maximum Appeared value	2	2	1	2	2	1	1	-	1	1	1	2	2	2	2

PRINCIPAL

Dr.G. RANGANATHAN B.E.,M.E.,Ph.D,
PRINCIPAL
SREE SAKTHI ENGINEERING COLLEGE
COIMBATORE - 641 104.

SUBJECT CODE: CS3301

SUBJECT NAME: DATA STRUCTURE

COURSE OUTCOMES:

At the end of the course, the students will be able to:

CO1: Define linear and non-linear data structures.
CO2: Implement linear and non–linear data structure operations.
CO3: Use appropriate linear/non–linear data structure operations for solving a given problem
CO4: Apply appropriate graph algorithms for graph applications.
CO5: Analyze the various searching and sorting algorithms

Cos Mapping with PO's

Course Outcomes	Programme Outcomes (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-1	PSO-3
CO-1	2	3	1	2	2	-	-	-	1	2	1	3	2	1	3
CO-2	1	2	1	2	2	-	-	-	1	1	1	2	2	2	2
CO-3	2	3	1	2	3	-	-	-	1	1	1	2	2	1	2
CO-4	2	1	-	1	1	-	-	-	2	1	1	2	2	3	1
CO-5	1	2	1	2	2	1	-	-	1	2	1	3	2	2	3
Maximum Appeared value	2	2	1	2	2	1	-	-	1	1	1	2	2	2	2

SUBJECT CODE: CS3391
SUBJECT NAME: OBJECT ORIENTED PROGRAMMING
COURSE OUTCOMES:

Upon completion of the course, students will be able to

CO1: Apply the concepts of classes and objects to solve simple problems.
CO2: Develop programs using inheritance, packages and interfaces.
CO3: Make use of exception handling mechanisms and multithreaded model to solve real world problems.
CO4: Build Java applications with I/O packages, string classes, Collections and generics concepts.
CO5: Integrate the concepts of event handling and JavaFX components and controls for developing GUI based applications

Cos Mapping with PO's

Course Outcomes	Programme Outcomes (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
CO-1	1	1	3	1	3	-	-	-	3	2	2	2	3	1	2
CO-2	2	1	3	2	1	-	-	-	2	1	1	3	3	3	2
CO-3	3	3	1	2	2	-	-	-	3	2	1	2	3	1	3
CO-4	3	1	2	2	2	-	-	-	1	2	1	3	3	1	1
CO-5	1	1	2	2	2	-	-	-	3	2	1	2	3	3	3
Maximum Appeared value	2	1	2	2	2	-	-	-	2	2	1	2	3	2	2

SUBJECT CODE: CS3311
SUBJECT NAME: DATA STRUCTURES LABORATORY
COURSE OUTCOMES:

On completion of the course, students will be able to:

CO1: Implement Linear data structure algorithms.
CO2: Implement applications using Stacks and Linked lists.
CO3: Implement Binary Search tree and AVL tree operations
CO4: Implement graph algorithms..
CO5: Analyze the various searching and sorting algorithms.

Cos Mapping with PO's

Course Outcomes	Programme Outcomes (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
CO-1	1	2	2	1	-	-	-	-	2	1	2	2	2	2	3
CO-2	3	3	1	1	-	-	-	-	1	1	1	3	1	2	2
CO-3	2	1	3	1	-	-	-	-	1	1	2	3	3	3	3
CO-4	3	1	3	3	-	-	-	-	1	2	3	3	2	1	2
CO-5	3	2	1	1	2	-	-	-	3	3	3	1	3	1	3
Maximum Appeared value	2	2	1	1	2	-	-	-	2	2	2	2	2	2	3

SUBJECT CODE: CS3381

SUBJECT NAME: OBJECT ORIENTED PROGRAMMING LABORATORY

COURSE OUTCOMES:

Upon completion of the course, the students should be able to

CO1: Design and develop java programs using object oriented programming concepts.
CO2: Develop simple applications using object oriented concepts such as package, exceptions
CO3: Implement multithreading, and generics concepts
CO4: Create GUIs and event driven programming applications for real world problems.
CO5: Implement and deploy web applications using Java

Cos Mapping with PO's

Course Outcomes	Programme Outcomes (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
CO-1	2	1	2	1	-	-	-	-	1	2	2	2	1	2	3
CO-2	2	1	3	1	-	-	-	-	2	3	3	2	1	3	1
CO-3	2	2	1	2	1	-	-	-	1	2	1	3	2	3	2
CO-4	2	2	1	3	-	-	-	-	3	1	1	1	2	1	2
CO-5	1	3	3	1	3	-	-	-	1	1	1	1	2	1	2
Maximum Appeared value	2	2	2	2	2	-	-	-	2	2	2	2	2	2	2

SUBJECT CODE:CS3361

SUBJECT NAME: DATA SCIENCE LABORATORY

COURSE OUTCOMES:

CO1: Make use of the python libraries for data science.
CO2: Make use of the basic Statistical and Probability measures for data science
CO3: Perform descriptive analytics on the benchmark data sets.
CO4: Perform correlation and regression analytics on standard data sets.
CO5: Present and interpret data using visualization packages in Python.

Cos Mapping with PO's

Course Outcomes	Programme Outcomes (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
CO-1	3	2	1	1	-	-	-	-	1	3	3	3	1	3	2
CO-2	3	2	2	3	1	-	-	-	3	1	3	2	1	3	3
CO-3	3	2	1	3	1	-	-	-	2	1	1	1	3	2	3
CO-4	2	3	1	3	-	-	-	-	2	3	2	3	3	3	1
CO-5	1	2	3	1	1	-	-	-	2	1	3	1	1	3	3
Maximum Appeared value	2	2	2	2	1	-	-	-	2	2	2	2	2	3	2

SUBJECT CODE: GE3361
SUBJECT NAME: PROFESSIONAL DEVELOPMENT
COURSE OUTCOMES:

At the end of the course, learners will be able to:

CO1: Use MS Word to create quality documents, by structuring and organizing content for their day to day technical and academic requirements
CO2: Use MS EXCEL to perform data operations and analytics, record, retrieve data as per requirements and visualize data for ease of understanding
CO3: Use MS PowerPoint to create high quality academic presentations by including common tables, charts, graphs, interlinking other elements, and using media objects.

SUBJECT CODE: CS3452 SUBJECT NAME: THEORY OF COMPUTATION

LEARNING OUTCOMES:

SEMESTER - IV		
S.NO	**Subjectcode**	**Subject name**
1.	CS3452	Theory of Computation
2.	CS3491	Artificial Intelligence and Machine Learning
3.	CS3492	Database Management System
4.	CS3401	Algorithms
5.	CS3451	Introduction to Operating Systems
6.	GE3451	Environmental Sciences and Sustainability
7.	CS3461	Operating Systems Laboratory
8.	CS3481	Database Management Systems Laboratory

At the end of the course, learners will be able to

CO1: Construct automata theory using Finite Automata
CO2: Write regular expressions for any pattern
CO3: Design context free grammar and Pushdown Automata
CO4: Design Turing machine for computational functions
CO5: Differentiate between decidable and undecidable problems

Cos Mapping with PO's

Course Outcomes	Programme Outcomes (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-1	PSO-3
CO-1	1	3	2	3	-	-	-	-	1	1	2	3	1	3	2
CO-2	2	2	3	2	1	-	-	-	3	3	2	3	3	1	2
CO-3	2	2	3	2	1	-	-	-	1	3	1	2	1	2	2
CO-4	2	2	2	1	-	-	-	-	1	3	3	2	1	3	2
CO-5	2	2	2	1	1	-	-	-	1	1	3	2	3	1	3
Maximum Appeared value	2	2	2	2	1	-	-	-	1	2	2	2	2	2	2

SUBJECT CODE: CS3491 SUBJECT NAME: ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

COURSE OUTCOMES:

At the end of the course the students will be able to

CO1: Use appropriate search algorithms for problem solving
CO2: Apply reasoning under uncertainty
CO3: Build supervised learning models
CO4: Build ensembling and unsupervised models
CO5: Build deep learning neural network models

Cos Mapping with PO's

Course Outcomes	Programme Outcomes (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-1	PSO-3
CO-1	3	2	3	3	-	-	-	-	1	3	3	3	1	2	2
CO-2	1	1	1	3	1	-	-	-	1	2	1	3	2	3	2
CO-3	2	1	2	1	1	-	-	-	2	1	1	3	1	1	1
CO-4	3	1	3	1	-	-	-	-	2	1	2	1	2	2	2
CO-5	3	1	1	2	2	-	-	-	3	1	2	3	2	1	2
Maximum Appeared value	2	1	2	2	1	-	-	-	2	2	2	3	2	2	2

SUBJECT CODE: CS3492 SUBJECT NAME: DATABASE MANAGEMENT SYSTEMS

COURSE OUTCOMES:

After completion of this course, the students should be able to

CO1: Construct SQL Queries using relational algebra
CO2: Design database using ER model and normalize the database
CO3: Construct queries to handle transaction processing and maintain consistency of thedatabase
CO4: Compare and contrast various indexing strategies and apply the knowledge to tune theperformance of the database
CO5: Appraise how advanced databases differ from Relational Databases and find a suitabledatabase for the given requirement.

Cos Mapping with PO's

Course Outcomes	Programme Outcomes (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-1	PSO-3
CO-1	2	2	3	2	1	-	-	-	2	1	1	1	2	1	3
CO-2	3	1	1	1	1	-	-	-	2	3	3	3	3	1	2
CO-3	3	2	3	2	1	-	-	-	2	1	1	2	2	3	3
CO-4	1	2	3	2	-	-	-	-	3	2	3	3	1	2	3
CO-5	1	1	3	3	2	-	-	-	1	3	3	1	2	2	2
Maximum Appeared value	2	2	3	2	1	-	-	-	2	2	2	2	2	2	3

SUBJECT CODE: CS3401 SUBJECT NAME: ALGORITHMS

COURSE OUTCOMES:

At the end of the course, the students will be able to:

CO1: Analyze the efficiency of algorithms using various frameworks
CO2: Apply graph algorithms to solve problems and analyze their efficiency.
CO3: Make use of algorithm design techniques like divide and conquer, dynamic programming and greedy techniques to solve problems
CO4: Use the state space tree method for solving problems.
CO5: Solve problems using approximation algorithms and randomized algorithms

Cos Mapping with PO's

Course Outcomes	Programme Outcomes (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-1	PSO-3
CO-1	3	2	-	-	-		1	-	-	-	-	1	-	1	-
CO-2	2	3	-	-	-	-	1	-	-	-	-	1	-	1	-
CO-3	1	2	3	1	-	-	2	-	-	-	-	-	-	1	1
CO-4	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-
CO-5	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-
Maximum Appeared value	2.67	1.8	3	1	-	-	1.33	-	-	-	-	1	-	1	1

SUBJECT CODE: CS3451
SUBJECT NAME: INTRODUCTION TO OPERATING SYSTEMS

COURSE OUTCOMES:

At the end of this course, the students will be able to:

CO1: Analyze various scheduling algorithms and process synchronization.
CO2: Explain deadlock prevention and avoidance algorithms.
CO3: Compare and contrast various memory management schemes.
CO4: Explain the functionality of file systems, I/O systems, and Virtualization
CO5: Compare iOS and Android Operating Systems.

Cos Mapping with PO's

Course Outcomes	Programme Outcomes (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
CO-1	3	1	2	2	-	-	-	-	3	2	3	1	1	2	2
CO-2	2	2	3	1	1	-	-	-	2	1	1	2	2	1	2
CO-3	1	3	2	2	1	-	-	-	2	2	1	1	1	2	2
CO-4	1	3	3	3	-	-	-	-	1	2	1	2	1	3	2
CO-5	3	1	2	1	1	-	-	-	3	2	3	2	2	2	1
Maximum Appeared value	2	2	2	2	1	-	-	-	2	2	2	2	1	2	2

SUBJECT CODE: GE3451
SUBJECT NAME: ENVIRONMENTAL SCIENCES AND SUSTAINABILITY
COURSE OUTCOMES:

On completion of the course, students will be able to:

CO1: To recognize and understand the functions of environment, ecosystems and biodiversity andtheir conservation.
CO2: To identify the causes, effects of environmental pollution and natural disasters and contributeto the preventive measures in the society.
CO3: To identify and apply the understanding of renewable and non-renewable resources andcontribute to the sustainable measures to preserve them for future generations.
CO4: To recognize the different goals of sustainable development and apply them for suitabletechnological advancement and societal development.
CO5: To demonstrate the knowledge of sustainability practices and identify green materials, energycycles and the role of sustainable urbanization. O1: Develop algorithmic solutions to simple computational problems

Cos Mapping with PO's

Course Outcomes	Programme Outcomes (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
CO-1	2	1	-	-	-	2	3	-	-	-	-	2	-	-	-
CO-2	3	2	-	-	-	3	3	-	-	-	-	2	-	-	-
CO-3	3	-	1	-	-	2	2	-	-	-	-	2	-	-	-
CO-4	3	2	1	1	-	2	2	-	-	-	-	2	-	-	-
CO-5	3	2	1	-	-	2	2	-	-	-	-	1	-	-	-
Maximum Appeared value	2.8	1.8	1	1	-	2.2	2.4	-	-	-	-	1.8	-	-	-

SUBJECT CODE: CS3461 SUBJECT NAME: OPERATING SYSTEMS LABORATORY

COURSE OUTCOMES:

At the end of this course, the students will be able to:

CO1: Define and implement UNIX Commands.
CO2: Compare the performance of various CPU Scheduling Algorithms.
CO3: Compare and contrast various Memory Allocation Methods.
CO4: Define File Organization and File Allocation Strategies.
CO5: Implement various Disk Scheduling Algorithms.

Cos Mapping with PO's

Course Outcomes	Programme Outcomes (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
CO-1	3	1	3	1	1	-	-	-	1	3	3	3	2	1	3
CO-2	3	1	1	2	2	-	-	-	3	2	1	1	3	1	2
CO-3	3	3	2	1	2	-	-	-	3	3	1	2	2	2	2
CO-4	1	2	2	3	2	-	-	-	3	1	3	1	1	2	1
CO-5	2	2	1	1	3	-	-	-	1	2	2	3	1	3	3
Maximum Appeared value	2	2	2	2	2	-	-	-	2	2	2	2	2	2	2

SUBJECT CODE: CS3481 SUBJECT NAME: DATABASE MANAGEMENT SYSTEMS LABORATORY

LEARNING OUTCOMES:

At the end of this course, the students will be able to:

CO1: Create databases with different types of key constraints.
CO2: Construct simple and complex SQL queries using DML and DCL commands.
CO3: Use advanced features such as stored procedures and triggers and incorporate in GUI based application development.
CO4: Create an XML database and validate with meta-data (XML schema).
CO5: Create and manipulate data using NOSQL database.

Cos Mapping with PO's

Course Outcomes	Programme Outcomes (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
CO-1	3	3	3	3	-	-	-	-	3	1	3	2	2	3	2
CO-2	2	2	3	2	2	-	-	-	1	2	3	3	2	1	2
CO-3	3	3	2	1	1	-	-	-	1	1	1	3	2	3	3
CO-4	1	3	3	3	1	-	-	-	1	1	3	2	3	1	3
CO-5	3	2	1	1	1	-	-	-	2	2	3	1	3	1	2
Maximum Appeared value	2	3	2	2	1	-	-	-	2	1	3	2	2	2	2

PRINCIPAL

Dr.G. RANGANATHAN B.E.,M.E.,Ph.D,
PRINCIPAL
SREE SAKTHI ENGINEERING COLLEGE
COIMBATORE - 641 104.

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DEPARTMENT OF MECHANICAL ENGINEERING

2.6.1	PROGRAMME EDUCATIONAL OBJECTIVES
	PROGRAMME OUTCOMES (POs)
	PROGRAM SPECIFIC OUT COMES OF MECHANICAL ENGINEERING
	COURSE OUTCOMES
	CO,PO&PSO ATTAINMENT LEVEL

PROGRAMME EDUCATIONAL OBJECTIVES

PEO 1	Effectuating success in careers by exploring with the design, digital and computational analysis of engineering systems, experimentation and testing, smart manufacturing, technical services, and research.
PEO 2	Amalgamating effectively with stakeholders to update and improve their core competencies and abilities to ethically compete in the ever-changing multicultural global enterprise.
PEO 3	To encourage multi-disciplinary research and development to foster advanced technology, and to nurture innovation and entrepreneurship in order to compete successfully in the global economy.
PEO 4	To globally share and apply technical knowledge to create new opportunities that proactively advances our society through team efforts and to solve various challenging technical, environmental and societal problems.
PEO 5	To create world class mechanical engineers capable of practice engineering ethically with a solid vision to become great leaders in academia, industries and society.

PROGRAMME OUTCOMES (POs)

PO1	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2	Problem analysis: Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3	Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4	Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
PO6	The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7	Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9	Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10	Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11	Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12	Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUT COMES OF MECHANICAL ENGINEERING

PSO 1	Apply the knowledge gained in Mechanical Engineering for design and development and manufacture of engineering systems.
PSO 2	Apply the knowledge acquired to investigate research-oriented problems in mechanical engineering with due consideration for environmental and social impacts.
PSO 3	Use the engineering analysis and data management tools for effective management of multidisciplinary projects.

COURSE OUTCOMES (III SEM)

MA3351 - Transforms and Partial Differential Equations	
CO1	Understand how to solve the given standard partial differential equations.
CO2	Solve differential equations using Fourier series analysis which plays a vital role in engineering applications.
CO3	Appreciate the physical significance of Fourier series techniques in solving one- and two- dimensional heat flow problems and one-dimensional wave equations.
CO4	Understand the mathematical principles on transforms and partial differential equations would provide them the ability to formulate and solve some of the physical problems of engineering.
CO5	Use the effective mathematical tools for the solutions of partial differential equations by using Z transform techniques for discrete time systems

ME3351 - Engineering Mechanics	
CO1	Illustrate the vector and scalar representation of forces and moments
CO2	Analyse the rigid body in equilibrium
CO3	Evaluate the properties of distributed forces
CO4	Determine the friction and the effects by the laws of friction
CO5	Calculate dynamic forces exerted in rigid body

ME3391- Engineering Thermodynamics	
CO1	Apply the zeroth and first law of thermodynamics by formulating temperature scales and calculating the property changes in closed and open engineering systems
CO2	Apply the second law of thermodynamics in analysing the performance of thermal devices through energy and entropy calculations.
CO3	Apply the second law of thermodynamics in evaluating the various properties of steam through steam tables and Mollier chart
CO4	Apply the properties of pure substance in computing the macroscopic properties of ideal and real gases using gas laws and appropriate thermodynamic relations.
CO5	Apply the properties of gas mixtures in calculating the properties of gas mixtures and applying various thermodynamic relations to calculate property changes.

CE3391- Fluid Mechanics and Machinery	
CO1	Understand the properties and behaviour in static conditions. Also, to understand the conservation laws applicable to fluids and its application through fluid kinematics and dynamics
CO2	Estimate losses in pipelines for both laminar and turbulent conditions and analysis of pipes connected in series and parallel. Also, to understand the concept of boundary layer and its thickness on the flat solid surface.
CO3	Formulate the relationship among the parameters involved in the given fluid phenomenon and to predict the performances of prototype by model studies
CO4	Explain the working principles of various turbines and design the various types of turbines.
CO5	Explain the working principles of centrifugal, reciprocating and rotary pumps and design the centrifugal and reciprocating pumps

ME3392- Engineering Materials and Metallurgy	
CO1	Explain alloys and phase diagram, Iron-Iron carbon diagram and steel classification.
CO2	Explain isothermal transformation, continuous cooling diagrams and different heat treatment processes.
CO3	Clarify the effect of alloying elements on ferrous and non-ferrous metals.
CO4	Summarize the properties and applications of non-metallic materials.
CO5	Explain the testing of mechanical properties.

ME3393- Manufacturing Processes	
CO1	Explain the principle of different metal casting processes.
CO2	Describe the various metal joining processes.
CO3	Illustrate the different bulk deformation processes.
CO4	Apply the various sheet metal forming process.
CO5	Apply suitable molding technique for manufacturing of plastics components.

ME3381- Computer Aided Machine Drawing	
CO1	Prepare standard drawing layout for modelled assemblies with BoM.
CO2	Model orthogonal views of machine components.
CO3	Prepare standard drawing layout for modelled parts

ME3382- Manufacturing Technology Laboratory	
CO1	Demonstrate the safety precautions exercised in the mechanical workshop and join two metals using GMAW
CO2	The students able to make the work piece as per given shape and size using machining process such as rolling, drawing, turning, shaping, drilling and milling
CO3	The students become make the gears using gear making machines and analyze the defects in the cast and machined components

GE3361- Professional Development	
CO1	Use MS Word to create quality documents, by structuring and organizing content for their day to day technical and academic requirements
CO2	Use MS EXCEL to perform data operations and analytics, record, retrieve data as per requirements and visualize data for ease of understanding
CO3	Use MS PowerPoint to create high quality academic presentations by including common tables, charts, graphs, interlinking other elements, and using media objects.

IV SEM COURSE OUTCOMES

ME3491 Theory of Machines	
CO1	Discuss the basics of mechanism.
CO2	Solve problems on gears and gear trains
CO3	Examine friction in machine elements.
CO4	Calculate static and dynamic forces of mechanisms.
CO5	Calculate the balancing masses and their locations of reciprocating and rotating masses. Computing the frequency of free vibration, forced vibration and damping coefficient.

ME3451 Thermal Engineering	
CO1	Apply thermodynamic concepts to different air standard cycles and solve problems.

CO2	To solve problems in steam nozzle and calculate critical pressure ratio
CO3	Explain the flow in steam turbines, draw velocity diagrams, flow in Gas turbines and solve problems.
CO4	Explain the functioning and features of IC engine, components and auxiliaries.
CO5	Calculate the various performance parameters of IC engines

ME3492 Hydraulics and Pneumatics	
CO1	Apply the working principles of fluid power systems and hydraulic pumps
CO2	Apply the working principles of hydraulic actuators and control components.
CO3	Design and develop hydraulic circuits and systems.
CO4	Apply the working principles of pneumatic circuits and power system and its components.
CO5	Identify various troubles shooting methods in fluid power systems.

ME3493 Manufacturing Technology	
CO1	Apply the mechanism of metal removal process and to identify the factors involved in improving machinability.
CO2	Describe the constructional and operational features of centre lathe and other special purpose lathes.
CO3	Describe the constructional and operational features of reciprocating machine tools
CO4	Apply the constructional features and working principles of CNC machine tools.
CO5	Demonstrate the Program CNC machine tools through planning, writing codes and setting up CNC machine tools to manufacture a given component.

CE3491 Strength of Materials	
CO1	Understand the concepts of stress and strain in simple and compound bars, the importance of principal stresses and principal planes.
CO2	Understand the load transferring mechanism in beams and stress distribution due to shearing force and bending moment.
CO3	Apply basic equation of torsion in designing of shafts and helical springs
CO4	Calculate slope and deflection in beams using different methods.
CO5	Analyze thin and thick shells for applied pressures.

GE3451 Environmental Sciences and Sustainability	
CO1	To recognize and understand the functions of environment, ecosystems and biodiversity and their conservation.
CO2	To identify the causes, effects of environmental pollution and natural disasters and contribute to the preventive measures in the society.
CO3	To identify and apply the understanding of renewable and non-renewable resources and contribute to the sustainable measures to preserve them for future generations.
CO4	To recognize the different goals of sustainable development and apply them for suitable technological advancement and societal development.
CO5	To demonstrate the knowledge of sustainability practices and identify green materials, energy cycles and the role of sustainable urbanization

CE3481 Strength of Materials and Fluid Machinery Laboratory	
CO1	Determine the tensile, torsion and hardness properties of metals by testing
CO2	Determine the stiffness properties of helical and carriage spring
CO3	Apply the conservation laws to determine the coefficient of discharge of a venturimeter and finding the friction factor of given pipe
CO4	Apply the fluid static and momentum principles to determine the metacentric height and forces due to impact of jet
CO5	Determine the performance characteristics of turbine, rotodynamic pump and positive displacement pump.

ME3461 THERMAL ENGINEERING LABORATORY	
CO1	Conduct tests to evaluate performance characteristics of IC engines
CO2	Conduct tests to evaluate the performance of refrigeration cycle
CO3	Conduct tests to evaluate Performance and Energy Balance on a Steam Generator

PRINCIPAL

Dr.G. RANGANATHAN B.E.,M.E.,Ph.D,
PRINCIPAL
SREE SAKTHI ENGINEERING COLLEGE
COIMBATORE - 641 104.

Type text here

SREE SAKTHI ENGINEERING COLLEGE
TNEA Admission Code 2673
OOTY MAIN ROAD, KARAMADAI, COIMBATORE- 641104. INDIA | MOB : +91 92445 04444,+91 92445 02277
Web : www.sreesakthi.edu.in
Affiliated to Anna University & Approved by AICTE, Accredited by NAAC

SEMESTER - III		
S.NO	**Subject code**	**Subject name**
1.	MA3303	Probability and Complex Functions
2.	EE3301	Electromagnetic Fields
3.	EE3302	Digital Logic Circuits
4.	EC3301	Electron Devices and Circuits
5.	EE3303	Electrical Machines - I
6.	CS3353	C Programming and Data Structures
7.	EC3311	Electronic Devices and Circuits Laboratory
8.	EE3311	Electrical Machines Laboratory – I
9.	CS3362	C Programming and Data Structures Laboratory
SEMESTER -IV		
1.	GE3451	Environmental Sciences and Sustainability
2.	EE3401	Transmission and Distribution
3.	EE3402	Linear Integrated Circuits
4.	EE3403	Measurements and Instrumentation
5.	EE3404	Microprocessor and Microcontroller
6.	EE3405	Electrical Machines - II
7.	EE3411	Electrical Machines Laboratory - II
8.	EE3412	Linear and Digital Circuits Laboratory
9.	EE3413	Microprocessor and Microcontroller laboratory

SEMESTER - III

Subject code: MA3303 subject Name: PROBABILITY AND COMPLE FUNCTIONS

COURSE OUTCOMES:

At the end of the course, learners will be able to

- CO1: Understand the fundamental knowledge of the concepts of probability and have knowledge of standard distributions which can describe real life phenomenon.
- CO2: Understand the basic concepts of one and two dimensional random variables and apply in engineering applications.
- CO3: To develop an understanding of the standard techniques of complex variable theory in particular analytic function and its mapping property.
- CO4: To familiarize the students with complex integration techniques and contour integration techniques which can be used in real integrals.
- CO5: To acquaint the students with Differential Equations which are significantly used in engineering problems.

MAPPING OF COs WITH POs AND PSOs

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	3	0	0	0	0	0	0	2	0	0	2	-	-	-
2	3	3	0	0	0	0	0	0	2	0	0	2	-	-	-
3	3	3	0	0	0	0	0	0	2	0	0	2	-	-	-
4	3	3	0	0	0	0	0	0	2	0	0	2	-	-	-
5	3	3	0	0	0	0	0	0	2	0	0	2	-	-	-
Avg.	3	3	0	0	0	0	0	0	2	0	0	2	-	-	-

Subject code: EE3301 **subject Name: ELECTROMAGNETIC FIELDS**

COURSE OUTCOMES:

Upon the successful completion of the course, students will be able to:

- CO1: Visualize and explain Gradient, Divergence, and Curl operations on electromagnetic vector fieldsand identify the electromagnetic sources and their effects.
- CO2: Compute and analyse electrostatic fields, electric potential, energy density along with their applications.
- CO3:Compute and analyse magneto static fields, magnetic flux density, vector potential along with their applications.
- CO4: Explain different methods of emf generation and Maxwell's equations
- CO5: Explain the concept of electromagnetic waves and characterizing parameters

MAPPING OF COs WITH POs AND PSOs

	POs												PSOs		
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**P06**	**P07**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PS01**	**PS02**	**PS03**
CO1	3	2	-	-	-	-	3	1	-	-	-	1	3	2	1
CO2	3	2	1	2	-	-	1	1	-	-	-	1	3	2	1
CO3	3	2	1	2	-	-	1	1	-	-	-	1	3	2	1
CO4	3	2	1	2	-	-	1	1	-	-	-	1	3	2	1
CO5	3	2	1	2	-	-	1	1	-	-	-	1	3	2	1
Avg.	3	2	1	2	-	-	1.4	1	-	-	-	1	3	2	1

Subject code: EE3302 **subject Name: DIGITAL LOGIC CIRCUITS**

COURSE OUTCOMES:

Upon the successful completion of the course, students will be able to:

- CO1: Explain various number systems and characteristics of digital logic families
- CO2: Apply K-maps and Quine McCluskey methods to simplify the given Boolean expressions
- CO3: Explain the implementation of combinational circuit such as multiplexers and de multiplexers - code converters, adders, subtractors, Encoders and Decoders
- CO4: Design various synchronous and asynchronous circuits using Flip Flops
- CO5: Explain asynchronous sequential circuits and programmable logic devices
- CO6: Use VHDL for simulating and testing RTL, combinatorial and sequential circuits

MAPPING OF COs WITH POs AND PSOs

COs	POs												PSOs		
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**P06**	**P07**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PS01**	**PS02**	**PS03**
CO1	3	3	3	1	3	-	-	1	-	-	-	1	3	-	1
CO2	3	3	3	1	3	-	-	1	-	-	-	1	3	-	1
CO3	3	3	3	1	3	-	-	1	-	-	-	1	3	-	1
CO4	3	3	3	1	3	-	-	1	-	-	-	1	3	-	1
CO5	3	3	3	1	3	-	-	1	-	-	-	1	3	-	1
Avg	3	3	3	1	3	-	-	1	-	-	-	1	3	-	1

Subject code: EC3301 **Subject Name: ELECTRON DEVICES AND CIRCUITS**

COURSE OUTCOMES:

At the end of the course, learners will be able to:

Upon successful completion of the course, the students will be able to:

- CO1: Explain the structure and operation of PN junction devices (diode, Zener diode, LED and Laser diode)
- CO2: Design clipper, clamper, half wave and full wave rectifier, regulator circuits using PN junction diodes
- CO3: Analyze the structure and characteristics BJT, FET, MOSFET, UJT, Thyristor and IGBT
- CO4: Analyze the performance of various configurations of BJT and MOSFET based amplifier CO5: Explain the characteristics of MOS based cascade and differential amplifier
- CO6: Explain the operation of various feedback amplifiers and oscillators

MAPPING OF COs WITH POs AND PSOs

COs	POs												PSOs		
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**P06**	**P07**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PS01**	**PS02**	**PS03**
CO1	2	2	3	2	2	-	-	1	-	-	-	1	3	-	1
CO2	2	2	3	2	2	-	-	1	-	-	-	1	3	-	1
CO3	2	2	3	2	2	-	-	1	-	-	-	1	3	-	1
CO4	2	2	3	2	2	-	-	1	-	-	-	1	3	-	1
CO5	2	2	3	2	2	-	-	1	-	-	-	1	3	-	1
Avg.	2	2	3	2	2	-	-	1	-	-	-	1	3	-	1

Subject code: EE3303 subject Name: ELECTRICAL MACHINES - I

COURSE OUTCOMES:

At the end of the course students will be able to:

- CO1: Apply the laws governing the electromechanical energy conversion for singly and multiple excited systems.
- CO2: Explain the construction and working principle of DC machines. CO3: Interpret various characteristics of DC machines.
- CO4: Compute various performance parameters of the machine, by conducting suitable tests. CO5: Draw the equivalent circuit of transformer and predetermine the efficiency and regulation.
- CO6: Describe the working principle of auto transformer, three phase transformer with different types of connections.

MAPPING OF COs WITH POs AND PSOs

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	P06	P07	PO8	PO9	PO10	PO11	PO12	PS01	PS02	PS03
CO1	3	3	1	1	1	-	-	1	-	-	-	1	3	2	2
CO2	3	3	1	1	1	-	-	1	-	-	-	1	3	1	1
CO3	3	3	1	1	1	-	-	1	-	-	-	1	3	1	1
CO4	3	3	1	1	1	-	-	1	-	-	-	1	3	3	2
CO5	3	3	1	1	1	-	-	1	-	-	-	1	3	3	2
CO6	3	3	1	1	1	-	-	1	-	-	-	1	3	3	2
Avg	3	3	1	1	1	-	-	1	-	-	-	1	3	3	3

Subject code: CS3353 subject Name: C PROGRAMMING AND DATA STRUCTURES

COURSE OUTCOMES:

At the end of the course students will be able to:

- CO1 Develop C programs for any real world/technical application. CO2 Apply advanced features of C in solving problems.
- CO3 Write functions to implement linear and non–linear data structure operations.
- CO4 Suggest and use appropriate linear/non–linear data structure operations for solving a given problem.
- CO5 Appropriately use sort and search algorithms for a given application.
- CO6 Apply appropriate hash functions that result in a collision free scenario for data storage and retrieval.

MAPPING OF COs WITH POs AND PSOs

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	2	3	1	2	2	1	1	-	1	2	1	3	2	1	3
2	1	2	1	2	2	-	-	-	1	1	1	2	2	2	2
3	2	3	1	2	3	-	-	-	1	1	1	2	2	1	2
4	2	1	-	1	1	-	-	-	2	1	1	2	2	3	1
5	1	2	1	2	2	1	1	-	1	2	1	3	2	2	3
Avg	2	2	1	2	2	1	1	-	1	1	1	2	2	2	2

Subject code: EC3311 subject Name: ELECTRONIC DEVICES AND CIRCUITS LABORATORY

COURSE OUTCOMES:

At the end of the course students will be able to:
Upon successful completion of the course, the students will be able to:

- CO1: Analyze the characteristics of PN, Zener diode and BJT in CE,CC,CB configurations experimentally
- CO2: Analyze the characteristics of JFET and UJT experimentally
- CO3: Analyze frequency response characteristics of a Common Emitter amplifier experimentally
- CO4: Analyze the characteristics of RC phase shift and LC oscillators experimentally CO5: Analyze the characteristics of half-wave and full-wave rectifier with and without
- filters experimentally
- CO6: Analyze the characteristics of FET based differential amplifier experimentally CO7: Calculate the frequency and phase angle using CRO experimentally
- CO8: Analyze the frequency response characteristics of passive filters experimentally

MAPPING OF COs WITH POs AND PSOs

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	P06	P07	PO8	PO9	PO10	PO11	PO12	PS01	PS02	PS03
CO1	-	-	-	3	3	-	-	1.5	-	-	3	-	-	3	3
CO2	-	-	3	3	3	-	-	1.5	-	-	3	-	-	3	3
CO3	-	3	2	3	-	-	-	1.5	-	-	3	-	-	3	3
CO4	-	3	3	3	-	-	-	1.5	-	-	3	-	-	3	3
CO5	-	-	-	-	3	-	-	1.5	-	-	-	-	-	3	3
CO6	-	-	-	-	3	-	-	1.5	-	-	-	-	-	3	3
CO7	-	-	-	-	3	-	-	1.5	-	-	3	-	-	3	3
CO8	-	-	-	-	3	-	-	1.5	-	-	3	-	-	3	3
Avg	-	3	2.7	3	3	-	-	1.5	-	-	3	-	-	3	3

Subject code: EE3311 subject Name: ELECTRICAL MACHINES LABORATORY – I

COURSE OUTCOMES:

- At the end of the course students will be able to:
- CO1: Construct the circuit with appropriate connections for the given DC machine/transformer. CO2: Experimentally determine the characteristics of different types of DC machines.
- CO3: Demonstrate the speed control techniques for a DC motor for industrial applications. CO4: Identify suitable methods for testing of transformer and DC machines.
- CO5: Predetermine the performance parameters of transformers and DC motor.
- CO6: Understand DC motor starters and 3-phase transformer connections.

MAPPING OF COs WITH POs AND PSOs

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	P06	P07	PO8	PO9	PO10	PO11	PO12	PS01	PS02	PS03
CO1	3	3	1	1	-	-	-	-	1	-	-	-	3	1	1
CO2	3	3	1	1	-	-	-	-	1	-	-	-	3	3	2
CO3	3	3	1	1	-	-	-	-	1	-	-	-	3	3	2
CO4	3	3	1	1	-	-	-	-	1	-	-	-	2	3	2
CO5	3	3	1	1	-	-	-	-	1	-	-	-	2	3	2
CO6	3	3	1	1	-	-	-	-	1	-	-	-	2	3	1
Avg	3	3	1	1	-	-	-	-	1	-	-	-	2.5	2.6	1.6

Subject code: CS3362 subject Name: C Programming and Data Structures Laboratory

COURSE OUTCOMES:

- At the end of the course, the students will be able to:
- CO1 Use different constructs of C and develop applications
- CO2 Write functions to implement linear and non-linear data structure operations
- CO3 Suggest and use the appropriate linear / non-linear data structure operations for a given problem
- CO4 Apply appropriate hash functions that result in a collision free scenario for data storage and Retrieval
- CO5 Implement Sorting and searching algorithms for a given application

MAPPING OF COs WITH POs AND PSOs

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO 3
1	2	3	1	2	2	1	1	-	1	2	1	3	2	1	3
2	1	2	1	2	2	-	-	-	1	1	1	2	2	2	2
3	2	3	1	2	3	-	-	-	1	1	1	2	2	1	2
4	2	1	-	1	1	-	-	-	2	1	1	2	2	3	1
5	1	2	1	2	2	1	1	-	1	2	1	3	2	2	3
Avg.	2	2	1	2	2	1	1	-	1	1	1	2	2	2	2

SEMESTER - IV

Subject code: GE3451 Subject Name: ENVIRONMENTAL SCIENCES AND SUSTAINABILITY

COURSE OUTCOMES :

- CO1:To recognize and understand the functions of environment, ecosystems and biodiversity and their conservation.
- CO2:To identify the causes, effects of environmental pollution and natural disasters and contribute to the preventive measures in the society.
- CO3:To identify and apply the understanding of renewable and non-renewable resources and contribute to the sustainable measures to preserve them for future generations.
- CO4:To recognize the different goals of sustainable development and apply them for suitable technological advancement and societal development.
- CO5:To demonstrate the knowledge of sustainability practices and identify green materials, energy cycles and the role of sustainable urbanization.

MAPPING OF COs WITH POs AND PSOs

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	P06	P07	PO8	PO9	PO10	PO11	PO12	PS01	PS02	PS03
1	2	1	-	-	-	2	3	-	-	-	-	2	-	-	-
2	3	2	-	-	-	3	3	-	-	-	-	2	-	-	-
3	3	-	1	-	-	2	2	-	-	-	-	2	-	-	-
4	3	2	1	1	-	2	2	-	-	-	-	2	-	-	-
5	3	2	1	-	-	2	2	-	-	-	-	1	-	-	-
Avg.	2.8	1.8	1	1	-	2.2	2.4	-	-	-	-	1.8	-	-	-

Subject code: EE3401 Subject Name: TRANSMISSION AND DISTRIBUTION

COURSE OUTCOMES

On the successful completion of the course, students will be able to:

- CO1 : Understand the structure of power system, computation of transmission line parameters for different configurations.
- CO2 : Model the transmission lines to determine the line performance and to understand the impact of Ferranti effect and corona on line performance.
- CO3 : Do Mechanical design of transmission lines, grounding and to understand about the insulators in transmission system.
- CO4 : Design the underground cables and understand the performance analysis of underground cable.
- CO5 : Understand the modelling, performance analysis and modern trends in distribution system.

MAPPING OF COs WITH POs AND PSOs

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	P06	P07	PO8	PO9	PO10	PO11	PO12	PS01	PS02	PS03
CO1	2	1	-	-	-	-	-	1	-	-	-	-	3	1	1
CO2	3	2	1	1	-	1	-	2	-	-	-	-	3	2	1
CO3	3	2	1	1	-	1	-	2	-	-	-	-	3	3	1
CO4	3	2	1	1	-	1	-	2	-	-	-	-	3	3	1
CO5	3	2	1	1	-	1	-	2	-	-	-	-	3	3	1
Avg	2.8	1.8	1	1		1	-	1.8					3	2.4	1

Subject code: **EE3402** Subject Name: **LINEAR INTEGRATED CIRCUITS**

COURSE OUTCOMES:

Upon successful completion of the course, the students will be able to:

- CO1 Explain monolithic IC fabrication process
- CO2 Explain the fabrication of diodes, capacitance, resistance, FETs and PV Cell.
- CO3 Analyze the characteristics and basic applications (inverting/non-inverting amplifier, summer, differentiator, integrator, V/I and I/V converter) of Op-Amp
- CO4 Explain circuit and applications of op-amp based instrumentation amplifier, log/antilog amplifier, analog multiplier /divider, active filters, comparators, waveform

generators, A/D and D/A converters

- CO5 Explain Functional blocks, characteristics and applications of Timer, PLL, analog multiplier ICs. CO6 Explain the applications of ICs in Instrumentation amplifier, fixed and variable voltage regulator,SMPS and function generator.

MAPPING OF COs WITH POs AND PSOs

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	P06	P07	PO8	PO9	PO10	PO11	PO12	PS01	PS02	PS03
CO1	2	2	3	2	2	-	-	1	-	-	-	1	3	2	1
CO2	2	2	3	2	2	-	-	1	-	-	-	1	3	2	1
CO3	2	2	3	2	2	-	-	1	-	-	-	1	3	2	1
CO4	2	2	3	2	2	-	-	1	-	-	-	1	3	2	1
CO5	2	2	3	2	2	-	-	1	-	-	-	1	3	2	1
Avg	2	2	3	2	2	-	-	1	-	-	-	1	3	2	1

Subject code: **EE3403** Subject Name: **MEASUREMENTS AND INSTRUMENTATION**

COURSE OUTCOMES:

Upon successful completion of the course, the students should have the:

- CO1: Ability to understand the fundamental art of measurement in engineering. CO2: Ability to understand the structural elements of various instruments.
- CO3: Ability to understand the importance of bridge circuits.
- CO4: Ability to understand about various transducers and their characteristics by experiments.
- CO5: Ability to understand the concept of digital instrumentation and virtual instrumentation by experiments.

MAPPING OF COs WITH POs AND PSOs

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	P06	P07	PO8	PO9	PO10	PO11	PO12	PS01	PS02	PS03
CO1	3	2	3	-	3	2	-	2	-	-	-	3	3	3	3
CO2	3	2	3	2	-	-	-		-	3	-	3	3	3	3
CO3	3	2	3	-	3	2	-		-	-	-	3	3	3	3
CO4	3	2	3	-	-	-	-	2	-	-	-	-	3	3	3
CO5	3	2	3	2	3	-	-		-	3	-	3	3	3	3
Avg	3	2	3	2	3	2	-	2	-	3	-	3	3	3	3

Subject code: **EE3404** Subject Name: **MICROPROCESSOR AND MICROCONTROLLER**

COURSE OUTCOMES:

Upon successful completion of the course, the students should have the:

- CO1: Ability to write assembly language program for microprocessor and microcontroller CO2: Ability to design and implement interfacing of peripheral with microprocessor and
- microcontroller
- CO3: Ability to analyze, comprehend, design and simulate microprocessor based systems used for control and monitoring.
- CO4: Ability to analyze, comprehend, design and simulate microcontroller based systems used for control and monitoring.
- CO5: Ability to understand and appreciate advanced architecture evolving microprocessor field

MAPPING OF COs WITH POs AND PSOs

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	P06	P07	PO8	PO9	PO10	PO11	PO12	PS01	PS02	PS03
CO1	2	1	2	3	-	-	-	1	-	-	-	3	3	1	3
CO2	2	1	2	3	-	-	-	1	-	-	-	3	3	1	3
CO3	2	1	2	3	-	-	-	1	-	-	-	3	3	1	3
CO4	2	1	2	3	-	-	-	1	-	-	-	3	3	1	3
CO5	2	1	2	3	-	-	-	1	-	-	-	3	3	1	3
Avg	2	1	2	3	-	-	-	1	-	-	-	3	3	1	3

Subject code: **EE3405** Subject Name: **ELECTRICAL MACHINES – II**

COURSE OUTCOMES:

Upon the successful completion of the course, students will have the:

- CO1: Ability to understand the construction and working principle of Synchronous generator
- CO2: Ability to understand the construction and working principle of Synchronous Motor
- CO3:Ability to understand the construction and working principle of Three Phase Induction Motor
- CO4: Acquire knowledge about the starting and speed control of induction motors.
- CO5:To gain knowledge about the basic principles and working of Single phase induction motors and Special Electrical Machines.

MAPPING OF COs WITH POs AND PSOs

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	P06	P07	PO8	PO9	PO10	PO11	PO12	PS01	PS02	PS03
CO1	3	3	2	3	3	-	-	1	-	-	-	-	3	3	2
CO2	3	3	2	3	3	-	-	1	-	-	-	-	3	3	2
CO3	3	3	2	3	3	-	-	1	-	-	-	-	3	3	2
CO4	3	3	2	3	3	-	-	1	-	-	-	-	3	3	2
CO5	3	3	1	1	2	-	-	1	-	-	-	-	3	3	2
CO6	3	3	1	1	2	-	-	1	-	-	-	-	3	3	2
Avg	3	3	1.6	2.3	2.6	-	-	1	-	-	-	-	3	3	2

Subject code: EE3411 Subject Name: ELECTRICAL MACHINES LABORATORY – II

COURSE OUTCOMES:

At the end of the course, the student should have the:

- CO1: Ability to understand and analyze EMF and MMF methods CO2: Ability to analyze the characteristics of V and Inverted V curves
- CO3: Acquire hands on experience of conducting various tests on alternators and obtaining their performance indices using standard analytical as well as graphical methods. to understand the importance of Synchronous machines
- CO4: Acquire hands on experience of conducting various tests on induction motors and obtaining their performance indices using standard analytical as well as graphical methods. to understand the importance of single and three phase Induction motors
- CO5: Ability to acquire knowledge on separation of losses

MAPPING OF COs WITH POs AND PSOs

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	P06	P07	PO8	PO9	PO10	PO11	PO12	PS01	PS02	PS03
CO1	3	3	1	1	-	-	-	1.5	1	-	-	3	3	3	2
CO2	3	3	1	1	-	-	-	1.5	1	-	-	3	3	3	2
CO3	3	3	1	1	-	-	-	1.5	1	-	-	3	3	3	1
CO4	3	3	1	1	-	-	-	1.5	1	-	-	3	3	3	1
CO5	3	3	1	1	-	-	-	1.5	1	-	-	2	3	3	2
Avg	3	3	1	1	-	-	-	1.5	1	-	-	2.8	3	3	1.6

Subject code: EE3412 Subject Name: LINEAR AND DIGITAL CIRCUITS LABORATORY

COURSE OUTCOMES:

At the end of the course, the student should have the:

- CO1: Ability to understand and implement Boolean Functions. CO2: Ability to understand the importance of code conversion
- CO3: Ability to Design and implement circuits with digital ICs like decoders, multiplexers, register.
- CO4: Ability to acquire knowledge on Application of Op-Amp
- CO5: Ability to Design and implement counters using analog ICs like timers, VCOs and digital ICs like Flip-flops and counters.

MAPPING OF COs WITH POs AND PSOs

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	P06	P07	PO8	PO9	PO10	PO11	PO12	PS01	PS02	PS03
CO1	-	-	-	3	-	-	-	1.5	-	-	3	3	2	1	2
CO2	-	-	3	3	-	-	-	1.5	-	-	3	3	2	1	2
CO3	-	3	2	3	3	-	-	1.5	-	-	3	3	2	1	2
CO4	-	3	3	3	3	-	-	1.5	-	-	3	3	2	1	2
CO5	-	-	-	-	-	-	-	1.5	-	-	-	3	-	-	-
Avg	-	3	1.6	3	3	-	-	1.5	-	-	3	3	2	1	2

Subject code: EE3413 Subject Name: MICROPROCESSOR AND MICROCONTROLLER LABORATORY

COURSE OUTCOMES:

After studying the above subject, students should have the:

- CO1: Ability to write assembly language program for microprocessor. CO2: Ability to write assembly language program for microcontroller
- CO3: Ability to design and implement interfacing of peripheral with microprocessor and microcontroller
- CO4: Ability to analyze, comprehend, design and simulate microprocessor based systems used for control and monitoring..
- CO5: Ability to analyze, comprehend, design and simulate microcontroller based systems used for control and monitoring.

SREE SAKTHI ENGINEERING COLLEGE
TNEA Admission Code 2673
OOTY MAIN ROAD, KARAMADAI, COIMBATORE- 641104. INDIA | MOB : +91 92445 04444,+91 92445 02277
Web : www.sreesakthi.edu.in
Affiliated to Anna University & Approved by AICTE, Accredited by NAAC

MAPPING OF COs WITH POs AND PSOs

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	P06	P07	PO8	PO9	PO10	PO11	PO12	PS01	PS02	PS03
CO1	2	1	2	3	-	-	-	1.5	-	-	-	3	3	1	3
CO2	2	1	2	3	-	-	-	1.5	-	-	-	3	3	1	3
CO3	2	1	2	3	-	-	-	1.5	-	-	-	3	3	1	3
CO4	2	1	2	3	-	-	-	1.5	-	-	-	3	3	1	3
CO5	2	1	2	3	-	-	-	1.5	-	-	-	3	3	1	3
Avg	2	1	2	3	-	-	-	1.5	-	-	-	3	3	1	3

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PRINCIPAL

Dr.G. RANGANATHAN B.E.,M.E.,Ph.D,
PRINCIPAL
SREE SAKTHI ENGINEERING COLLEGE
COIMBATORE - 641 104.

SREE SAKTHI ENGINEERING COLLEGE
TNEA Admission Code 2673
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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

ACADEMIC YEAR 2022-2023

PROGRAMME OUTCOMES:

Engineering Graduates will be able to:

1. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems
2. **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice
9. **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. **Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OBJECTIVES (PSOs)

1. To analyze, design and develop solutions by applying foundational concepts of electronics and communication engineering.
2. To apply design principles and best practices for developing quality products for scientific and business applications.
3. To adapt to emerging information and communication technologies (ICT) to innovate ideas and solutions to existing/novel problems.

REGULATION-2017

COURSE OUTCOMES:

EC8351 - ELECTRONIC CIRCUITS I

After studying this course, the student should be able to:

Acquire knowledge of □ Working principles, characteristics and applications of BJT and FET □ Frequency response characteristics of BJT and FET amplifiers
Analyze the performance of small signal BJT and FET amplifiers - single stage and multi stage amplifiers
Apply the knowledge gained in the design of Electronic circuits

EC8352 SIGNALS AND SYSTEMS

To be able to determine if a given system is linear/causal/stable
Capable of determining the frequency components present in a deterministic signal
Capable of characterizing LTI systems in the time domain and frequency domain
To be able to compute the output of an LTI system in the time and frequency domains

EC8392 DIGITAL ELECTRONICS

Use digital electronics in the present contemporary world
Design various combinational digital circuits using logic gates
Do the analysis and design procedures for synchronous and asynchronous sequential
circuits
Use the semiconductor memories and related technology

EC8391 CONTROL SYSTEMS ENGINEERING

Identify the various control system components and their representations.
Analyze the various time domain parameters.
Analysis the various frequency response plots and its system.
Apply the concepts of various system stability criterions.
Design various transfer functions of digital control system using state variable models.

EC8491 COMMUNICATION THEORY

Design AM communication systems
Design Angle modulated communication systems
Apply the concepts of Random Process to the design of Communication systems
Analyze the noise performance of AM and FM systems
Gain knowledge in sampling and quantization

EC8451 ELECTROMAGNETIC FIELDS

Display an understanding of fundamental electromagnetic laws and concepts
Write Maxwell's equations in integral, differential and phasor forms and explain their physicalmeaning
Explain electromagnetic wave propagation in lossy and in lossless media
Solve simple problems requiring estimation of electric and magnetic field quantities based on these concepts and laws

EC8453 LINEAR INTEGRATED CIRCUITS

Design linear and non linear applications of OP – AMPS
Design applications using analog multiplier and PLL
Design ADC and DAC using OP – AMPS
Generate waveforms using OP – AMP Circuits
Analyze special function ICs

EC8501 DIGITAL COMMUNICATION

Design PCM systems
Design and implement base band transmission schemes
Design and implement band pass signaling schemes
Analyze the spectral characteristics of band pass signaling schemes and their noise performance

EC8553 DISCRETE-TIME SIGNAL PROCESSING

Apply DFT for the analysis of digital signals and systems
Design IIR and FIR filters
Characterize the effects of finite precision representation on digital filters
Design multirate filters
Apply adaptive filters appropriately in communication systems

EC8551 COMMUNICATION NETWORKS

Identify the components required to build different types of networks
Choose the required functionality at each layer for given application
Identify solution for each functionality at each layer
Trace the flow of information from one node to another node in the network

EC8691 MICROPROCESSORS AND MICROCONTROLLERS

Understand and execute programs based on 8086 microprocessor.
Design Memory Interfacing circuits.
Design and interface I/O circuits.
Design and implement 8051 microcontroller based systems.

EC8095 VLSI DESIGN

Realize the concepts of digital building blocks using MOS transistor.
Design combinational MOS circuits and power strategies.
Design and construct Sequential Circuits and Timing systems.
Design arithmetic building blocks and memory subsystems.
Apply and implement FPGA design flow and testing.

EC8652 WIRELESS COMMUNICATION

Characterize a wireless channel and evolve the system design specifications
Design a cellular system based on resource availability and traffic demands
Identify suitable signaling and multipath mitigation techniques for the wireless

EC8651 TRANSMISSION LINES AND RF SYSTEMS

Explain the characteristics of transmission lines and its losses
Write about the standing wave ratio and input impedance in high frequency
transmission lines
Analyze impedance matching by stubs using smith charts
Analyze the characteristics of TE and TM waves

EC8701 ANTENNAS AND MICROWAVE ENGINEERING

Apply the basic principles and evaluate antenna parameters and link power budgets
Design and assess the performance of various antennas
Design a microwave system given the application specifications

REGULATION-2021

COURSE OUTCOMES:

EC3353ELECTRONIC DEVICES AND CIRCUITS

Explain the structure and working operation of basic electronic devices.
Design and analyze amplifiers.
Analyze frequency response of BJT and MOSFET amplifiers
Design and analyze feedback amplifiers and oscillator principles.
Design and analyze power amplifiers and supply circuits

EC3351CONTROL SYSTEMS

Compute the transfer function of different physical systems.
Analyse the time domain specification and calculate the steady state error.
Illustrate the frequency response characteristics of open loop and closed loop system response.
Analyse the stability using Routh and root locus techniques.
Illustrate the state space model of a physical system and discuss the concepts of sampled data control system.

EC3352 DIGITAL SYSTEMS DESIGN

UseBooleanalgebraandsimplificationproceduresrelevant todigitallogic.
Designvariouscombinationaldigitalcircuitsusing logicgates.
Analyse and design synchronous sequential circuits
Analyse and design asynchronous sequential circuits. .
Buildlogicgatesanduseprogrammabledevices

EC3452 ELECTROMAGNETIC FIELDS

Relate the fundamentals of vector, coordinate system to electromagnetic concepts
Analyze the characteristics of Electrostatic field
Interpret the concepts of Electric field in material space and solve the boundary conditions
Explain the concepts and characteristics of Magneto Static field in material space and solve boundary conditions.
Determine the significance of time varying fields

EC3401 NETWORKS AND SECURITY

Explain the Network Models, layers and functions.
Categorize and classify the routing protocols.
List the functions of the transport and application layer.
Evaluate and choose the network security mechanisms.
Discuss the hardware security attacks and countermeasures.

EC3451 LINEAR INTEGRATED CIRCUITS

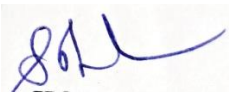
Design linear and nonlinear applications of OP – AMPS
Design applications using analog multiplier and PLL
Design ADC and DAC using OP – AMPS
Generate waveforms using OP – AMP Circuits
Analyze special function ICs

EC3492 DIGITAL SIGNAL PROCESSING

Apply DFT for the analysis of digital signals and systems
Design IIR and FIR filters
Characterize the effects of finite precision representation on digital filters
Design multirate filters
Apply adaptive filters appropriately in communication systems

EC3491 COMMUNICATION SYSTEMS

Gain knowledge in amplitude modulation techniques
Understand the concepts of Random Process to the design of communication systems
Gain knowledge in digital techniques
Gain knowledge in sampling and quantization
Understand the importance of demodulation techniques



HoD/ECE **PRINCIPAL**