THIAGARAJAR COLLEGE OF ENGINEERING

(A Govt. Aided Autonomous Institution Affiliated to Anna University)

MADURAI – 625 015

CREDIT DISTRIBUTION
&
SCHEDULING OF COURSES

FOR

B.TECH DEGREE PROGRAMME

IN

COMPUTER SCIENCE AND BUSINESS SYSTEMS

FOR THE STUDENTS ADMITTED FROM THE ACADEMIC YEAR 2026 - 2027 ONWARDS

Passed in BoS Meeting on 22.05.2026 Approved in 71st Academic Council Meeting on 27.06.2026

Thiagarajar College of Engineering, Madurai – 625 015

Department of Computer Science and Business Systems

VISION AND MISSION OF THE DEPARTMENT

Name of the Programme: B.Tech Computer Science and Business Systems

Vision

A globally recognized centre of excellence in Computer Science and Business Systems.

Mission

- Equip students through innovative, industry-oriented curricula and hands-on learning.
- Engage students in ethical, leadership, and professional development through curricular and extracurricular activities.
- Advance research, consultancy, and industry collaboration across emerging areas of computing and business.
- Deploy emerging technologies and modern tools across teaching, learning, and research.
- Attain continuous improvement through infrastructure, industry partnerships, and committed faculty members.

Thiagarajar College of Engineering, Madurai - 625015

Credit Distribution for B.Tech (Computer Science and Business Systems) Programme – 2026 – 2027 Batch

S.No	Category of Courses	Credits Regular	Credits Lateral Entry
A	Humanities and Social Sciences including Management Courses (HSMC)	11	8
B	Basic Science Courses (BSC)	22	6
C	Engineering Science Courses (ESC)	23	12
D	Professional Core Courses (PCC)	75	62
E	Professional Elective Courses (PEC)	21	21
F	Open Elective Courses (OEC)	6	6
G	Employability Enhancement Courses (EEC)	16	16
H	Internship and Mandatory Audit Courses (AC) as per Regulatory authorities (Non-Credit and not included in CGPA)	-	-
	Minimum Credits to be earned for the award of the Degree	**174**	**131**
		From A to G and the successful completion of H	

Thiagarajar College of Engineering, Madurai-625015
Department of Computer Science and Business Systems
Scheduling of Courses – for B.Tech (Computer Science and Business Systems) Programme - join in the year 2026 – 2027

Semester	1	2	3	4	5	6	7	8	9	10	CDIO Courses	Audit Courses (Mandatory Non- credit)	Credits
I	26CBSA0 Discrete Mathematics (BSC-4) 3-1-0	26PHSA0 Physics (BSC-3) 3-0-0	26EGHA0 Technical English (HSMC-3) TCP 1-0-2	26CBCA0 Fundamentals of Computer science + Laboratory (PCC–3) 2-0-2 (Practical)	26CBEA0 Essentials of Computing (ESC-3) 3-0-0					26PHSB0 Physics Laboratory (BSC-1.5)	26CCEA0 Introduction to Engineering (ESC-2) TCP 1-0-2	26TAAA0 Heritage of Tamil (AC-0) 26CCAA0 Vision and Speed Maths (AC-0)	19.5
II	26CBSB0 Statistics, Probability and Calculus (BSC-3) 2-1-0	26CHSB0 Applied Chemistry (BSC-3) 3-0-0	26CBCB0 Computer Organization and Architecture (PCC–3) 3-0-0	26CBCC0 Fundamentals of Economics (PCC–2) 2-0-0	26CBCD0 Computational Problem Solving using Python (PCC–4) 2-0-4(Practical)	26CBCE0 Business Communication & Value Science (PCC-1) 0-0-1	26CBEB0 Basic Electrical and Electronics Engineering (ESC-3) 3-0-0		26CCEB0 Biology for Engineers (ESC-3)	26CHSC0 Chemistry Laboratory (BSC-1.5)		26TAAB0 Tamil and Technology (AC-0) 26CCAB0 Foundations of Problem Solving-1 (AC-0)	23.5
III	26CBSC0 Linear Algebra (BSC-3) 2-1-0	26CBCF0 Data Structures & Algorithms (PCC-3) 3-0-0	26CBCG0 Object Oriented Programming with Java + Laboratory (PCC-4) 2-0-4 (Practical)	26CBCH0 Database Management Systems (PCC-3) 3-0-0	26CBCJ0 Fundamentals of Management (PCC-3) 3-0-0	26CBCK0 Data Structures & Algorithms Laboratory (PCC-1) 0-0-1	26CBCL0 Database Management Systems Laboratory (PCC-1) 0-0-1	26CBEC0 Formal Languages and Automata Theory (ESC–3) 3-0-0		26CCLA0 Building Communication Skills (EEC-1)	26CCEC0 Design Thinking (ESC-3)	26CCAC0 Constitution of India (AC-0)	25
IV	26CBSD0 Statistical methods (BSC-3) 2-1-0	26CBCM0 Operating Systems (PCC-3) 3-0-0	26CBCN0 Design and Analysis of Algorithms (PCC-3) 3-0-0	26CBCP0 Computer Networks (PCC-3) 3-0-0	26CBCQ0 Software Engineering with UML+ Laboratory (PCC-4) 2-0-4	26CBCR0 Marketing Research and Marketing Management (PCC-3) 3-0-0	26CBCS0 Computer Networks Laboratory (PCC-1.5) 0-0-1.5	26CBCT0 Design and Analysis of Algorithms Laboratory (PCC-1.5) 0-0-1.5	26CCED0 Environment and Sustainability (ESC-3)	26EGHB0 Professional Communication Laboratory (HSMC-2)	26CCLB0 Numerical Skills and Quantitative Problem Solving (EEC-1)	26CCAD0 Indian Knowledge System (AC-0)	28
V	26CCHA0 Project Management (HSMC-3)	26CBED0 Vibe Coding (ESC-3) 3-0-0	26CBCU0 Full stack development+ Laboratory (PCC-3) 2-0-2	26CBCV0 Cloud Microservices + Laboratory (PCC-3) 2-0-2	26CBCW0 Digital Business (PCC-3) 3-0-0	26CBCX0 Innovation, IP Management & Entrepreneurship (PCC-3) 3-0-0	26CBCY0 Operational Research + Laboratory (PCC-3) 2-0-2		26CCLC0 Aptitude Skills (EEC-2)	Basic Science Elective / Language Elective (OEC-3)	26ITLA0 Project-I (EEC-3)	26CCAE0 Universal Human Values and Ethics (AC-0)	29
VI	26CBHA0 Computational Finance (HSMC-3)	26CBCZ0 Cryptography and Network Security (PCC-3) 3-0--0	26CBDA0 Machine Learning (PCC-3) 3-0-0	26CBDB0 Embedded Systems and IoT + Laboratory (PCC-3) 2-0-2	26CBDC0 Human Resource Management (PCC-3) 3-0-0	26CBDD0 Machine Learning Laboratory (PCC-1) 0-0-1	PEC-1 (3)	PEC-2 (3)	Interdisciplinary Elective (OEC-3)		26ITLB0 Project-II (EEC-3)	26CCAF0 Disaster Management (AC-0)	28
VII	PEC-3 (3)	PEC-4 (3)	PEC-5 (3)	PEC-6 (3)	PEC-7 (3)						26ITLC0 Project-III (EEC-3)		18
VIII											26ITLD0 Project-IV (EEC-3)		3
													174

Mandatory requirement: First year category-wise credits are fixed i.e., HSMC: 3 | BSC: 16 | ESC: 11 | PCC: 13 | OEC: 0 | PEC: 0 | PW: 0 | Total: 43

BSC HSMC ESC PCC PEC OEC EEC AC

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THIAGARAJAR COLLEGE OF ENGINEERING, MADURAI- 625 015
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B.Tech (Computer Science and Business Systems) Programme

Categorization of Courses

List of Humanities and Social Science Courses (11)

26EGHA0 - Technical English (3)
26EGHB0 - Professional Communication Lab (2)
26CCHA0 - Project Management (3)
26CBHA0 - Computational Finance (3)

List of Basic Science Courses (22)

26CBSA0 - Discrete Mathematics (4)
26PHSA0 - Physics (3)
26PHSB0 - Physics Laboratory (1.5)
26CBSB0 - Statistics, Probability and Calculus (3)
26CHSB0 - Applied Chemistry (3)
26CHSC0 - Chemistry Laboratory (1.5)
26CBSC0 - Linear Algebra (3)
26CBSD0 - Statistical Methods (3)

List of Engineering Science Courses (23)

26CBEA0 - Essentials of Computing (3)
26CCEA0 - Introduction to Engineering (2)
26CBEB0 - Basic Electrical and Electronics engineering (3)
26CCEB0 - Biology for Engineers (3)
26CBEC0 - Formal Language & Automata Theory (3)
26CCEC0 - Design Thinking (3)
26CCED0 - Environment and Sustainability (3)
26CBED0 - Vibe Coding (3)

List of Professional Core Courses (75)

26CBCA0 - Fundamentals of Computer Science + Laboratory (3)
26CBCB0 - Computer Organization and Architecture (3)
26CBCC0 - Fundamentals of Economics (2)
26CBCD0 - Computational Problem Solving using Python (4)
26CBCE0 - Business Communication & Value Science (1)
26CBCF0 - Data Structures and Algorithms (3)
26CBCG0 - Object Oriented Programming with Java + Laboratory (4)
26CBCH0 - Database Management Systems (3)
26CBCJ0 - Fundamentals of Management (3)
26CBCK0 - Data Structures and Algorithms Laboratory (1)
26CBCL0 - Database Management Systems Laboratory (1)
26CBCM0 - Operating Systems (3)
26CBCN0 - Design and Analysis of Algorithms (3)
26CBCP0 - Computer Networks (3)
26CBCQ0 - Software Engineering with UML + Laboratory (4)

26CBCR0 - Marketing Research and Marketing Management (3)
26CBCS0 - Computer Networks Laboratory (1.5)
26CBCT0 - Design and Analysis of Algorithms Laboratory (1.5)
26CBCU0 - Full Stack Development + Laboratory (3)
26CBCV0 - Cloud Microservices + Laboratory (3)
26CBCW0 - Digital Business (3)
26CBCX0 - Innovation, IP Management & Entrepreneurship (3)
26CBCY0 - Operations Research + Laboratory (3)
26CBCZ0 - Cryptography and Network Security (3)
26CBDA0 - Machine Learning (3)
26CBDB0 - Embedded Systems and IoT + Laboratory (3)
26CBDC0 - Human Resource Management (3)
26CBDD0 - Machine Learning Laboratory (1)

Programme Elective Courses

Honours				**Minor**
Vertical I Enterprise Systems	**Vertical II AI for Business**	**Vertical III Product and Innovation**	**Vertical IV FinTech and Industry Domains**	**Vertical V Analytics and Intelligent Systems**
Enterprise Resource Planning	Artificial Intelligence	Product Management	FinTech Systems	Predictive Analytics
Enterprise Digital Systems	AI for Business Decision Making	Product Innovation and Development	Computational Modelling	Customer Analytics
IT Service Management	Deep Learning for Business	Digital Twin Technologies	Blockchain Technology	Marketing Analytics
Business Process Management	Generative AI for Enterprises	Platform Business Models	Ethics in AI and Data Privacy	HR Analytics
Customer Relationship Management	Natural Language Processing	Agile Product Engineering	Healthcare Information Systems	Supply Chain Analytics
Enterprise Architecture	Computer Vision Applications	IT Product Management	Retail and E-Commerce Analytics	Data Visualization
Digital Transformation Strategies	Explainable AI for Business	Compiler Design	Business Ethics	Edge Computing for Enterprises
Supply Chain Information Systems	Intelligent Automation and Chatbots	Quantum Computing Applications	Industry 5.0 Technologies	Business Intelligence Applications

Open Elective Courses (6)
Basic Science Elective / Language Elective (3)
Interdisciplinary Elective (3)

Employability Enhancement Courses (EEC) (16)
26CCLA0 - Building Communication Skills (1)
26CCLB0 - Numerical Skills and Quantitative Problem Solving (1)
26CCLC0 - Aptitude Skills (2)
26ITLA0 - Project -I (3)
26ITLB0 - Project -II (3)
26ITLC0 - Project -III (3)
26ITLD0 - Project -IV (3)

Multi-disciplinary Elective Courses (3)
Business Analytics (3)
Digital Marketing (3)

CURRICULUM AND DETAILED SYLLABI

FOR

FIRST SEMESTER

B.TECH DEGREE (Computer Science and Business Systems) PROGRAMME

FOR THE STUDENTS ADMITTED FROM THE

ACADEMIC YEAR 2026 – 2027 ONWARDS

THIAGARAJAR COLLEGE OF ENGINEERING

(A Govt. Aided Autonomous Institution Affiliated to Anna University)

MADURAI – 625 015

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THIAGARAJAR COLLEGE OF ENGINEERING: MADURAI – 625 015
B.Tech (Computer Science and Business Systems) Programme

COURSES OF STUDY
(For the candidates admitted from 2026 - 27 onwards)

FIRST SEMESTER

Sl. No.	COURSE CODE	COURSE TITLE	CATEGORY	No.of Hours / Week			Credits
				L	T	P	
THEORY COURSES							
1	26CBSA0	Discrete Mathematics	BSC	3	1	0	4
2	26CBEA0	Essentials of Computing	ESC	3	0	0	3
3	26PHSA0	Physics	BSC	3	0	0	3
THEORY CUM PRACTICAL COURSES							
4	26CBCA0	Fundamentals of Computer Science	PCC	2	0	2	3
5	26CCEA0	Introduction to Engineering	ESC	1	0	2	2
6	26EGHA0	Technical English	HSMC	2	0	2	3
PRACTICAL COURSES							
7	26PHSB0	Physics Laboratory	BSC	0	0	1.5	1.5
AUDIT COURSES							
8	26TAAA0	Heritage of Tamil	AC	-	-	-	-
9	26CCAA0	Vision + ESAT	AC	-	-	-	-
TOTAL							**19.5**

BSC : **Basic Science Courses**
HSMC : Humanities and Social Sciences including Management Courses
ESC : Engineering Science Courses
PCC : Programme Core Courses
PEC : Programme Elective Courses
OEC : Open Elective Courses
EEC : Employability Enhancement Courses
AC : Audit Courses

L : Lecture
T : Tutorial
P : Practical

Note:
1 Hour Lecture is equivalent to 1 credit
1 Hour Tutorial is equivalent to 1 credit
1 Hours Practical is equivalent to 0.5 credit

THIAGARAJAR COLLEGE OF ENGINEERING: MADURAI – 625 015
B.Tech (Computer Science and Business Systems) Programme

SCHEME OF EXAMINATIONS
(For the candidates admitted from 2026- 27 onwards)

FIRST SEMESTER

S.No.	Course Code	Name of the Course	Duration of Terminal Exam. in Hrs.	Marks			Minimum Marks for Pass	
				Continuous Assessment	Terminal Exam	Max. Marks	Terminal Exam	Total
THEORY								
1	26CBSA0	Discrete Mathematics	3	40	60	100	27	50
2	26CBEA0	Essentials of Computing	3	40	60	100	27	50
3	26PHSA0	Physics	3	40	60	100	27	50
THEORY CUM PRACTICAL								
4	26CBCA0	Fundamentals of Computer Science	3 (TCP-P)	50	50	100	22.5	50
5	26CCEA0	Introduction to Engineering	3	50	50	100	22.5	50
6	26EGHA0	Technical English	3	50	50	100	22.5	50
PRACTICAL								
7	26PHSB0	Physics Laboratory	3	60	40	100	18	50
AUDIT COURSES								
8	26TAAA0	Heritage of Tamil	-	-	-	-	-	-
9	26CCAA0	Vision + ESAT	-	-	-	-	-	-

26CBSA0	DISCRETE MATHEMATICS

Category	L	T	P	Credit
BSC	3	1	0	4

Preamble

Discrete Mathematics explores the fundamental concepts of discrete mathematical structures, logical reasoning, and algebraic systems used in computer science and computational applications. It develops problem-solving and analytical skills through Boolean algebra, combinatorics, graph theory, and formal logic. The course also provides a foundation for advanced topics in algorithms, cryptography, data structures, and artificial intelligence.

Prerequisite

- NIL

Course Outcomes

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

No.	Course Outcome	TPS Level	Performance Indicator	CO Weightage	SDG addressed	SDG Level
CO1	Apply Boolean algebra identities, logic gates, Karnaugh maps to simplify Boolean expressions and Boolean functions.	TPS3	1.1.1	19%	SDG 4	2
CO2	Apply the properties of relation to classify the given relation.	TPS3	1.1.1	16%	SDG 4	2
CO3	Solve combinatorial problems using counting techniques, pigeonhole principle, mathematical induction	TPS3	1.1.1	15%	SDG 4	2
CO4	Apply recurrence relation to solve combinatorial problem.	TPS3	1.1.1	15%	SDG 4	2
CO5	Apply graph theoretic concepts to characterize the given discrete structures.	TPS3	1.1.1	16%	SDG 4	2
CO6	Apply the foundations of logic to construct valid mathematical arguments and logic proofs.	TPS3	1.1.1	19%	SDG 4	2

Assessment Pattern

CO	CAT1	Assignment 1	CAT2	Assignment 2	Terminal Exam
	% of Marks	% of Marks	% of Marks	% of Marks	% of Marks
CO1	38	38			19
CO2	32	32			16
CO3	30	30			15
CO4			30	30	15

CO5			32	32	16
CO6			38	38	19
Total	100	100	100	100	100

Syllabus

Boolean Algebra: Boolean Functions – Boolean Expressions and Boolean Functions - Identities of Boolean Algebra – Duality - The Abstract Definition of a Boolean Algebra -Representing Boolean Functions - Sum-of-Products Expansions – Logic Gates – Combinations of Gates - Examples of Circuits – Adders - Minimization of Circuits - Karnaugh Maps – Don't care conditions.

Relations: Relations and Their Properties – Representing Relations – Equivalence Relations

Combinatorics: Mathematical Induction - The Basics of Counting - The Pigeonhole Principle – Solving Linear Recurrence Relations

Graph Theory: Graphs and Models - Graph Terminology and Special Types of Graphs – Representing Graphs and Graph Isomorphism – Connectivity – Euler and Hamiltonian Paths – Graph Colouring

Propositional Calculus: Propositional Logic – Propositional Equivalences – Rules of Inference.

Learning Resources

Text Book

1. Kenneth H. Rosen., "Discrete Mathematics and Its Applications", 8th Edition, McGraw-Hill Education, 2021.

Reference Books & Web resources

1. S.B. Singh, "Combinatorics and Graph Theory", 3rd Edition, Khanna Publishing House, 2018.
2. J.P. Tremblay and R. Manohar, "Discrete Mathematical Structures with Applications to Computer Science", 1st Edition, McGraw Hill Education, 2017.
3. S.B. Singh, Jai Kishore and Ekata Gupta, "Discrete Structures", 3rd Edition, Khanna Publishing House, 2017.

Course Contents and Lecture Schedule

Module No	Topics	No of Periods
1	**Boolean Algebra**	**12**
1.1	Boolean Functions, Boolean Expressions and Boolean Functions	1
1.2	Identities of Boolean Algebra, Duality	1
1.3	The Abstract Definition of a Boolean Algebra	1
	Tutorial	1
1.4	Representing Boolean Functions, Sum-of-Products Expansions	1
1.5	Logic Gates, Combinations of Gates, Examples of Circuits	1
1.6	Adders	1
	Tutorial	1
1.7	Minimization of Circuits, Karnaugh Maps	2
1.8	Don't care conditions	1
	Tutorial	1
2	**Relations**	**7**

2.1	Relations	1
2.2	Properties of Relations	1
	Tutorial	1
2.3	Representing Relations	2
2.4	Equivalence Relations	1
	Tutorial	1
3	**Combinatorics**	**8**
3.1	Mathematical Induction	2
3.2	The Basics of Counting	1
	Tutorial	1
3.3	The Pigeonhole Principle	1
3.4	Solving Linear Recurrence Relations	2
	Tutorial	1
4	**Graph Theory**	**13**
4.1	Graphs and Models, Graph Terminology and Special Types of Graphs	2
4.2	Representing Graphs	1
	Tutorial	1
4.3	Graph Isomorphism	2
4.4	Connectivity	2
	Tutorial	1
4.5	Euler and Hamiltonian Paths	2
4.6	Graph Colouring	1
	Tutorial	1
5	**Propositional Calculus**	**8**
5.1	Propositional Logic	2
5.2	Propositional Equivalences	2
	Tutorial	1
5.3	Rules of Inference	2
	Tutorial	1
	Total Periods	**48**

Course Designer(s):

1. Ms. H. Sri Vinodhini, Assistant Professor, Department of Mathematics srivinodhini@tce.edu
2. Dr. S. Suriyakala, Assistant Professor, Department of Mathematics ssamat@tce.edu
3. Mr. R. Suresh Kannan, Assistant Professor, Department of Mathematics rskmat@tce.edu
4. Dr. K. Saravanakumar, Assistant Professor, Department of Mathematics kskmat@tce.edu

26CBEA0	ESSENTIALS OF COMPUTING

Category	L	T	P	Credit
ESC	3	0	0	3

Preamble

Computer Science introduces the fundamentals of computing, computational thinking, and problem solving through logical reasoning and visual programming. The course develops essential programming skills and builds a foundation for understanding modern digital technologies and their real-world applications.

Prerequisite

NIL

Course Outcomes

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

No.	Course Outcome	TPS Level	Performance Indicator	CO Weightage	SDG addressed	SDG Level
CO1	Explain the fundamentals, characteristics, and applications of computers.	TPS2	1.3.1	12%	SDG 8	1
CO2	Solve problems using computational thinking, number systems, and Boolean logic.	TPS3	1.3.1	20%	SDG 8	1
CO3	Apply decomposition, abstraction, and pattern recognition to solve problems and design suitable algorithms.	TPS3	1.3.1	18%	SDG 8	1
CO4	Demonstrate programming concepts using appropriate programming paradigms and tools.	TPS3	1.3.1	20%	SDG 4	1
CO5	Implement simple Scratch programs using variables, decisions, loops, lists, and searching concepts.	TPS3	1.4.1	16%	SDG 4	1
CO6	Develop applications using modular and iterative problem-solving approaches.	TPS3	1.4.1	14%	SDG 9	1

Assessment Pattern

CO	CAT1	Assignment 1	CAT2	Assignment 2	Terminal Exam
	% of Marks	% of Marks	% of Marks	% of Marks	% of Marks
CO1	**20**				**12**
CO2	**40**	**50**			**20**
CO3	**40**	**50**			**18**

CO4			**40**	**40**	**20**
CO5			**30**	**30**	**16**
CO6			**30**	**30**	**14**
Total	**100**	**100**	**100**	**100**	**100**

Syllabus

Introduction to Computers: Computer-Characteristics, History, Classification, Applications. Basic Organization of a Computer. Data Representation, Using spread sheets for basic operations on data and visualize the data.

Activities: 1. Office Software for documentation and presentation
2. Spread sheets for calculations and data. Visualization

Computational Thinking: Definition, Basic model of computation, Number Systems, Conversions among Number systems, Logic- Boolean Logic, Applications of Propositional Logic

Activities: 1. Solving problems based on number systems and logics.
2. Virtual Demonstration of Computational thinking

Problem Solving Basics & Algorithms: Problem Definition, Logical Reasoning, Decomposition, pattern recognition, abstraction, Real-world problem modelling, Notion of Algorithm – Iterative vs Recursive Styles - Implementation of Algorithms - Design and implementation of fundamental computational algorithms.

Activities: Algorithm Development for simple mathematical problems

Programming Languages: Program Development Life Cycle, Program Design Tools, Flowcharts, Pseudocodes, Programming Languages, Programming Paradigms, Traditional Programming Concepts, Procedural Units, Language Implementation, Declarative Programming.

Activities: Flowchart design for simple mathematical problems

Scratch Programming: Data Types, Variables, Getting Input from Users. Making Decisions, Comparison Operators, Decision Structures, Logical Operators, Repetition, Loop Blocks, Stop Commands, Counters, Nested Loops, String Processing, String Manipulation, Lists, Numerical Lists, Searching and Sorting Lists.

Activities: 1. Creation of Functional Block for simple mathematical problems
2. Scratch Animation for understanding Conditional and Loop statements.
3. Scratch Programs for applied scientific computing and data manipulations

Application Development: Building Apps using problem, solving techniques on any app development platform, Modelling, incremental and iterative, reuse, modularization, algorithmic thinking, abstracting and modularizing, decomposition, testing and debugging. Activities: Sample App Developments for societal problems.

Learning Resources

Text Book

1. Brookshear, J. G., & Brylow, D. “Computer Science: An Overview”, 13th ed.. Pearson.2022.
2. Thareja, R., “Fundamentals of computers”. Oxford University Press, 2020.
3. Riley, D. D., & Hunt, K. A., “Computational thinking for the modern problem solver”, CRC Press, 2014.

Reference Books&Web resources

1. Marji, M., “Learn to program with Scratch: A visual introduction to programming with games”, art, science and math. No Starch Press, 2014.

2. Scratch software: https://scratch.mit.edu/
3. MIT APP INVENTOR software: https://appinventor.mit.edu/
4. app.diagrams.net

Course Contents and Lecture Schedule

Module No	Topics	No of Periods	Course Outcomes
1	**Introduction to Computers**		CO1
1.1	Computer-Characteristics, History, Classification.	1	CO1
1.2	Applications, Basic Organization of a Computer.	1	CO1
1.3	Data Representation, Using spread sheets for basic operations on data and visualize the data.	2	CO1
2	**Computational Thinking**		CO2
2.1	Definition, Basic model of computation,	1	CO2
2.2	Number Systems	1	CO2
2.3	Conversions among Number systems,	2	CO2
2.4	Logic- Boolean Logic, Applications of Propositional Logic	2	CO2
3	**Problem Solving Basics & Algorithms**		CO3
3.1	Problem Definition, Logical Reasoning, Decomposition	2	CO3
3.2	pattern recognition, abstraction, Real-world problem modelling	2	CO3
3.3	Notion of Algorithm – Iterative vs Recursive Styles - Implementation of Algorithms	2	CO3
3.4	Design and implementation of fundamental computational algorithms.	2	CO3
4	**Programming Languages**		CO4
4.1	Program Development Life Cycle, Program Design Tools,	1	CO4
	Flowcharts, Pseudocodes, Programming Languages,	2	CO4
	Programming Paradigms, Traditional Programming Concepts, Procedural Units	2	CO4
4.2	Language Implementation, Declarative Programming.	2	CO4
5	**Scratch Programming**		CO5
5.1	Data Types, Variables, Getting Input from Users. Making Decisions	1	CO5
5.2	Comparison Operators, Decision Structures, Logical Operators	1	CO5
5.3	Repetition, Loop Blocks, Stop Commands, Counters, Nested Loops,	2	CO5
5.4	String Processing, String Manipulation, Lists, Numerical Lists, Searching and Sorting Lists.	2	CO5
6	**Application Development**		CO6
6.1	Building Apps using problem, solving techniques on any app development platform	1	CO6
6.2	Modelling, incremental and iterative, reuse, modularization, algorithmic thinking,	2	CO6
6.3	abstracting and modularizing, decomposition, testing and debugging.	2	CO6
	Total Periods	**36**	

Course Designer(s):

1. Mrs.R.Subhashni, Assistant Professor, Department of CSBS rsica@tce.edu
2. Mr.M.Venkatesh, Assistant Professor, Department of CSBS mvhca@tce.edu

26PHSA0	PHYSICS (COMMON TO ALL BRANCHES)

Category*	L	T	P	Credit
BSC	2	1	0	3

Preamble

Physics provides a strong foundation in classical and modern physics, including mechanics, wave phenomena, electrodynamics, electronic materials, and quantum theory, relevant to engineering applications. This course connects fundamental principles with modern technologies such as solar cells, electric vehicles, MRI scanners, scanning tunneling microscopes, and emerging quantum technologies.

Prerequisite

Physics and Mathematics at Higher Secondary Level (Class XII)

Course Outcomes

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

No.	Course Outcome	TPS Level	Performance Indicator	CO Weightage	SDG addressed	SDG Level
CO1	Apply the principles of mechanics of solids, including the work-energy theorem, central forces, conservation of angular momentum, and coordinate transformations, to solve problems on satellite maneuvers.	TPS3	1.2.1	15	SDG 9	1
CO2	Apply the equations of oscillatory and wave motion to solve problems on damped and forced oscillations, Q factor, impedance matching, phase and group velocity, and dispersive wave phenomena.	TPS3	1.2.1	15	SDG 11	1
CO3	Apply Maxwell's equations and Poynting's theorem to solve problems on electromagnetic wave propagation, polarization, and energy-momentum transport in vacuum and conducting media.	TPS3	1.2.1	18	SDG 3	1
CO4	Apply band theory, carrier transport equations, and Fermi level concepts to compute carrier concentration and solve problems related to the operation of solar cells, batteries, supercapacitors, and EV materials.	TPS3	1.2.1	18	SDG 7	2

CO5	Apply the Schrodinger wave equation and quantum mechanical principles to solve problems on a particle in a 1D box, a quantum harmonic oscillator, and tunneling as realized in the scanning tunneling microscope.	TPS3	1.2.1	17	SDG 4	0
CO6	Apply the principles of superposition, entanglement, and quantum logic gates to solve problems, illustrating the fundamental operational differences between classical and quantum computing using qubit representations.	TPS3	1.4.1	17	SDG 9	1

Assessment Pattern

CO	CAT1	Assignment 1	CAT2	Assignment 2	Terminal Exam
	% of Marks	% of Marks	% of Marks	% of Marks	% of Marks
CO1	35	35	—	—	15
CO2	35	35	—	—	15
CO3	30	30	—	—	18
CO4	—	—	35	35	18
CO5	—	—	35	35	17
CO6	—	—	30	30	17
Total	**100**	**100**	**100**	**100**	**100**

Note: CO-wise assessment must align with CO weightage.

Syllabus

Module 1: Mechanics of Solids (6 hrs)

Scalars and Vectors Under Rotation Transformation – Work-Energy Theorem – Central Forces – Energy in Conservative and Non-Conservative Forces – Conservation of Angular Momentum – Coordinate Systems: Cartesian, Polar, Cylindrical – Satellite Maneuvers.

Module 2: Oscillations and Waves (6 hrs)

Oscillatory Motion – Damped Oscillations – Forced Oscillations (Qualitative only): Differential Equation and its Solution – Q Factor – Impedance Matching – Group Velocity and Phase Velocity – Non-Dispersive Transverse and Longitudinal Waves in a String – Dispersive Waves – Seismic Waves – Water Waves and Tsunamis.

Module 3: Electrodynamics (6 hrs)

Maxwell's Equations of Electromagnetism – Equation of Continuity – Poynting's Theorem – Electromagnetic Waves – Polarization – EM Waves in Vacuum and Conductors – Energy and Momentum in EM Waves – Application: CT/MRI Scan.

Module 4: Physics of Electronic Materials (6 hrs)

Band Theory of Solids – Kronig-Penney Model (Qualitative only) – Bloch's Theorem – Intrinsic and Extrinsic Semiconductors – Carrier Concentration and Fermi Level – Electron and Hole

Transport – Solar Cells – Charge Storage in Batteries and Supercapacitors – Materials for Electric Vehicles (EV) – 2D Materials, Flexible Electronic Materials, and Quantum Materials.

Module 5: Quantum Mechanics (6 hrs)
Wave Nature of Particles – Wave Function – Expectation Values – Schrodinger Wave Equations – Uncertainty Principle – Particle in a 1D Box – Quantum Harmonic Oscillator – Quantum Tunnelling (Qualitative only) – Scanning Tunneling Microscope.

Module 6: Quantum Computing (6 hrs)
Quantum Computing – Classical and Quantum Computing: Key Differences – Bloch Sphere Representation of Qubits – Types of Qubits – Superposition – Quantum Entanglement – Quantum Logic Gates.

Learning Resources

Text Book

H. D. Young and R. A. Freedman, "University Physics with Modern Physics", Pearson Education, 15th Edition, 2023.

D. J. Griffiths, "Introduction to Electrodynamics", Cambridge University Press, 4th Edition, 2017.

M. Mahendran, M. Tamilelakkiya, S. Karthickprabhu, P. Sivakumar, “Engineering Physics” , Shanlax Publications, 1st edition, 2026.

Reference Books & Web resources

1. S. O. Pillai, "Solid State Physics", New Age International Publishers, 8th Edition, 2018.

N. David Mermin, "Quantum Computer Science: An Introduction", Cambridge University Press, 2007.

R. P. Feynman, R. B. Leighton and M. Sands, "The Feynman Lectures on Physics – Vol. I, II & III", Addison-Wesley, 2011.

NPTEL Course: "Engineering Physics" – https://nptel.ac.in

MIT OpenCourseWare: "Physics II: Electricity and Magnetism" – https://ocw.mit.edu

Course Contents and Lecture Schedule

Module	Topics	Periods
1	Scalars and Vectors Under Rotation Transformation	1
1.1	Work-Energy Theorem; Central Forces	1
1.2	Energy in Conservative and Non-Conservative Forces; Conservation of Angular Momentum	1
1.3	Coordinate Systems: Cartesian, Polar, Cylindrical	2
1.4	Satellite Maneuvers	1
2	Oscillatory Motion; Damped Oscillations	1
2.1	Forced Oscillations – Differential Equation and Solution; Q Factor; Impedance Matching	2
2.2	Group Velocity and Phase Velocity; Non-Dispersive Waves in a String	1
2.3	Dispersive Waves; Seismic Waves; Water Waves and Tsunamis	2

3	Maxwell's Equations, Equation of Continuity	2
3.1	Poynting's Theorem; Electromagnetic Waves; Polarization	1
3.2	EM Waves in Vacuum and Conductors; Energy and Momentum in EM Waves	2
3.3	Application: CT/MRI Scan	1
4	Band Theory of Solids; Kronig-Penney Model (Qualitative); Bloch's Theorem	1
4.1	Intrinsic and Extrinsic Semiconductors; Carrier Concentration and Fermi Level	2
4.2	Electron and Hole Transport; Solar Cells	1
4.3	Charge Storage in Batteries and Supercapacitors; EV Materials, Flexible Electronic Materials, 2D and Quantum Materials	1
5	Wave Nature of Particles; Wave Function; Expectation Values	1
5.1	Schrodinger Wave Equation (Time-dependent and Time-independent)	2
5.2	Uncertainty Principle; Particle in a 1D Box	2
5.3	Quantum Harmonic Oscillator; Quantum Tunnelling (Qualitative); Scanning Tunneling Microscope	1
6	Classical vs Quantum Computing: Qubit – Definition and Types	1
6.1	Bloch Sphere Representation; Superposition	2
6.2	Quantum Entanglement; Quantum Logic Gates	2
6.3	Case Study: Quantum Computing Applications	1
	Total Periods	36

SDG-Aligned Academic Activities

CO	SDG	Activity	Linkage to Module	TPS	Level
CO1	SDG 9	Compute orbital velocity, period, and energy for a satellite executing a Hohmann transfer between circular orbits using conservation of angular momentum and the work-energy theorem.	Module 1 – Satellite Maneuvers	TPS 3	1
CO2	SDG 11	Use the forced-oscillation model to compute the resonant frequency and Q-factor for a seismic sensor	Module 2 – Forced Oscillations, Seismic Waves	TPS 3	1

		and relate impedance matching to signal fidelity in earthquake early-warning systems.			
CO3	SDG 3	Apply Poynting's theorem to compute the power density of EM waves used in MRI and CT imaging and use polarization principles to explain contrast differentiation in medical scans.	Module 3 – Poynting's Theorem, CT/MRI Scan	TPS 3	1
CO4	SDG 7	Compute the efficiency of a p-n junction solar cell using given carrier concentration and Fermi level data and solve charge storage problems for a supercapacitor in an EV energy management scenario.	Module 4 – Solar Cells, EV Materials, Supercapacitors	TPS 3	2
CO5	SDG 4	Solve the particle-in-a-1D-box problem for a quantum dot of given dimensions, compute allowed energy levels and use the tunneling probability formula to explain STM tip-sample distance sensitivity.	Module 5 – Particle in 1D Box, Quantum Tunnelling, STM	TPS 3	0
CO6	SDG 9	Apply Hadamard and CNOT gate matrices to given qubit input states, trace the state on the Bloch sphere, and demonstrate the creation of entangled Bell states using quantum logic gate sequences.	Module 6 – Quantum Logic Gates, Entanglement	TPS 3	1

Course Designer(s):

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Dr. S. Karthickprabhu skphy@tce.edu

26CBCA0	FUNDAMENTALS OF COMPUTER SCIENCE

Category	L	T	P	Credits	TE Type
PCC	2	0	2	3	TCP-P

Preamble

This course introduces computational problem solving and structured programming using the C programming language. It develops algorithmic thinking, logical reasoning, and fundamental programming skills to solve real-world computational problems.

Prerequisite

NIL

Course Outcomes

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

No.	Course Outcome	TCE Proficiency Scale	Performance Indicator	CO Weightage	SDG Addressed	SDG Level
CO1	Apply fundamental ANSI C programming concepts and control structures to develop computational solutions for problem-solving tasks	3	1.3.1	15%	4	1
CO2	Demonstrate functions, recursion, parameter passing, and arrays to develop modular data-processing programs	3	1.8.1	20%	8	1
CO3	Solve programming problems using pointer concepts and string operations involving arrays, strings, and functions.	3	1.4.1	20%	8	1

CO4	Use structures, unions, pointers, and file operations to solve complex data organization and processing problems.	3	1.4.1	25%	8	1
CO5	Demonstrate effective technical communication skills through structured documentation, code presentation, and problem-solving activities.	3	9.1.2	5%	NC	-
CO6	Apply teamwork skills to develop, and test, C programming projects collaboratively	3	8.1.1	10%	NC	-
CO7	Evaluate C programming solutions based on professional ethics, software reliability, and sustainable computing practices aligned with relevant SDGs.	3	7.2.1	5%	NC	-

Assessment Pattern

CO	Theory		Practical		Terminal Exam % of Marks Practical
	CAT1	CAT2	OCR/Continuous Assessment	Model Test CO-wise	
	% of Marks	% of Marks	% of Marks	% of Marks	
CO1	40		15	15	
CO2	60		20	20	
CO3		50	20	20	

CO4		50	25	25	100
CO5			5	5	
CO6			10	10	
CO7			5	5	
Total	100	100	100	100	100

Assessment Pattern: Practical Component

Type of Assessment	Component	Marks	Remarks
Continuous Assessment	Pre-lab, In-lab, Post-lab	75	Conducted throughout the semester
Model Test	CO-wise (Cognitive)	25	Rubrics covering all Domains of learning
Total Internal Marks		**100**	
End Semester Examination	CO-wise (Cognitive)	100	Rubrics covering all Domains of learning

Syllabus

Problem Solving Concepts: Fundamentals of ANSI C Programming – Structure of a C program – Compilation and execution process – variables, constants, data types – scope and lifetime of variables - Operators, Expressions and Type conversion – Precedence and Order of Execution - break, continue, exit, goto labels – Basic Syntax and Logical Errors in compilation, source, object and executable code

Control Structures: Statements and blocks – if, if-else, else-if ladder and switch – while, do-while and for loops – Nested loops

Functions: Function prototype, function definition, function call, Built-in functions – Recursion – Parameter passing: Pass by value, Pass by reference - Preprocessor directives and macros – Standard library functions

Arrays and Strings: Declaration, Initialization – One-dimensional array –Two-dimensional arrays – Passing arrays to functions - maximum and minimum value – Selection Sort – Linear and Binary search techniques - Character Array - String operations (length, concat, compare, copy)

Pointers: Pointer arithmetic – Arrays and pointers – Character pointers and strings – Pointer arrays and pointer to pointer – Pointers to functions

Structures and Union: Structures and functions – Arrays and pointers to structures – Self-referential structures – Array of Structures - typedef and bit-fields

Files: Introduction to files - Types of file processing: Sequential access, Random access - Command line arguments– Error handling

Text Book

1. Yashavant Kanetkar, "Let Us C", BPB Publications, 21st edition, 2025.

Reference Books & web resources

1. Jens Gustedt, Modern C, 3rd Edition, Manning Publications, 2025.

2. Herbert Schildt, “C: The Complete Reference”, Fourth Edition, McGraw Hill, 2017
3. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, 2nd Edition, Prentice Hall / Pearson Education, 1988.
4. NPTEL – “ Problem Solving through Programming in C” - https://onlinecourses.nptel.ac.in/e-learning/preview/noc26_cs53

SDG Alignment

Activities aligned with SDGs addressed:

1. SDG 4 – C Programs that enables the students to convert the mathematical concepts into digital codes
2. SDG 8 – Programs using arrays, pointers and string will help to analyze the utilization of systems memory and improvise it effectively.

Course Contents and Lecture Schedule

Module No	Topics	No. of Periods	Course Outcomes
1	**Problem Solving Concepts & Control Structures**		
1.1	Fundamentals of ANSI C Programming – Structure of a C program – Compilation and execution process - variables, constants, data types	1	CO1
1.2	Scope and lifetime of variables		
1.3	Operators, Expressions and Type conversion – Precedence and Order of Execution - break, continue, exit, goto labels	1	CO1
1.4	Basic Syntax and Logical Errors in compilation, source, object and executable code		
1.5	Statements and blocks – if, if-else, else-if ladder and switch	1	CO1
1.6	while, do-while and for loops – Nested loops	1	CO1, CO7
2	**Functions and Arrays:**		
2.1	Function prototype, function definition, function call, Built-in functions – Recursion	1	CO2
2.2	Parameter passing: Pass by value, Pass by reference -	1	CO2
2.3	Preprocessor directives and macros – Standard library functions	1	CO2
2.4	Declaration, Initialization – One-dimensional array –Two-dimensional arrays - Passing arrays to functions	1	CO2, CO6
2.5	Maximum and minimum value, Selection Sort – Linear and Binary search techniques	1	CO2, CO5
3	**Strings and Pointers**		
3.1	Character Array - String operations (length, concat, compare, copy)	1	CO2
3.2	Pointer arithmetic – Arrays and pointers	1	CO3
3.3	Character pointers and strings	1	CO3
3.4	Pointer arrays and pointer to pointer	1	CO3, CO6
3.5	Pointers to functions	1	CO3
4	**Structures, Union and Files:**		
4.1	Structures and functions	1	CO4, CO5

4.2	Arrays and pointers to structures – Self-referential structures	2	CO4
4.3	Array of Structures - typedef and bit-fields	1	CO4
4.4	Introduction to files - Types of file processing: Sequential access, Random access -	1	CO4, CO6
4.5	Command line arguments– Error handling	1	CO4, CO7
	Total Periods	**24**	

List of Experiments with CO Mapping

Sl. No.	Name of the Experiment	Level of Experiment	Objective(s)	COs Addressed
1	Develop a C program to perform arithmetic and relational operations on different data types and analyze the effect of type conversion and operator precedence	1	3- Experimentation	CO1
2	Construct a menu-driven application using conditional statements to perform different operations based on user choice.	1	3- Experimentation	CO1, CO5
3	Develop a C program using loops to generate number patterns and perform mathematical computations such as factorial and Fibonacci series.	1	2- Models	CO1
4	Design a C program to solve mathematical problems using both user-defined functions and recursive techniques.	2	3- Experimentation	CO2
5	Develop a C program to compare pass by value and pass by reference methods for performing data manipulation operations.	2	3- Experimentation	CO2, CO5
6	Construct a C program to perform matrix operations and determine the maximum and minimum elements in arrays.	2	2- Models	CO2
7	Develop a C program to sort a dataset and search for a specific element using suitable searching techniques.	2	2- Models	CO2
8	Design a C program to perform string operations such as concatenation, comparison,	2	3- Experimentation	CO3, CO7

	and copying without using built-in library functions.			
9	Develop a C application using pointers and function pointers to process arrays and perform dynamic function execution.	3	3- Experimentation	CO3, CO6
10	Construct a file-based C application using structures to store, retrieve, and manage records efficiently.	3	3- Experimentation	CO4, CO6, CO7
11	MINI PROJECT*	3	9 - Design	CO1 – CO7

*__Assessment__: The Mini Project carries a 10% weightage in the Test marks. Starting from Exercise 9, students will do the exercises based on their chosen Mini Project. Students must work in teams of three members for the Mini Project. It will be evaluated based on all CO's.

Course Designer(s):

1. Dr. J. Felicia Lilian, Assistant Professor, Department of CSBS jflcse@tce.edu
2. Mrs. Priya Thiagarajan, Assistant Professor, Department of CSBS ptica@tce.edu

26CCEA0	INTRODUCTION TO ENGINEERING	Category	L	T	P	Credits	TE type
		ESC	1	0	2	2	TCP-P

1. Preamble

This course introduces first-year engineering students to the engineering profession, fundamental measurement techniques, and the design of simple functional systems. Through hands-on activities such as product teardown, instrument-based measurements, 3D modelling using TinkerCAD, data analysis with Excel, and team-based projects, students develop essential technical and professional skills. The course follows the CDIO (Conceive–Design–Implement–Operate) framework, fostering engineering thinking from the first semester. It also promotes awareness of engineering ethics, safety, sustainability, and the role of engineering in addressing societal challenges and the UN Sustainable Development Goals.

2. Prerequisite

Nil

3. Course Outcomes

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

No.	Course Outcome	TCE Proficiency Scale	Performance Indicator	CO Weightage	SDG Addressed	SDG Level
CO1	Describe the engineering profession, major engineering disciplines, and the CDIO framework for product and system lifecycle.	TPS 2	1.1.1	15%	SDG 4	1
CO2	Decompose a product or engineering system into its functional components, sub-systems, and operational constraints using structured analysis.	TPS 3	1.2.1	20%	SDG 9	2
CO3	Apply data acquisition systems and computational tools (Excel / Python) to acquire, process, and interpret sensor data with appropriate uncertainty analysis.	TPS 3	5.2.1	20%	SDG 9	2
CO4	Implement and validate a simple engineering artefact/system by applying basic	TPS 3	4.4.1	20%	SDG 9	2

	engineering principles, tools, and teamwork.					
CO5	Demonstrate professional teamwork and technical communication competencies through a structured engineering report and oral presentation.	TPS 3	8.2.1	15%	SDG 4	2
CO6	Evaluate engineering solutions against criteria of professional ethics, occupational safety, and sustainable development, with reference to relevant SDGs.	TPS 4	7.2.1	10%	SDG 12, SDG 13	3

4. Assessment Pattern

CO	Theory		Practical		Terminal Exam (Practical)
	CAT1	CAT2	OCR/Continuous Assessment	Model Test CO-wise	
	% of Marks	% of Marks	% of Marks	% of Marks	% of Marks
CO1		**25**	**100**	**100**	100
CO2		**35**			
CO3		**30**			
CO4		**10**			
CO5					
CO6					
Total	-	100	100	100	100

5. Assessment Pattern: Practical Component

Type of Assessment	Component	Marks	Remarks
Continuous Assessment	Pre-lab, In-lab, Post-lab	75	Conducted throughout the semester
Model Test	CO-wise (Cognitive, Psychomotor, Affective)	25	Rubrics covering all Domains of learning
Total Internal Marks		**100**	
End Semester Examination	CO-wise (Cognitive, Psychomotor, Affective)	100	Rubrics covering all Domains of learning

6. Syllabus

Module 1: Engineering Around Us

What is engineering? – Major engineering disciplines – Engineering in everyday life – Engineering and society – Creativity and innovation – Engineering products and systems – Product observation and teardown activity.

Module 2: Engineering Measurements and Tools

SI units and engineering measurements – Measurement of dimensions and physical quantities using basic measuring instruments – Data recording – Accuracy, precision, and errors – Engineering estimation and reasoning – Safe use of engineering tools and instruments.

Module 3: Engineering Visualization and Simulation

Introduction to engineering drawings and visualization – Basic 2D and 3D concepts – Excel for tables and graph plotting – Introduction to ThinkerCAD – Simple 3D object creation – Basic circuit simulation.

Module 4: Engineering Making

Introduction to engineering materials – Basic fabrication techniques: cutting, joining, and assembling – Workshop safety practices – Introduction to sensors and automation concepts – Team-based engineering activity – Building a simple functional model.

Module 5: Teamwork, Ethics and Sustainability

Teamwork and collaboration – Basics of technical presentations – Engineering ethics and responsibilities – Engineering safety – Sustainability and SDGs in engineering – Engineering solutions for society.

7. Learning Resources

7.1 Text Books

1. Crawley, E., Malmqvist, J., Ostlund, S., Brodeur, D., "Rethinking Engineering Education: The CDIO Approach", Springer, 2014.
2. Eide, A., Jenison, R., Mashaw, L., Northup, L., "Introduction to Engineering Design and Problem Solving", McGraw-Hill, 3rd Edition.

7.2 Reference Books & Web Resources

1. CDIO Syllabus v3.0, Worldwide CDIO Initiative -- www.cdio.org (free download).
2. MIT Open Course Ware 2.00A: Introduction to Design -- ocw.mit.edu.
3. Python for Engineers: Google Colab notebooks (free, requires internet).
4. IEEE Engineering Ethics Resources -- www.ieee.org/ethics.

8. Course Contents and Lecture Schedule

Module No	Topics	No of Periods	**Course Outcomes**
Module 1:			
1.1	What is engineering? – Major engineering disciplines – Engineering in everyday life	2	CO1
1.2	Engineering and society – Creativity and innovation	1	CO1
1.3	Engineering products and systems – Product observation and teardown activity	1	CO1, CO2
2.1	SI units and engineering measurements – Measurement of physical quantities using basic instruments	1	CO3
2.2	Data recording – Accuracy, precision, and errors – Engineering estimation and reasoning	1	CO3

2.3	Safe use of engineering tools and instruments	1	CO3, CO6
3.1	Introduction to engineering drawings and visualization – Basic 2D and 3D concepts	1	CO2
3.2	Excel for tables and graph plotting – TinkerCAD: 3D object creation and basic circuit simulation	1	CO2, CO3
4.1	Introduction to engineering materials – Fabrication techniques: cutting, joining, assembling – Workshop safety	1	CO4, CO6
4.2	Sensors and automation concepts – Team-based engineering activity – Building a simple functional model	2	CO4
5.1	Teamwork and collaboration – Basics of technical presentations	1	CO5
5.2	Engineering ethics and responsibilities – Engineering safety	1	CO5, CO6
5.3	Sustainability and SDGs in engineering – Engineering solutions for society	1	CO5, CO6
Total (Hrs)		15	

9. List of Experiments with CO Mapping

Sl. No.	Name of the Experiment	Level of Experiment	Objective(s)	COs Addressed
1.	Product Teardown and Functional Analysis	Level 1	Obj. 3 – Experimentation	CO1, CO2, CO6
2.	Product Teardown and Design Improvement	Level 2	Obj. 5 – Design	CO1, CO2, CO4, CO6
3.	Measurement of Dimensions and Physical Quantities Using Basic Engineering Instruments.	Level 1	Obj. 1 – Instrumentation	CO3, CO6
4.	Design and Visualization of Basic 3D Geometric Objects Using TinkerCAD	Level 1	Obj. 5 – Design	CO2, CO3
5.	Design and Simulation of a Basic Electrical Circuit Using TinkerCAD	Level 2	Obj. 3 – Experimentation	CO2, CO3, CO4
6.	Data Tabulation and Graph Plotting Using Microsoft Excel	Level 1	Obj. 4 – Data Analysis	CO3
7.	Micro Project	Level 3	Obj. 5 – Design	CO2, CO4, CO5
8.	Case Study – Engineering Ethics and Responsibility	Level 2	Obj. 13 – Ethics & Integrity	CO5, CO6
9.	Technical Report Writing	Level 1	Obj. 11 – Communication	CO5

10. Course Designer(s):

- Dr. S. Baskar, Professor, EEE, and Dean (A&A), sbeee@tce.edu
- Dr. R. Rajan Prakash, Associate Professor, EEE, r_rajanprakash@tce.edu
- Dr. V. Balasubramani, Associate Professor, Mechanical, vbmech@tce.edu

26EGHA0	TECHNICAL ENGLISH	CATEGORY	L	T	P	CREDITS	TE TYPE
		HSMC	2	0	2	3	TCP-T

1. Preamble

Technical English is a course that develops essential communication skills for academic and engineering professional contexts. The course integrates listening, speaking, reading, and writing through practical technical and workplace-based activities.

2. Prerequisite

Nil

3. Course Outcomes

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

No.	Course Outcome	TPS Level	Performance Indicator	CO Weightage	SDG addressed	SDG Level
CO1	Interpret technical texts, engineering manuals, and academic articles, extracting key information and inferring meaning from the context.	TPS3	9.1.1	20%	4	1
CO2	Use context-appropriate vocabulary and grammatical accuracy in technical writing including reports, Instructions, and graphical Interpretation.	TPS3	9.1.2	20%	4	1
CO3	Draft agendas, notices, and minutes of meetings in accordance with standard organizational formats and communication protocols.	TPS3	9.1.3	20%	5	1
CO4	Design effective technical presentation slides using visual clarity, proper formatting, and appropriate data representation techniques.	TPS3	9.2.2	20%	4	1
CO5	Apply professional and ethical communication practices in social media and workplace digital communication using proper netiquette and sentence construction.	TPS3	9.3.2	20%	11	1

4. Assessment Pattern

CO	Assessment 1						Assessment 2			Terminal (%)		
	Written Test 1 (%)			Assignment 1 (%)			Lab Activities					
TPS	1	2	3	1	2	3	1	2	3	1	2	3
CO1	-	-	20%	-			-	-	20%	-	-	20%
CO2	-	-	20%	50%			-	-	20%	-	-	20%
CO3	-	-	20%	-			-	-	20%	-	-	20%
CO4	-	-	20%	-			-	-	20%	-	-	20%
CO5	-	-	20%	50%			-	-	20%	-	-	20%
TOTAL	100%			100%					100%	100%		

5. Syllabus

Module1

Technical Reading and Vocabulary Development

Technical Reading Strategies – Skimming, Scanning, Intensive and Extensive Reading – Manuals - Academic Articles — Technical Word Families – Prefixes and Suffixes in Engineering Terminology – Collocations in Engineering Discourse – Inferring meaning from Context- Note-making, Summarising and Paraphrasing Technical Content.

Lab Activity: Listening files and Note-taking& Reading- based note making

Module 2

Editing, Analytical Reading and Ethical AI Communication Skills

Analytical Reading and Error Identification – Sentence clarity, cohesion and transition signals – Ethical use of AI in Writing and Communication – AI-assisted Editing and Summarising – Interpreting Charts, Graphs and Diagrams.

Lab Activity: Reading-based Editing Exercises – Picture/Chart Description Activity.

Module 3

Professional and Technical Workplace Communication

Formal Letters – Permission- Bona fide - Business Letters – Formats – Letters of Inquiry, Complaint, and Recommendation – Minutes of Meetings and Notices – Agenda preparation – Recording and Circulating Minutes – Action Items and Follow-up Communication.

Lab Activity: Listening to Audio files and Preparing Minutes

Module 4

Oral Communication and Interpersonal Skills

Question Forms and Question Tags- Spotting Errors- Types of Sentences- Oral Presentation Skills – Planning and Structuring a Technical Presentation – Designing effective Slides (visual clarity, data display) – Verbal and Non-verbal Communication – Handling Q&A Sessions.

Lab Activity: Digital Presentation, Spotting Errors

Module 5

Career Communication and Digital Professionalism

Social Media and Workplace Digital Communication – Professional Use of Platforms – etiquette – Data Privacy and Ethical Communication Practices – Environmental and SDG-aligned Communication- Jumbled Sentences.

Lab Activity: Presentation on SDG topics, Jumbled Sentences

6. Learning Resources

6.1 Text Book

1. **Sanjay Kumar and Pushplata,** "Communication Skills", 3rd Edition, Oxford University Press, 2021.
2. **M. Ashraf Rizvi,** "Effective Technical Communication", 2nd Edition, McGraw-Hill Education India, 2018.
3. **John M. Lannon and Laura J. Gurak,** "Technical Communication", 15th Edition, Pearson Education, 2020.

Department of English, Technical English Work Book, 1st Edition, New Century Book House (P) Ltd., Chennai.

6.2 Reference Books & Web resources

- Michael Markel and Stuart A. Selber, "Technical Communication", 12th Edition, Bedford/St. Martin's, 2018.
- Sharon J. Gerson and Steven M. Gerson, "Technical Writing: Process and Product", 8th Edition, Pearson, 2017.
- Adrian Wall work, "English for Writing Research Papers", 2nd Edition, Springer, 2016.
- AICTE Examination Reform Policy, November 2018 – https://www.aicte-india.org
- MIT Open Courseware – Technical Writing (21W.035): https://ocw.mit.edu
- NPTEL – Communication Skills (IIT Kharagpur): https://nptel.ac.in

7. Course Contents and Lecture Schedule

S.No	Topic	No. of Hours
1.	Technical Word Families, Prefixes/Suffixes	1
2.	Manuals and Academic Articles	1
3.	Collocations & Contextual Meanings	1
4.	Note-making, Summarising & Paraphrasing Technical Content	1
5.	Note-taking & Reading-based Note-making	1
6.	Analytical Reading and Error Identification	1
7.	Sentence Clarity, Cohesion and Transition Signals	1
8.	Ethical Use of AI in Writing and Communication	1
9.	AI-assisted Editing and Summarising	1
10.	Interpreting Charts, Graphs and Diagrams	1
11.	Reading-based Editing Exercises & Picture/Chart Description	1
12.	Formal Letters – Permission – Bona fide – Business Letter Formats	1
13.	Letters of Inquiry, Complaint and Recommendation	1
14.	Minutes of Meetings and Notices	1
15.	Agenda Preparation – Recording, Circulating Minutes & Follow-up Communication	1
16.	Preparing Minutes	1
17.	Question Forms, Question Tags, Spotting Errors & Types of Sentences	1
18.	Oral Presentation Skills – Planning and Structuring Technical Presentation	1
19.	Designing Effective Slides, Verbal & Non-verbal Communication, Handling Q&A	1

20.	Spotting Errors	1
21.	Social Media and Workplace Digital Communication	1
22.	Professional Use of Platforms, Netiquette & Data Privacy	1
23.	Environmental and SDG-aligned Communication & Ethical Practices	1
24.	Professional Use of Platforms & etiquette	1
Total		**24**

8. Course Contents and Lab Schedule: 16 hours

1.	Listening-based Note-taking Exercises	2
2.	Reading-based Editing Exercises and Picture/Chart Description Activity.	2
3.	Preparing Minutes from Audio Files	2
4.	Jumbled sentence activities Exercises	2
5.	Presentation on SDG Topics	2
6.	Technical Presentation Practice	2
7.	Digital Presentation	2
8.	Model Exam	2
Total		**16**

9. Lab Assessment

S.No	Assessment Activity	Skills Assessed	Percentage (%)
1.	Listening to Technical Audio (CO1 – 20 marks)	Listening comprehension and acquisition of technical vocabulary	20%
2.	Spotting Errors (CO4 – 10 marks) and Reading Comprehension (CO5 - 20 marks)	Grammatical correctness, coherence, sentence organization and context understanding	30%
3.	Picture Description (CO2 – 20 marks)	Vocabulary, technical description and fluency	20%
4.	Minutes and Digital Presentation (CO3 – 20 marks, CO4 – 10 marks)	Communication skill, confidence and response to questions	30%

The course includes End Semester Theory Examination.

10. Course Designer(s):

1. Dr.S.Subash Assistant Professor, Department of English | ssheng@tce.edu
2. Dr.M.Arjunan, Assistant Professor, Department of English | maeng@tce.edu

26PHSB0	Physics Laboratory (Common to all branches)	Category	L	T	P	Credits
		BSC	0	0	3	1.5

Preamble

Physics Laboratory enables first-year engineering students to experimentally explore the concepts taught in the co-requisite theory course (26PHSA0) through carefully designed experiments in core areas of physics. The course develops practical skills in instrumentation, data analysis, model validation, teamwork, safety, and ethical scientific reporting. It also supports Sustainable Development Goals related to quality education, clean energy, innovation, and sustainable development.

Prerequisite

- Engineering Physics (26PHSA0) co-requisite
- Physics at the Higher Secondary (Class XII) level

Course Outcomes

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

COs	Course Outcome Statement	TCE Proficiency Scale	Performance Indicators	Objective	SDG Addressed	SDG Level
CO1	Operate laboratory instruments, including photo detectors, solar cell setups, and logic trainers, to measure physical quantities related to core physics experiments.	TPS 3	5.2.1	1	NC	-
CO2	Analyse deviations between theoretical predictions and experimental results in mechanics, electrodynamics, and quantum physics experiments.	TPS 4	2.3.1	2	NC	-
CO3	Evaluate experimental procedures for adequacy of controls, documentation standards, and reproducibility.	TPS 5	4.2.1	3	NC	-
CO4	Examine experimental data using statistical methods to quantify uncertainty and draw valid conclusions.	TPS 3	4.3.1	4	NC	-
CO5	Demonstrate practical skills in setting up and handling optical, mechanical, and electronic experimental systems.	TPS 3	5.2.1	6	NC	-
CO6	Prepare structured laboratory reports that present experimental	TPS 3	9.1.2	13	NC	-

	methods, results, and conclusions in a professional manner, with due regard for ethical standards.					

Assessment Pattern: Cognitive Domain

Type of Assessment	Component	Marks	Remarks
Continuous Assessment	Pre-lab, In-lab, Post-lab	75	Conducted throughout the semester
Model Test	CO-wise (Cognitive, Psychomotor, Affective)	25	Mid/End semester internal test
Total Internal Marks		**100**	
End Semester Examination	CO-wise (Cognitive, Psychomotor, Affective)	100	As directed by COE or as per the curriculum

List of Experiments with CO Mapping

Sl. No.	Name of the Experiment	Level of Experiment	Objective(s)	COs Addressed
1	Determine the acceleration due to gravity (g) and the radius of gyration of a compound pendulum by studying its time period of oscillation.	1	1,2,3,4,13	CO1, CO2, CO3, CO4, CO6
2	Determine the resonant frequency, quality factor (Q), and bandwidth of an LCR series circuit by measuring the frequency response of current amplitude.	1	1,2,3,4,13	CO1, CO2, CO3, CO4, CO6
3	Determine the energy band gap (E_g) of a semiconductor material (Germanium or Silicon) by studying the variation of reverse saturation current with temperature.	1	1,2,3,4,13	CO1, CO2, CO3, CO4, CO6
4	Determine Planck's constant (h) using LEDs of different known wavelengths by measuring the threshold (knee) voltage for light emission.	1	1,2,3,4,6	CO1, CO2, CO3, CO4, CO5
5	Determine the frequency of AC supply using a sonometer and verify the	1	1,2,3,4,6	CO1, CO2, CO3, CO4, CO5

	laws of transverse vibrations of stretched strings.			
6	Realise the Toffoli gate (CCNOT) using standard NAND, AND, and XOR logic gates, and verify its truth table, demonstrating reversibility and universality.	2	1,3,13	CO1, CO3, CO6
7	Study the I-V characteristics of a silicon solar cell under illumination and determine it short-circuit current (Isc), open-circuit voltage (Voc), fill factor (FF), and photoelectric conversion efficiency (η).	1	1,2,3,4,13	CO1, CO2, CO3, CO4, CO6
8	Determine the magnetic field along the axis of a current-carrying circular coil and verify the Biot–Savart law.	1	1,2,3,4,13	CO1, CO2, CO3, CO4, CO6

Course Designer(s):

Dr. M. Mahendran manickam-mahendran@tce.edu
Dr. M. Tamilelakkiya mtphy@tce.edu
Dr. S. Karthickprabhu skphy@tce.edu

26TAAA0	HERITAGE OF TAMILS	Category	L	T	P	Credits
		Audit	1	0	0	0

1. Preamble

Tamil heritage represents a rich blend of culture, literature, art, science, ethics, and social values that have shaped Tamil civilization for centuries. It offers valuable insights into humanism, environmental harmony, indigenous knowledge systems, and inclusive social living. The timeless ideals reflected in Tamil literature and traditions help students develop cultural awareness, ethical responsibility, and global citizenship. This course enables learners to appreciate the contributions of the Tamils and understand the relevance of their heritage in the modern world

2. Prerequisite

NIL

3. Course Outcome:

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

No	Course Outcome	TPS Level	PO Addressed	CO Weightage	SDG addressed	SDG Level
CO1	Explain the historical development of Tamil language and literature, including Sangam literature, Tamil epics, Bhakti movements, and modern literary contributions	TPS2	PO1 – M PO2 – L	20	SDG 4	1
CO2	Explain the significance of Tamil artistic traditions, temple architecture, handicrafts, musical instruments, and their role in preserving Tamil culture.	TPS2	PO1 – M PO2 – L	20	SDG 4	1
CO3	Illustrate the role of Tamil folk and martial art forms in promoting cultural values, community participation, and traditional knowledge.	TPS3	PO1 – S PO2 – M PO3 – L	20	SDG 4	1
CO4	Illustrate the relationship between Sangam literary concepts, socio-economic life, and the environmental and cultural practices of ancient Tamil society.	TPS3	PO1 – S PO2 – M PO3 – L	20	SDG 4	1
CO5	Illustrate the impact of Tamil cultural, literary, and social contributions on Indian society and heritage.	TPS3	PO1 – S PO2 – M PO3 – L	20	SDG 4	1

4. Assessment Pattern

CO	CAT 1	Assignment 1	CAT 2 (MCQ)	Assignment 2	Terminal Exam (MCQ)
	% of marks	% of Marks	% of Marks	% of Marks	% of Marks
CO1	-	-	10	10	10
CO2	-	-	10	10	10
CO3	-	-	20	20	20
CO4	-	-	30	30	30
CO5	-	-	30	30	30
Total	**-**	**-**	**100**	**100**	**100**

* The Terminal Examination and CAT-2 shall be conducted as a Multiple-Choice Question (MCQ) examination.

5. Syllabus

Module 1:
Language Families in India – Dravidian Language – Tamil as a Classical Language – Classical Literature in Tamil – Secular Nature of Sangam Literature – Management Principles in Thirukkural – Tamil Epics and Impact of Buddhism & Jainism in Tamil Land – Bhakti Literature: Azhwars and Nayanmars – Forms of Minor Poetry – Development of Modern Literature in Tamil – Contribution of Bharathiyar and Bharathidasan.

Module 2:
Hero Stone to Modern Sculpture – Bronze Icons – Tribes and their Handicrafts – Art of Temple Car Making – Massive Terracotta Sculptures – Village Deities – Thiruvalluvar Statue at Kanyakumari – Making of Musical Instruments: Mridangam, Parai, Veenai, Yazh and Nadaswaram – Role of Temples in Social and Economic Life of Tamils.

Module 3:
Therukoothu, Karagattam, Villuppattu, Kaniyan Koothu, Oyilattam, Leather Puppetry, Silambattam, Valari, Tiger Dance – Sports and Games of Tamils.

Module 4:
Flora and Fauna of Tamils – Akam and Puram Concept from Tolkappiam and Sangam Literature – Aram Concept of Tamils – Education and Literacy during Sangam Age – Ancient Cities and Ports of Sangam Age – Export and Import during Sangam Age – Overseas Conquest of Cholas.

Module 5:
Contribution of Tamils to Indian Freedom Struggle – The Cultural Influence of Tamils over the Other Parts of India – Self-Respect Movement – Role of Siddha Medicine in Indigenous System of Medicine – Inscriptions & Manuscripts – Print History of Tamil Books.

6. Learning Resources

- தமிழக வரலாறு - மக்களும் பண்பாடும் (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்)
- கணித் தமிழ் - முனைவர் இல சுந்தரம் (விகடன் பிரசுரம்)
- கீழடி - வைகை நதிக்கரையில் சங்ககால நாகரீகம் (தொல்லியல் துறை வெளியீடு)
- பொருநை ஆற்றங்கரை நாகரீகம் (தொல்லியல் துறை வெளியீடு)
- Social Life of the Tamil – The Classical Period (Dr.K.K.Pillay) A joint publication of TNTB&ESC and RMRL – (inprint)
- Social Life of the Tamils- The Classical Period (Dr.S.Singaravelu) Published by: International Institute of TamilStuies.
- Historial Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D.Thirunavukkarasu)) Published by: International Institute of TamilStuies.
- The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) Published by: International Institute of TamilStuies
- Keeladi – Sangam City Civilzation on the banks of river Vaigai (Jointly Published Department of Archaeology & Tamil Nadu Text Book and Educational Servics Corporation,Tamilnadu)
- Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillai, Publisher by The Author)

- Porunai Civilization (Jointly Published by : Department of Archaeology & Tamil Nadu Text Book and Education Service Corporation, TamilNadu)
- Journey of Civization indus to Vaigai (R.Balakrishnan) Published by: RMRL – Reference Book

1. Course Contents and Lecture Schedule

Module No.	Topics	No. of Periods
1	**LANGUAGE AND LITERATURE**	
1.1	Language Families in india – Dravidean Language – Tamil as a Classical Language – Classical Literature in Tamil – Secular Nature of Sangam Literature	1
1.2	Management Principles in Thirukural – Tamil Epics and impact of Buddhism & jainesm in Tamil Land – Bakthi Literature Azhwar and Nayanmars	1
1.3	Forms of minor Poetry – Development of Modern Literature in Tamil – Contribution of Bharathiyar and Bharathidhasan.	1
2	**HERITAGE – ROCK ART PAINTING TO MODERN ART – SUCLPUTRE**	
2.1	Hero Stone to Modern Sculputre – Bronze icons – tribes and their handicrafts – Art of Temples car making	1
2.2	Massive Terracotta Sculputres, Village deties, Thiruvalluvar State at Kanyakumari, Making of musical instruments	1
2.3	Mridhangam, Parai,Veenai, Yazh and Nadhaswaram-Role of Temples in Social and Economic Life of Tamils.	1
3	**FOLK AND MARTIAL ARTS**	
3.1	Therukoothu, Karagattam,Villu Pattu,	1
3.2	Kaniyan koothu,Oyillattam,Leather puppertry,	1
3.3	Silambattam,Valari,Tiger dance-Sports and Games of Tamils.	1
4	**THINAI COCEPT OF TAMILS**	
4.1	Flora and Fauna of Tamils &Aham and Puram Concept forTholkappiam and Sangam Litearture	1
4.2	Aram Concept of Tamils – Education and Literacy during Sangam Age	1
4.3	Ancient Cities and Ports of Sangam Age – Export and Import during Sangam Age- Overseas Conduest of Cholas.	1
5	**CONTRIBUTION OF TAMILS TO INDIAN NATIONAL MOVEMENT AND INDIAN CULTURE**	
5.1	Contribution of Tamils TO Indian Freedom Struggle	1
5.2	The Cultural Influnence of Tamils over the other parts of India – Self – Respect Movement	1
5.3	Role of Siddha Medicine in Indigenous System of Medicine – Inscription & Manuscripts – Print History of Tamil Books	1
	Total	15

Course Designers:

Mr. M Babu.mbutce@tce.edu

26CCAA0	VISION and SPEED MATHS (Common to all Programmes)	Category	L	T	P	Credits
		AC	0	0	2	0

1. Preamble

This course inducts first-year students into the TCT Career Training (CT) framework. It combines a Vision induction — orientation, baseline online assessment, and group counseling — with WOWs, a structured Speed-Maths workshop that introduces mental-arithmetic methods. Together these elements build the motivation, baseline awareness, and computational fluency that support all subsequent CT courses.

2. Course Outcomes

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

No.	Course Outcome	TPS Level	Performance Indicator	CO Weightage
CO1	Articulate personal and academic goals aligned with the CT programme objectives.	TPS3	2.1.1	20%
CO2	Assess baseline aptitude through diagnostic tests and identify focus areas for improvement.	TPS3	2.1.2	20%
CO3	Apply foundational mental-arithmetic methods (SAW, Oz, Mirror, High 5) to solve numeric problems.	TPS3	1.4.1	20%
CO4	Apply advanced WOWs methods (square/cube roots, Crisscross, Base multiplication) to multi-digit calculations.	TPS3	1.4.1	20%
CO5	Demonstrate computational speed and accuracy in time-bound aptitude challenges.	TPS4	2.4.1	20%

3. Assessment Pattern

CO	CAT1 (% of Marks)	CAT2 (% of Marks)	Terminal Exam (% of Marks)
CO1	50	—	10
CO2	50	—	10
CO3	—	50	20
CO4	—	50	20
CO5	—	—	40
Total	**100**	**100**	**100**

The assessment will be conducted by the Training Team, and the marks will be submitted by the respective faculty in charge.

4. Syllabus

Module 1: Vision — Orientation & Programme Overview

Programme overview – CT framework – Expectations and outcomes – Code of conduct

Module 2: Vision — Diagnostic Online Test

Baseline aptitude assessment – Section-wise diagnosis – Personal scorecard – Improvement plan

Module 3: Vision — Group Counseling & Career Mapping

Career exploration – Goal setting – Strengths / interests mapping – Sector overview – Action planning

Module 4: WOWs — Foundational Methods

SAW method – Oz method – Mirror method – High 5 method – Minion's method – King and Queen method – Square root and cube root – Butterfly method – Inception method

Module 5: WOWs — Advanced Methods

Cube of a number – Goldeneye method – Base multiplication – Crisscross method – Super power method – Cast away method

5. Learning Resources

5.1 Text Book

M. Tyra — "Magical Book on Quicker Maths", BSC Publishing.

5.2 Reference Books & Web Resources

1. Bhanu Prakash — "Quicker Maths", S. Chand Publishing.
2. Arun Sharma — "How to Prepare for Quantitative Aptitude", McGraw Hill.
3. TCT CT Internal Workshop Manual — Speed Maths (WOWs).

6. Course Designer(s)

1. Mr. S. A. R. Sheik Masthan, Asst. Professor, Mechatronics, sarsmech@tce.edu
2. Dr. R. Rajan Praksah, Associate Professor, EEE, r_rajanprakash@tce.edu

CURRICULUM AND DETAILED SYLLABI

FOR

SECOND SEMESTER

B.TECH DEGREE (Computer Science and Business Systems) PROGRAMME

FOR THE STUDENTS ADMITTED FROM THE

ACADEMIC YEAR 2026 – 2027 ONWARDS

THIAGARAJAR COLLEGE OF ENGINEERING

(A Govt. Aided Autonomous Institution Affiliated to Anna University)

MADURAI – 625 015

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Web:www.tce.edu

Passed in BoS Meeting on 22.05.2026 Approved in71st Academic Council Meeting on 27.06.2026

B.Tech (Computer Science and Business Systems) Programme
COURSES OF STUDY
(For the candidates admitted from 2026 - 27 onwards)

SECOND SEMESTER

Sl. No.	COURSE CODE	COURSE TITLE	CATEGORY	No.of Hours / Week			Credits
				L	T	P	
THEORY COURSES							
1	26CBSB0	Statistics, Probability and Calculus	BSC	3	0	0	3
2	26CHSB0	Applied Chemistry	BSC	3	0	0	3
3	26CBCB0	Computer Organization and Architecture	PCC	3	0	0	3
4	26CBCC0	Fundamentals of Economics	PCC	2	0	0	2
5	26CBEB0	Basic Electrical and Electronics Engineering	ESC	3	0	0	3
6	26CCEB0	Biology for Engineers	ESC	3	0	0	3
THEORY CUM PRACTICAL COURSES							
7	26CBCD0	Computational Problem Solving using Python	PCC	2	0	4	4
PRACTICAL COURSES							
8	26CBCE0	Business Communication & Value Science	PCC	0	0	1	1
9	26CHSC0	Chemistry Laboratory	BSC	0	0	1.5	1.5
AUDIT COURSES							
10	26TAAB0	Tamil and Technology	AC	-	-	-	-
11	26CCAB0	Foundations of Problem Solving-1	AC	-	-	-	-
TOTAL							**23.5**

BSC : Basic Science Courses
HSMC : Humanities and Social Sciences including Management Courses
ESC : Engineering Science Courses
PCC : Programme Core Courses
PEC : Programme Elective Courses
OEC : Open Electives
EEC : Employability Enhancement Courses
AC : Audit Courses

L : Lecture
T : Tutorial
P : Practical

Note:
1 Hour Lecture is equivalent to 1 credit
1 Hour Tutorial is equivalent to 1 credit
1 Hours Practical is equivalent to 0.5 credit

THIAGARAJAR COLLEGE OF ENGINEERING: MADURAI – 625 015
B.Tech (Computer Science and Business Systems) Programme

SCHEME OF EXAMINATIONS
(For the candidates admitted from 2026 - 27 onwards)

SECOND SEMESTER

S.No.	Course Code	Name of the Course	Duration of Terminal Exam. in Hrs.	Marks			Minimum Marks for Pass	
				Continuous Assessment	Terminal Exam	Max. Marks	Terminal Exam	Total
THEORY COURSES								
1	26CBSB0	Statistics, Probability and Calculus	3	40	60	100	27	50
2	26CHSB0	Applied Chemistry	3	40	60	100	27	50
3	26CBCB0	Computer Organization and Architecture	3	40	60	100	27	50
4	26CBCC0	Fundamentals of Economics	3	40	60	100	27	50
5	26CBEB0	Basic Electrical and Electronics Engineering	3	40	60	100	27	50
6	26CCEB0	Biology for Engineers	3	40	60	100	27	50
THEORY CUM PRACTICAL COURSES								
7	26CBCD0	Computational Problem Solving using Python	3 (TCP-P)	40	60	100	22.5	50
PRACTICAL COURSES								
8	26CBCE0	Business Communication & Value Science	Only Internal	60	40	100	18	50
9	26CHSC0	Chemistry Laboratory	3	60	40	100	18	50
AUDIT COURSES								
10	26TAAB0	Tamil and Technology	-	-	-	-	-	-
11	26CCAB0	Foundations of Problem Solving-1	-	-	-	-	-	-

26CBSB0	STATISTICS, PROBABILITY AND CALCULUS

Category	L	T	P	Credit
BSC	2	1	0	3

Preamble

Statistics, Probability and Calculus aims to enable the students of Computer Science and Business Systems to analyze, visualize, and interpret data for data-driven decision making, predictive analysis, and business insights. The subject also develops analytical and problem-solving skills through probabilistic models, statistical techniques, and calculus-based methods used in computing, data science, and business applications.

Prerequisite

NIL

Course Outcomes

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

No.	Course Outcome	TPS Level	Performance Indicator	CO Weightage	SDG addressed	SDG Level
CO1	Apply statistical methods to organize, represent, and analyse data using tables, graphs, and measures of central tendency and dispersion.	TPS3	1.1.1	20%	4	2
CO2	Apply correlation and regression methods to study relationships between variables.	TPS3	1.1.1	17%	4	2
CO3	Use probability concepts and counting techniques to solve problems involving uncertainty.	TPS3	1.1.1	13%	4	2
CO4	Apply discrete probability distributions to find probabilities and expected values.	TPS3	1.1.1	17%	4	2
CO5	Apply continuous probability distributions to determine probabilities and expected values.	TPS3	1.1.1	17%	4	2
CO6	Apply differential and integral calculus concepts to solve engineering problems.	TPS3	1.1.1	16%	4	2

Assessment Pattern

CO	CAT1	Assignment 1	CAT2	Assignment 2	Terminal Exam
	% of Marks	% of Marks	% of Marks	% of Marks	% of Marks
CO1	40	40			20
CO2	33	33			17
CO3	27	27			13
CO4			34	34	17
CO5			34	34	17
CO6			32	32	16
Total	100	100	100	100	100

Syllabus

Statistical Methods: Introduction - Collection of Data - Graphical Representation, Comparison of Frequency Distribution: Measures of Central Tendency – Mean, Median, Mode, Measures of Dispersion – Range, Quartile Deviation, Mean Deviation, Standard Deviation, Moments, Skewness, Kurtosis.

Correlation and Regression: Linear Correlation – Univariate - Lines of Regression.

Probability: Sample Space and Events, Axioms, Interpretations and Properties of Probability, Counting Techniques, Conditional Probability – Bayes' Theorem.

Discrete Random Variables: Probability Distribution for Discrete Random Variables, Expected Values, The Binomial Probability Distribution, The Poisson Probability Distribution.

Continuous Random Variables: Probability Density Functions, Cumulative Distribution Functions and Expected Values, The Normal Distribution.

Calculus: Maxima and Minima of functions of single variable, Effect of derivative on shape of the graph - Fundamental theorem of Calculus

Learning Resources

Text Book

1. B. S. Grewal, "Higher Engineering Mathematics", Khanna Publication, Delhi, 42nd edition, 2012.
2. James Stewart, Daniel Clegg and Saleem Watson, "Calculus Early Transcendentals", 9th, Cengage Learning, New Delhi, 2019.
3. Jay L. Devore, "Probability & Statistics for Engineering and the Sciences", Brooks/Cole, CENGAGE Learning, 9th edition, 2016.

Reference Books & Web resources

1. Ronald E. Walpole, Raymond H. Myers, Sharon L. Myers and Keying Ye, "Probability and Statistics for Engineers and Scientists", Pearson Education, 9th edition, 2017.
2. A. Goon, M. Gupta and B. Dasgupta, "Fundamentals of Statistics, vol. I & II", World Press, 2013.

Course Contents and Lecture Schedule

Module No	Topics	No of Periods
1	**Statistical Methods**	**9**
1.1	Collection of Data, Graphical Representation, Comparison of Frequency Distribution	1
1.2	Measures of Central Tendency - Mean	1
	Tutorial	1
1.3	Median, Mode	1
1.4	Measures of Dispersion - Range, Quartile Deviation	1
	Tutorial	1
1.5	Mean Deviation, Standard Deviation, Coefficient of variation	1
1.6	Moments, Skewness, Kurtosis	1
	Tutorial	1
	Application Problem using Mathematical Software	
2.	**Correlation and Regression**	**4**
2.1	Linear Correlation - Univariate	1
2.2	Lines of Regression	2
	Tutorial	1

	Application Problem using Mathematical Software	
3	**Probability**	**6**
3.1	Sample Space and Events,	1
3.2	Axioms, Interpretations and Properties of Probability	1
	Tutorial	1
3.3	Counting Techniques	1
3.4	Conditional Probability, Bayes' Theorem	1
	Tutorial	1
	Application Problem using Mathematical Software	
4	**Discrete Random Variables**	**6**
4.1	Probability Distribution for Discrete Random Variables	1
4.2	Expected Values	1
	Tutorial	1
4.3	The Binomial Probability Distribution	1
4.4	The Poisson Probability Distribution	1
	Tutorial	1
	Application Problem using Mathematical Software	
5	**Continuous Random Variables**	**6**
5.1	Probability Density Functions	1
5.2	Cumulative Distribution Functions and Expected Values	1
	Tutorial	1
5.3	The Normal Distribution	2
	Tutorial	1
	Application Problem using Mathematical Software	
6	**Calculus**	**5**
6.1	Maxima and Minima of functions of single variable	1
6.2	Effect of derivative on shape of the graph	1
	Tutorial	1
6.3	Fundamental theorem of Calculus	1
	Tutorial	1
	Application Problem using Mathematical Software	
	Total Periods	**36**

Course Designer(s):

1. Ms. H. Sri Vinodhini, Assistant Professor, Department of Mathematics srivinodhini@tce.edu
2. Dr. S. Suriyakala, Assistant Professor, Department of Mathematics ssamat@tce.edu
3. Mr. R. Suresh Kannan, Assistant Professor, Department of Mathematics rskmat@tce.edu
4. Dr. K. Saravanakumar, Assistant Professor, Department of Mathematics kskmat@tce.edu

26CHSB0	APPLIED CHEMISTRY	Category	L	T	P	Credit
		BSC	3	0	0	3

Preamble

This course equips students of circuit and computer branches with chemical principles underlying key engineering technologies. It covers water quality assessment and treatment, spectroscopic analytical techniques, electrochemical energy storage systems, and chemistry of advanced engineering materials.

Prerequisite

- Nil

Course Outcomes

After the successful completion of the course, students will be able to

No.	Course Outcome	TPS Level	Performance Indicator	CO Weightage	SDG addressed	SDG Level
CO1	Explain water quality parameters and assessment techniques, including IOT based sensors, to assess water suitability for domestic, industrial, and boiler applications.	2	1.2.1	10	SDG 3 – Good Health and well-being SDG 6 - Clean water and sanitation	2
CO2	Apply standard estimation techniques, appropriate water treatment methods to select and justify solutions for boiler feed water preparation and industrial effluent treatment.	3	1.2.1	20	SDG 6 - Clean water and sanitation	2
CO3	Apply the principles and instrumentation of spectroscopic techniques to identify materials and interpret spectra for chemical, environmental, biomedical, and space applications.	3	1.2.1	20	SDG 3 – Good Health and well-being	2
CO4	Apply electrochemical principles to analyze energy storage systems and photovoltaic devices	3	1.2.1	16	SDG 7 – Affordable and Clean Energy	2

CO5	Use the concepts of corrosion mechanisms and surface protection techniques to select appropriate corrosion control measures for electronic devices.	3	1.2.1	14	SDG 9 – Industry, Innovation and Infrastructure	2
CO6	Apply structure–property relationships of ceramics, carbon-based nanomaterials to select suitable materials for specific applications.	3	1.2.1	20	SDG 9 - Industry, Innovation and Infrastructure SDG 12 – Responsible consumption	2

Assessment Pattern

CO	CAT1	Assignment 1	CAT2	Assignment 2	Terminal Exam
	% of Marks	% of Marks	% of Marks	% of Marks	% of Marks
CO1	20				10
CO2	40	50			20
CO3	40	50			20
CO4			32	50	16
CO5			28		14
CO6			40	50	20
Total	100	100	100	100	100

Syllabus

Water: Water Quality parameters: Physical, Chemical, Biological- Alkalinity-Hardness of water: types-determination of hardness by EDTA method –Boiler trouble –- Softening of water: Internal and External treatment methods – Ion-Exchange method, Desalination process: reverse- and forward osmosis, electrodialysis, solar and multistage flash distillation, Advanced oxidation process for Effluent Treatment. IOT-based sensor for water quality monitoring. [10 hours]

Spectroscopic techniques and applications: Principle, instrumentation, and applications: UV–Visiblespectroscopy-Fluorescence-Inductively Coupled Plasma-Optical Emission, Infra-red-Nuclear magnetic resonance, Magnetic resonance imaging - Spectroscopy in automobile, environmental, biomedical & space applications. [8 hours]

Electrochemical technologies for energy storage and surface protection: Basics of electrochemistry – Batteries: Parameters, Primary -and Secondary batteries (Lead-acid, Lithium-ion, Sodium, Air-batteries, Redox-flow battery, Numerical Problems) –Fuel cells -Photovoltaics and its types, Numerical Problems. Hydrogen generation and storage. Corrosion of electronic devices: causes, effects, Electrochemical methods of corrosion analysis. Control measures - Electroplating-Electroless plating. [11 hours]

Chemistry of Engineering materials: Bonding and the properties of materials -Ceramics and advanced ceramics: types, properties, applications – Nano-materials: Synthesis, structure, properties and applications. Carbon based materials – Graphene, Carbon fibers -. Molecular electronics - Conducting polymers and organic semiconductors, Organic light-emitting devices (OLEDs), Applications in wearable and flexible electronics. [7 hours]

Text Book

1. P.C. Jain and Monica Jain, A Textbook of Engineering Chemistry, Dhanpat Rai publications, New Delhi,17th edition, 2018.

Reference Books& web resources

1. S.S. Dara and S.S. Umare, "A Textbook of Engineering Chemistry", S.Chand & Company,12th Edition, Reprint, 2022.
2. V. K. Ahluwalia, Instrumental Methods of Chemical Analysis, Springer Cham, 1st Edition, 2023.
3. T. Pradeep, *A Textbook of Nanoscience and Nanotechnology*, McGraw-Hill (Indian Edition), 2012
4. Organic Semiconductors - https://www.youtube.com/watch?v=q2fPrFay0A0&list=PL-WugosnKdMsy8abZQDVZWBNya2Opdklf

Course Contents and Lecture Schedule

Module No	Topics	No of Periods
1	**WATER**	
1.1	Importance of water, standards for drinking water, (WHO, BIS & ICMR standards) physical, chemical & biological characteristics, Alkalinity (principle only)	2
1.2	Hardness of water- types, units. Determination of hardness by EDTA method and numerical problems	2
1.3	Boiler trouble: Scale and sludge formation, Langelier saturation index, boiler corrosion, priming and foaming, caustic embrittlement	1
1.4	Internal treatment methods: Carbonate, Phosphate, Colloidal, Calgon conditioning	1
1.5	Softening of water: ion exchange process	1
1.6	External treatment method: Desalination-forward &reverse osmosis, electrodialysis, multistage flash distillation	1
1.7	Effluent Treatment -Advanced oxidation process. IOT-based sensor for water quality	1
2	**SPECTROSCOPIC TECHNIQUES AND APPLICATIONS**	
2.1	Introduction to Electromagnetic Radiation, Types of spectra	1
2.2	**Principle, Instrumentation and Applications:** UV–Visible spectroscopy	2
2.3	Fluorescence spectroscopy, Inductively Coupled Plasma-Optical Emission Spectroscopy	2
2.4	Infra-red spectroscopy	2
2.5	Nuclear magnetic resonance spectroscopy –Magnetic resonance imaging	1
2.6	Spectroscopy in environmental, biomedical & space applications	1
3	**ELECTROCHEMICAL TECHNOLOGIES FOR ENERGY STORAGE AND SURFACE PROTECTION**	
3.1	Electrochemistry-Introduction–Basics of electrochemistry–Redox process, EMF	1
3.2	Energy storage–Batteries, Battery quality parameters, Primary battery–Dry cell and Alkaline cell	1
3.3	Secondary battery–Lead-acid battery, Lithium-ion, Sodium, Air-batteries, Redox-flow battery, Numerical Problems	2

3.4	Photovoltaics and its types, Numerical Problems	1
3.5	Fuel cells– Fundamentals, types and applications. Hydrogen generation and storage	2
3.6	Corrosion of electronic devices: causes, effects, Electrochemical methods of corrosion analysis	2
3.7	Control measures - Electroplating–Introduction, Process, Applications (Gold and nickel plating). Electroless plating – Principle, process, Applications (PCB manufacturing)	2
4	**CHEMISTRY OF ENGINEERING MATERIALS**	
4.1	Bonding and the property of materials - melting point-brittleness, ductility–thermal, electrical, and ionic conductivity-magnetic - optical-hydrophobic, hydrophilic properties	2
4.2	Ceramics and advanced ceramics: types, properties, applications	2
4.3	Nanomaterials – Classification, Synthesis and properties	1
4.4	Carbon based materials - Synthesis, structure, properties, and applications of graphene, carbon fibers	1
4.5	Molecular electronics - Conducting polymers and organic semiconductors, Organic light-emitting devices (OLEDs), Applications in wearable and flexible electronics	1
	Total Periods	36

Course Designer(s):

1. Dr. V. Velkannan, Assistant Professor and Head (i/c), Chemistry velkannan@tce.edu
2. Dr. M. Velayudham, Assistant Professor, Chemistry mvchem@tce.edu
3. Dr. B. Shankar, Assistant Professor, Chemistry bsrchem@tce.edu
4. Dr. R. Sivakumar, Assistant Professor, Chemistry rsrchem@tce.edu
5. Dr. P. Ramkumar, Assistant Professor, Chemistry prrchem@tce.edu

26CBCB0	COMPUTER ORGANIZATION AND ARCHITECTURE

Category	L	T	P	Credit
PCC	3	0	0	3

Preamble

The course enables students to understand the basic organization and functional components of computer systems. It covers instruction sets, arithmetic operations, memory hierarchy, cache design, and I/O organization. The syllabus also emphasizes memory mapping techniques used in modern computer architecture.

Prerequisite

- NIL

Course Outcomes

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

No.	Course Outcome	TPS Level	Performance Indicator	CO Weightage	SDG addressed	SDG Level
CO1	Explain the basic structure, functional units, bus structures, and instruction execution cycle of computer systems.	2	1.3.1	12%	SDG 4	1
CO2	Solve computing problems using data representation techniques, addressing modes, instruction formats, and CPU organization concepts.	3	1.3.1	18%	SDG 9	1
CO3	Apply arithmetic operations and control unit concepts in binary and floating-point computations.	3	1.3.1	18%	SDG 4	1
CO4	Apply hardwired and microprogrammed control unit concepts to execute and control instruction processing in computer systems.	3	1.3.1	12%	SDG 9	1
CO5	Use memory organization, cache memory, interrupts, DMA, and I/O interfacing techniques in computer system design.	3	1.3.1	20%	SDG 9	1

CO6	Implement pipelining and parallel processing concepts to improve processor performance in multiprocessor systems.	3	1.3.1	20%	SDG 9	1

Assessment Pattern

CO	CAT1	Assignment 1	CAT2	Assignment 2	Terminal Exam
	% of Marks	% of Marks	% of Marks	% of Marks	% of Marks
CO1	30				12
CO2	30	50			18
CO3	40	50			18
CO4			20	20	12
CO5			40	40	20
CO6			40	40	20
Total	**100**	**100**	**100**	**100**	**100**

Syllabus

Basic Structure of Computer Systems: Evolution of Computer Systems, Functional Units of a Computer, Bus Structures, Performance Measures, Instruction Execution Cycle.

Number Systems and Data Representation: Fixed Point and Floating Point Representation, Character Representation, Addressing Modes, Instruction Formats, Instruction Set Architecture, CPU Registers and Instruction Cycle.

Arithmetic Operations: Integer Arithmetic Operations, Addition and Subtraction Algorithms, Multiplication and Division Algorithms, Floating Point Arithmetic Operations, ALU Organization,

Processor Control Unit: Control Unit Fundamentals, Hardwired and Microprogrammed Control Unit.

Memory Organization and I/O Interfacing: Memory Hierarchy, RAM, ROM, Cache Basics, Associative Memory I/O Organization, Interrupts, DMA, Peripheral Interfacing Techniques

Parallel Processing and Pipeline Architecture: Parallel Processing Concepts, Flynn's Classification, Pipelining Fundamentals, Arithmetic and Instruction Pipeline, Pipeline Hazards, RISC and CISC Architecture, Multiprocessor Systems, Cache Coherency Problems.

Assignment Topic:

- Next Generation Computer Architecture – GPU, NPU, Intel Core, etc.,

Learning Resources

Text Book

1. William Stallings, "Computer Organization and Architecture: Designing for Performance", Pearson Education, 11th Edition, 2022.
2. David A. Patterson and John L. Hennessy, "Computer Organization and Design: The Hardware/Software Interface", Morgan Kaufmann Publishers, 6th Edition, 2021.

Reference Books & Web resources

1. Kai Hwang and Faye A. Briggs, “Computer Architecture and Parallel Processing”, McGraw Hill Education, 2019.
2. John P. Shen and Mikko H. Lipasti, “Modern Processor Design: Fundamentals of Superscalar Processors”, Tata McGraw Hill, 2018.
3. Kai Hwang, “Advanced Computer Architecture”, McGraw Hill Education, 2nd Edition, 2017.
4. Sarangi, S. R. ”Next-gen computer architecture”. White Falcon Publishing. 2023.
5. https://onlinecourses.nptel.ac.in/noc22_cs88/preview?utm_source=chatgpt.com
6. https://www.coursera.org/learn/comparch
7. https://epgp.inflibnet.ac.in/Home/ViewSubject?catid=fBYckQKJvP3a/8Vd3L08tQ.
8. https://www.coursera.org/learn/build-a-computer

Course Contents and Lecture Schedule

Module No	Topics	No of Periods	Course Outcomes
1	**Basic Structure of Computer Systems:**	**5**	
1.1	Evolution of Computer Systems	1	CO1
1.2	Functional Units of a Computer	1	CO1
1.3	Bus Structures, Performance Measures	2	CO1
1.4	Instruction Execution Cycle	1	CO1
2	**Number Systems and Data Representation :**	**7**	
2.1	Fixed Point and Floating Point Representation, Character Representation	2	CO2
2.2	Addressing Modes, Instruction Formats	2	CO2
2.3	Instruction Set Architecture	1	CO2
2.4	CPU Registers and Instruction Cycle	1	CO2
3	**Arithmetic Operations:**	**7**	
3.1	Integer Arithmetic Operations	1	CO3
3.2	Addition and Subtraction Algorithms	2	CO3
3.3	Multiplication and Division Algorithms	2	CO3
3.4	Floating Point Arithmetic Operations	1	CO3
3.5	ALU Organization	1	CO3
4	**Processor Control Unit:**	**4**	
4.1	Control Unit Fundamentals	1	CO4
4.2	Hardwired Control Unit.	1	CO4
4.3	Microprogrammed Control Unit	2	CO4
5	**Memory Organization and I/O Interfacing:**	**6**	
5.1	Memory Hierarchy	1	CO5
5.2	RAM, ROM	1	CO5
5.3	Cache Basics, Associative Memory I/O Organization	1	CO5

5.4	Interrupts, DMA	1	CO5
5.5	Peripheral Interfacing Techniques	2	CO5
6	**Parallel Processing and Pipeline Architecture:**	**7**	
6.1	Parallel Processing Concepts, Flynn's Classification	1	CO6
6.2	Pipelining Fundamentals, Arithmetic and Instruction Pipeline	1	CO6
6.3	Pipeline Hazards	1	CO6
6.4	RISC and CISC Architecture, Multiprocessor Systems	1	CO6
6.5	Cache Coherency Problems	2	CO6
	Next Generation Computer Architecture	1	CO6
	Total Periods	**36**	

Course Designer(s):

1. Dr. P. Suganthi, Associate Professor, Department of CSBS psica@tce.edu
2. Mr.T.Siva, Assistant Professor, Department of CSBS tsca@tce.edu

26CBCC0	FUNDAMENTALS OF ECONOMICS

Category	L	T	P	Credit
PCC	2	0	0	2

Preamble

The objective of this course is to provide the basic knowledge on micro and macroeconomics to analyse the market structure and demand-supply in real time economy. Further it imparts the knowledge of economic decision making by exploring the performance and behaviour of an economy

Prerequisite

NIL

Course Outcomes

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

No.	Course Outcome	TPS Level	Performance Indicator	CO Weightage	SDG addressed	SDG Level
CO1	Explain the basic principles and concepts of microeconomics for economic decision making	TPS2	1.2.1	10%	SDG 4	1
CO2	Demonstrate the application of microeconomic demand–supply concepts for solving business problems.	TPS3	1.3.1	18%	SDG 8	2
CO3	Apply systematic methods to measure and interpret consumer behaviour in decision making.	TPS3	1.2.1	18%	SDG 12	2
CO4	Use production and cost concepts to determine firm equilibrium under different market structures.	TPS3	2.4.1	18%	SDG 9	2
CO5	Solve real-time economic problems using macroeconomic components and the Keynesian multiplier.	TPS3	1.3.1	18%	SDG 8	3
CO6	Demonstrate monetary policy instruments to support economic development.	TPS3	2.4.1	18%	SDG 16	3

Assessment Pattern

CO	CAT1	Assignment 1	CAT2	Assignment 2	Terminal Exam
	% of Marks	% of Marks	% of Marks	% of Marks	% of Marks
CO1	20				10
CO2	40	50			18
CO3	40	50			18
CO4			30	30	18
CO5			35	30	18
CO6			35	40	18
Total	**100**	**100**	**100**	**100**	**100**

Syllabus

Microeconomics: The themes of microeconomics, Elasticity of Supply, Elasticity of Demand, Microeconomics versus Macroeconomics, Behavior of Firm and Household.

Principles of Demand and Supply: Supply Curves of Firms - Elasticity of Supply; Demand Curves of Households - Elasticity of Demand; Equilibrium and Comparative Statics (Shift of a Curve and Movement along the Curve); Welfare Analysis - Consumers' and Producers' Surplus - Price Ceilings and Price Floors;

Consumer Behaviour: Axioms of Choice -Budget Constraints and Indifference Curves; Consumer's Equilibrium - Effects of a Price Change, Income and Substitution Effects -Derivation of a Demand Curve; Applications - Tax and Subsidies- Intertemporal Consumption - Suppliers' Income Effect;

Theory of Production: Production Function and Iso-quants - Cost Minimization; Cost Curves - Total, Average and Marginal Costs -Long Run and Short Run Costs; Equilibrium of a Firm Under Perfect Competition; Monopoly and Monopolistic Competition.

Macroeconomics: National Income and its Components - GNP, NNP, GDP, NDP; Consumption Function; Investment; Simple Keynesian Model of Income Determination and the Keynesian Multiplier; Government Sector - Taxes and Subsidies;

Monetary Policy: External Sector; Money - Demand for Money, Supply of Money - Bank's Credit Creation Multiplier; Integrating Money and Commodity Markets – Overview of IS, LM Model; Business Cycles and Stabilization - Monetary and Fiscal Policy; The Classical Paradigm.

Case Study:

- Minimum Support Price (MSP) for Farmers,
- LPG Gas Subsidy Scheme,
- Dairy Production and Cost Management,
- COVID-19 and Indian GDP,
- Central Bank and the Government.

Learning Resources

Text Book

1. Pindyck, Robert S., and Daniel L. Rubinfeld, "Microeconomics 9th edition" Pearson Education, 2020.
2. RudigerDornbusch, Stanley Fischer, Richard Startz, "Macroeconomics 13th edition" McGraw Hill, 2018.

3. T.R. Jain, V.K. Ohri, “Introductory to Microeconomics and Macroeconomics” VK Global Publications, 2023.

Reference Books & Web resources

1. Varian, Hal R., *“*Intermediate Microeconomics: A Modern Approach*”* 10th edition, W.W. Norton & Company, 2024.
2. Mankiw, N. Gregory, “Principles of Macroeconomics*”* 9th edition, Cengage Learning, 2021”
3. Greco, Anthony N., “Fundamentals of Economics: A Book of Readings”, Cognella Academic Publishing, 2023.
4. Bade, Robin, and Parkin, Michael, “Foundations of Economics”, 9th Global Edition, Pearson Education, 2024.

Course Contents and Lecture Schedule

Module No.	Topic	No. of Periods	Course Outcomes
1.	**Introduction to Microeconomics**	**2**	
1.1	The themes of microeconomics, Elasticity of Supply, Elasticity of Demand	1	CO1
1.2	Microeconomics versus Macroeconomics, Behaviour of firm and House hold	1	CO1
2.	**Principles of Demand and Supply**	**4**	
2.1	Supply Curves of Firms, Demand Curves of Households	1	CO2
2.2	Market Equilibrium & Comparative Statics	1	CO2
2.3	Consumers’ and Producers’ Surplus	1	CO2
2.4	Price Ceilings and Price Floors, Case Study: Minimum Support Price (MSP) for Farmers	1	CO2
3.	**Consumer Behaviour**	**4**	
3.1	Axioms of Choice, Budget Constraints and Indifference Curves, Consumer’s Equilibrium, Effects of a Price Change	1	CO3
3.2	Income and Substitution Effects, Derivation of a Demand Curve	1	CO3
3.3	Applications: Tax and Subsidies, Inter-temporal Consumption, Case Study: LPG Gas Subsidy Scheme	1	CO3
3.8	Suppliers’ Income Effect	1	CO3
4.	**Theory of Production**	**4**	
4.1	Production Function and Iso-quants, Cost Minimization, , Case Study: Dairy Production and Cost Management	1	CO4
4.2	Cost Curves: Total, Average and Marginal Costs	1	CO4
4.3	Long Run and Short Run Costs	1	CO4
4.4	Equilibrium of a Firm Under Perfect Competition, Monopoly and Monopolistic Competition	1	CO4
5.	**Introduction to Macroeconomics**	**6**	
5.1	National Income and its Components, GNP, NNP, GDP, NDP, Case Study: COVID-19 and Indian GDP	1	CO5
5.2	Consumption Function, Investment	1	CO5
5.3	Simple Keynesian Model of Income Determination	1	CO5
5.4	Keynesian Multiplier	1	CO5

5.5	Government Sector, Taxes and Subsidies,	1	CO5
6.	**Monetary Policy**	**5**	
6.1	External Sector, Money- Demand for Money, Supply of Money	1	CO6
6.2	Bank's Credit Creation Multiplier, Integrating Money and Commodity Markets	1	CO6
6.3	Overview of IS, LM Model	1	CO6
6.4	Case Study: Central Bank and the Government	1	CO6
6.5	Business Cycles and Stabilization - Monetary and Fiscal Policy, The Classical Paradigm	1	CO6
	Total Hours	**24**	

Course Designer(s):

1. Mrs.D.Yuvasini, Assistant Professor, Department of CSBS, dyica@tce.edu
2. Mr.V.Janakiraman, Assistant Professor, Department of CSBS, vjncse@tce.edu

26CBEB0	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

Category	L	T	P	Credit
ESC	2	1	0	3

Preamble

Introduces the basic principles of electrical and electronics engineering, including circuits, machines, semiconductor devices, digital electronics, and instrumentation. Enables students to understand the applications of electrical and electronic systems in computing, automation, smart technologies, and modern industrial environments.

Prerequisite

- Engineering Mathematics
- Engineering Physics

Course Outcomes

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

No.	Course Outcome	TPS Level	Performance Indicator	CO Weightage	SDG Addressed	SDG Level
CO1	Compute electrical circuit parameters using Ohm's law, Kirchhoff's laws, nodal and mesh analysis for simple DC circuits.	TPS 3	1.3.1	15%	7	4
CO2	Analyze AC circuit quantities such as RMS value, power, power factor, and response of simple RLC circuits.	TPS 4	1.4.1	15%	7	4
CO3	Explain the construction, working principles, and applications of electrical machines and transformers.	TPS 2	1.3.1	20%	9	2
CO4	Analyze the characteristics and applications of semiconductor and power electronic devices.	TPS 4	1.4.1	20%	9	4
CO5	Demonstrate digital logic concepts using number systems, SOP/POS forms, and K-map minimization.	TPS 3	2.3.1	15%	9	4
CO6	Explain the operating principles and applications of measuring instruments and data acquisition systems.	TPS 2	1.3.1	15%	9	3

Assessment Pattern

CO	CAT1	Assignment 1	CAT2	Assignment 2	Terminal Exam
	% of Marks	% of Marks	% of Marks	% of Marks	% of Marks
CO1	35	30	-	-	15
CO2	35	35	-	-	15
CO3	30	35	-	-	20
CO4	-	-	35	30	20
CO5	-	-	35	35	15
CO6	-	-	30	35	15
Total	**100**	**100**	**100**	**100**	**100**

Syllabus

Electrical Circuits: Circuit components: conductor, resistor, inductor and capacitor – Ohm's law – Kirchhoff's laws – independent and dependent sources – simple DC circuit problems – nodal analysis with independent sources – mesh analysis with independent sources – steady state DC circuit analysis.

AC Circuits and Power: Introduction to AC circuits – sinusoidal waveforms – average value – RMS value – instantaneous power – real power – reactive power – apparent power – power factor – steady state analysis of simple RLC circuits – simple numerical problems related to AC circuits and power.

Electrical Machines: Construction and working principle of DC generators – separately excited and self excited generators – EMF equation – types and applications of DC generators – working principle of DC motors – torque equation – types and applications of DC motors – construction, working principle and applications of transformers – three phase alternator – synchronous motor – three phase induction motor.

Analog Electronics and Power Electronic Devices: Resistor, inductor and capacitor in electronic circuits – semiconductor materials: silicon and germanium – PN junction diode – Zener diode – characteristics and applications – bipolar junction transistor and biasing – SCR – MOSFET – IGBT – types, I V characteristics and applications – rectifiers – inverters.

Digital Electronics: Review of number systems – binary codes – error detection and correction codes – combinational logic – representation of logic functions – SOP and POS forms – K map representation – minimization using K maps – simple Boolean simplification problems – relevance of digital logic in computing and business systems.

Measurements and Instrumentation: Functional elements of an instrument – standards and calibration – operating principle and types of moving coil and moving iron meters – measurement of three phase power – energy meter – instrument transformers: CT and PT – DSO block diagram – basics of data acquisition – applications in smart monitoring systems.

Learning Resources

Text Book

1. D. P. Kothari and I. J. Nagrath, "Basic Electrical and Electronics Engineering", McGraw Hill Education, Second Edition, 2020.
2. S. K. Bhattacharya, "Basic Electrical and Electronics Engineering", Pearson Education, Second Edition, 2017.

Reference Books & Web resources

1. R. S. Sedha, “A Textbook of Applied Electronics”, S. Chand and Co., 2008.
2. James A. Svoboda and Richard C. Dorf, “Dorf’s Introduction to Electric Circuits”, Wiley, 2018.
3. A. K. Sawhney and Puneet Sawhney, “A Course in Electrical and Electronic Measurements and Instrumentation”, Dhanpat Rai and Co., 2015.
4. Thomas L. Floyd, “Digital Fundamentals”, Pearson Education, Eleventh Edition, 2017.
5. Albert Malvino and David Bates, “Electronic Principles”, McGraw Hill Education, Seventh Edition, 2017.
6. NPTEL Web Resource: Basic Electrical Technology / Basic Electronics / Digital Electronics video lectures.

Course Contents and Lecture Schedule

Module No.	Topics	No. of Periods	Course Outcomes
1	**Electrical Circuits**	**6**	
1.1	Introduction to circuit elements	1	CO1
1.2	Ohm’s law and simple circuits	1	CO1
1.3	Kirchhoff’s laws	1	CO1
1.4	Independent and dependent sources	1	CO1
1.5	Nodal analysis	1	CO1
1.6	Mesh analysis and steady state DC circuit problems	1	CO1
2	**AC Circuits and Power**	**6**	
2.1	Fundamentals of AC waveforms	1	CO2
2.2	Average and RMS values	1	CO2
2.3	Real, reactive and apparent power	1	CO2
2.4	Power factor and power triangle	1	CO2
2.5	RL, RC and RLC circuit analysis	1	CO2
2.6	Numerical problems on AC circuits	1	CO2
3	**Electrical Machines**	**7**	
3.1	DC generators and EMF equation	1	CO3
3.2	Types and applications of DC generators	1	CO3
3.3	DC motors and torque equation	1	CO3
3.4	Types and applications of DC motors	1	CO3
3.5	Transformers and applications	1	CO3
3.6	Alternators and synchronous motors	1	CO3
3.7	Three phase induction motors and industrial applications	1	CO3
4	**Analog Electronics and Power Electronic Devices**	**7**	
4.1	Semiconductor materials and PN junction diode	1	CO4
4.2	Zener diode and applications	1	CO4
4.3	BJT and transistor biasing	1	CO4
4.4	SCR and power electronic devices	2	CO4
4.5	MOSFET and IGBT applications	1	CO4
4.6	Rectifiers and inverters	1	CO4
5	**Digital Electronics**	**5**	
5.1	Number systems and binary codes	1	CO5
5.2	Logic gates and Boolean algebra	1	CO5
5.3	SOP and POS forms	1	CO5
5.4	K-map minimization	1	CO5
5.5	Applications of digital electronics	1	CO5

Module No.	Topics	No. of Periods	Course Outcomes
6	**Measurements and Instrumentation**	**5**	
6.1	Functional elements and standards	1	CO6
6.2	Moving coil and moving iron instruments	1	CO6
6.3	Energy meter and instrument transformers	1	CO6
6.4	DSO operation and block diagram	1	CO6
6.5	Data acquisition systems and applications	1	CO6
	Total Periods	**36**	

Course Designer(s):

1. Dr. P. M. Devie, Assistant Professor, Department of EEE pmdeee@tce.edu
2. Dr. M.Meenakshi Devi, Assistant Professor, Department of EEE mmdeee@tce.edu
3. Mrs. V.Chandra, Assistant Professor, Department of EEE vcaeee@tce.edu

26CBCD0	COMPUTATIONAL PROBLEM SOLVING USING PYTHON

Category	L	T	P	Credit	TE Type
PCC	2	0	4	4	TCP-P

Preamble

This course introduces problem solving and programming using Python with emphasis on practical applications. It covers programming fundamentals, python collections, file handling, and modular programming, along with foundations of data science, visualization, and exploratory data analysis using Python libraries.

Prerequisite

Nil

Course Outcomes

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

No.	Course Outcome	TCE Proficiency Scale	Performance Indicator	CO Weightage	SDG Addressed	SDG Level
CO1	Apply control structures, Python collections, and searching and sorting techniques to solve computational problems.	3	1.3.1	20%	SDG 4	1
CO2	Demonstrate modular programming, recursion, file handling, and exception handling in programming applications.	3	1.4.1	20%	SDG 9	1
CO3	Compute and analyze data using NumPy and Pandas libraries for data science applications.	3	5.1.1	20%	SDG 9	1
CO4	Demonstrate the use of visualization and exploratory data analysis techniques using Matplotlib and Scikit-learn	3	5.1.1	20%	SDG 9	1

CO5	Demonstrate effective communication of data analysis results using visualizations and technical reports.	3	9.1.2	8%	NC	-
CO6	Apply ethical principles in data collection, analysis, and interpretation.	3	7.1.1	16%	NC	-
CO7	Apply teamwork skills to develop and present data-driven solutions collaboratively.	3	8.2.1	17%	NC	-

Assessment Pattern

CO	Theory		Practical		Terminal Exam PRACTICAL
	CAT1	CAT2	OCR/Continuous Assessment	Model Test CO-wise	
	% of Marks	% of Marks	% of Marks	% of Marks	% of Marks
CO1	50	-	20	25	100
CO2	50	-	20	25	
CO3	-	50	20	25	
CO4	-	50	20	25	
CO5	-	-	05	-	
CO6	-	-	05	-	
CO7	-	-	10	-	
Total	100	100	100	100	100

Assessment Pattern: Practical Component

Type of Assessment	Component	Marks	Remarks
Continuous Assessment	Pre-lab, In-lab, Post-lab	75	Conducted throughout the semester
Model Test	CO-wise (Cognitive, Psychomotor, Affective)	25	Rubrics covering all Domains of learning
Total Internal Marks		**100**	
End Semester Examination	CO-wise (Cognitive, Psychomotor, Affective)	100	Rubrics covering all Domains of learning

Syllabus

Python Fundamentals and Problem Solving: Variables and Data Types – Input and Output Operations – Operators and Expressions – Conditional Statements – Iterative Statements

Python Collections: String Operations – Ordered data with Lists and Tuples – Complex data mappings using Dictionaries and Sets – Searching & Sorting Techniques

Functions and Modular Programming: Function Definition and Invocation – Parameters and Return Values – Scope of Variables – Recursive Functions – Modules and Packages – Introduction to Classes and Objects

File Handling and Exception Handling: File Operations – Reading and Writing Files – File Processing Techniques – Exception Handling using try and except – Assertions – Regular Expressions – Basic Text Processing and Logging

Foundations of Data Science using Python: Data Science Workflow – Introduction to NumPy and Pandas – Series and DataFrames – Importing Data from Files – Data Cleaning and Transformation – Filtering and Aggregation – Basic Statistical Analysis

Data Visualization and Exploratory Data Analysis: Data Visualization using Matplotlib – Line, Bar, Pie and Scatter Plots – Exploratory Data Analysis Techniques – Correlation and Data Interpretation – Introduction to Scikit-learn – Basic Machine Learning Workflow - Real-world and Industrial Applications

Real-World Industrial Applications

1. **Predictive Maintenance:** Clean, analyze, and visualize equipment sensor data to detect abnormal operating patterns and reduce machine downtime.
2. **Energy Consumption Analysis:** Analyze industrial energy usage data to identify consumption patterns and recommend efficiency improvements.

Learning Resources

Text Book

1. Eric Matthes, “Python Crash Course”, 3rd Edition, No Starch Press, 2023.
2. Allen B. Downey, “Think Python: How to Think Like a Computer Scientist”, 3rd Edition, O’Reilly Media, 2024.

Reference Books & web resources

1. Wes McKinney, “Python for Data Analysis”, 3rd Edition, O’Reilly Media, 2022.
2. NPTEL, “Joy of Computing” https://nptel.ac.in/courses/106106182
3. NPTEL “Python for Data Science”, https://nptel.ac.in/courses/106106212

SDG Alignment

Activities aligned with SDGs addressed:

1. SDG 4 - Python programming activities that enable students to translate mathematical concepts into computational solutions, encouraging problem-solving, computational thinking, and digital literacy skills.
2. SDG 9 – Use modern data science tools to generate insights that drive innovation, industrial efficiency, and technological advancement.

Course Contents and Lecture Schedule

Module No	Topics	No of Periods	Course Outcomes
1	**Python Fundamentals and Problem Solving:**	**3**	
1.1	Variables and Data Types, Input and Output Operations	1	CO1
1.2	Operators and Expressions, Conditional Statements	1	CO1
1.3	Iterative Statements	1	CO1
2	**Python Collections:**	**4**	
2.1	String Operations, Ordered data with Lists and Tuples	1	CO1
2.2	Complex data mappings using Dictionaries and Sets	1	CO1
2.3	Searching & Sorting Techniques	2	CO1
3	**Functions and Modular Programming:**	**4**	
3.1	Function Definition and Invocation, Parameters and Return Values, Scope of Variables, Recursive Functions	2	CO2
3.2	Modules and Packages, Introduction to Classes and Objects	2	CO2
4	**File Handling and Exception Handling:**	**4**	
4.1	File Operations, Reading and Writing Files, File Processing Techniques	2	CO2
4.2	Exception Handling using try and except, Assertions, Regular Expressions, Basic Text Processing and Logging	2	CO2
5	**Foundations of Data Science using Python:**	**4**	
5.1	Data Science Workflow, Introduction to NumPy and Pandas, Series and DataFrames, Importing Data from Files	2	CO3
5.2	Data Cleaning and Transformation, Filtering and Aggregation, Basic Statistical Analysis	2	CO3
6	**Data Visualization and Exploratory Data Analysis:**	**5**	
6.1	Data Visualization using Matplotlib – Line, Bar, Pie and Scatter Plots	1	CO4, CO6
6.2	Exploratory Data Analysis Techniques, Correlation and Data Interpretation, Introduction to Scikit-learn	1	CO4
6.3	Basic Machine Learning Workflow	1	CO4
6.4	Real-world and Industrial Applications	2	CO4, CO5, CO6
	Total Periods	**24**	

List of Experiments with CO Mapping

Sl. No.	Name of the Experiment	Level of Experiment	Objective(s)	COs Addressed
1	Develop a Python program to perform arithmetic, relational, and logical operations on different data types and analyze the effect of type conversion and operator precedence.	1	3 - Experimentation	CO1

2	Construct a Python program using conditional and iterative statements to perform operations such as factorial, Fibonacci series, and prime number generation.	1	3 - Experimentation	CO1
3	Develop a Python program using lists, tuples, dictionaries, and sets to store, retrieve, and manipulate student or employee records.	2	3 - Experimentation	CO1
4	Construct a Python program to sort datasets and search for specific elements using suitable searching and sorting techniques.	2	3 - Experimentation	CO1
5	Design a Python program using user-defined functions and recursive techniques to solve mathematical problems such as factorial and Fibonacci computation.	2	3 - Experimentation	CO2
6	Construct a Python application to read, write, and process files for maintaining structured records.	1	3 - Experimentation	CO2
7	Develop a Python program using exception handling and regular expressions to validate and process user input data efficiently.	2	3 - Experimentation	CO2
8	Develop a Python program using NumPy arrays to perform array creation and manipulation operations.	2	4 - Data Analysis	CO3
9	Develop a Python program to perform basic statistical analysis on datasets.	3	4 - Data Analysis	CO3
10	Construct a Pandas-based program to import, clean, transform, and analyze structured data from CSV files.	3	4 - Data Analysis	CO4

11	Develop a Python program to perform data visualization and exploratory data analysis using Matplotlib and Scikit-learn on real-world datasets.	3	4 - Data Analysis	CO4, CO5, CO6
12	Mini project	3	5 - Design	CO1 - CO7

Course Designer(s):

1. Mrs. Priya Thiagarajan, Assistant Professor, Department of CSBS ptca@tce.edu

26CBCE0	BUSINESS COMMUNICATION & VALUE SCIENCE

Category	L	T	P	Credits
PCC	0	0	2	1

Preamble

This course is designed to develop business communication competence, interpersonal abilities, ethical awareness, and value-based learning among students through experiential and activity-oriented practices.

Prerequisite

NIL

Course Outcomes

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

COs	Course Outcomes	TCE Proficiency Scale	Performance Indicators	SDG Addressed	SDG Level
CO1	Apply grammar, vocabulary, and communication strategies effectively in academic and professional contexts.	TPS 3	9.4.1	4	1
CO2	Demonstrate listening, teamwork, leadership, stress management, and interpersonal skills during collaborative communication activities.	TPS 3	9.5.1	4	1
CO3	Prepare structured written & oral communication such as emails, posters, slogans & presentation using professional conventions.	TPS 3	9.6.2	4	1
CO4	Analyse communication barriers, cross-cultural interactions, workplace communication challenges, and ethical practices, and professionalism through reflective learning activities.	TPS 4	8.5.1	4	2

Assessment Pattern: Cognitive Domain

Type of Assessment	Component	Marks	Remarks
Continuous Assessment	Pre-lab, In-lab, Post-lab	75	Conducted throughout the semester
Model Test	CO-wise (Cognitive, Psychomotor, Affective)	25	Mid/End semester internal test
Total Internal Marks		**100**	
End Semester Examination	CO-wise (Cognitive, Psychomotor, Affective)	100	As directed by COE or as per curriculum

Syllabus

Types of communication - verbal and non–verbal, Barriers of communication, Effective communication strategies, Functional Grammar - Applications of tenses, Question formation (WH, Yes/No / Tag), Common errors.

Human Values & Interpersonal Skills - Importance of listening skills, Types of listening, Understanding Life Skills: Movie based learning, Introduction to critical life skills - Leadership, teamwork, Stress management & motivation, SWOT analysis and Self-introduction.
Business & Professional Communication - Formal and informal emails, Professional digital communication, Exposure to words from General Service List (GSL) by West, Academic word list (AWL) technical specific terms related to the field of technology - Idioms and Phrases.

Reading, Writing & Presentation Skills - Types of reading, Enhancing Reading skills, Comprehension & Interpretation, Slogan writing, Presentation & public speaking skills.

Introduction to Intercultural Communication - Overcoming Language Barriers in Global Settings, conflict resolution strategies, apologizing effectively, and maintaining professionalism under pressure, Designing Posters - Cross-cultural and Crisis Communication.

List of Experiments with CO Mapping

Sl. No.	Name of the Experiment	Level of Experiment	Objective(s)	COs Addressed
1	Verbal and Non-verbal Communication	01	11	CO1
2	Communication Barriers and Role Play	02	9,11	CO4
3	Functional Grammar Exercises	01	11	CO1
4	Vocabulary Development using GSL & AWL	01	11	CO1
5	Listening Skills and Movie-based Learning	02	12	CO2
6	Leadership and SWOT Analysis	02	12	CO2
7	Email Writing Practice	01	11	CO3
8	Reading Comprehension and Interpretation	01	11	CO3
9	Slogan Writing & presentation skills	02	9,11	CO3
10	Cross-cultural Communication Activities	02	11,13	CO4
11	Conflict Resolution & Crisis Communication Activities	03	8	CO4
12	Stress Management & Professional Behaviour Activities	02	13	CO2

Course Designer(s):

1. Dr. A. Tamilselvi, Professor & Head, Department of English tamilselvi@tce.edu
2. Dr. V. Anushya Devi, Assistant Professor, Department of English vaeng@tce.edu

26CHSC0	CHEMISTRY LABORATORY	Category	L	T	P	Credits
		BSC	0	0	3	1.5

Preamble

This course aims to provide the students with basic practical knowledge in chemistry. The objective of this course is to develop students' intellectual and psychomotor skills by providing hands-on experience in quantitative analysis, electrochemistry, physicochemistry, photocolorimetry, and green nanomaterial synthesis techniques.

Prerequisite

NIL

Course Outcomes

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

COs	Course Outcome	TCE Proficiency Scale	Performance Indicators	SDG Addressed	SDG Level
CO1	Operate pH meters, conductivity bridges, colorimeters, potentiometric systems, and volumetric apparatus to determine physicochemical properties of engineering samples.	TPS 3	5.2.1	SDG 9 – Industry, Innovation and Infrastructure	2
CO2	Measure readings from volumetric, and instrumental methods to determine concentration of chemical and water samples.	TPS 3	4.1.2	SDG 6 – Clean Water and Sanitation	2
CO3	Demonstrate precise laboratory techniques, including pipetting, burette handling, endpoint detection, calibration, and solution preparation during quantitative chemical analysis.	TPS 3	5.3.1	SDG 4 – Quality Education	2
CO4	Apply laboratory safety procedures, chemical handling practices, and waste disposal protocols during analytical and electrochemical experiments.	TPS 3	6.4.1	SDG 12 – Responsible Consumption and Production	2
CO5	Demonstrate structured laboratory reports by interpreting observations, calculations, graphs, error analysis, and experimental conclusions using scientific documentation practices.	TPS 3	9.1.2	SDG 4 – Quality Education	2
CO6	Apply collaborative responsibilities ethically during experimentation, data recording, analysis, and laboratory discussions.	TPS 3	8.2.1	SDG 16 – Peace, Justice and Strong Institutions	2

CO7	Analyse deviations and experimental errors in titrimetric, electrochemical, and instrumental methods, and recommend corrective measures to improve analytical accuracy.	TPS 4	4.3.1	SDG 9 – Industry, Innovation and Infrastructure	2
CO8	Evaluate electrochemical behaviour, corrosion characteristics, and electroplating efficiency of metallic systems using modern electrochemical techniques.	TPS 5	3.3.1	SDG 9 – Industry, Innovation and Infrastructure	2

Assessment Pattern: Cognitive Domain

Type of Assessment	Component	Marks	Remarks
Continuous Assessment	Pre-Lab, In-Lab, and Post-Lab Activities	75	Conducted throughout the semester as per laboratory assessment framework and openness levels specified in the curriculum guidelines.
Model Test	CO-wise Assessment covering Cognitive, Psychomotor, and Affective Domains	25	Mid-semester / End-semester internal practical assessment using structured rubrics aligned with all three learning domains.
Total Internal Marks		**100**	Continuous Assessment (75) + Model Test (25).
End Semester Examination	CO-wise Assessment covering Cognitive, Psychomotor, and Affective Domains	100	Conducted as per COE regulations and curriculum requirements using structured laboratory evaluation rubrics.

List of Experiments with CO Mapping

Sl. No.	Name of the Experiment	Level of Experiment	Objective(s)	COs Addressed
1	Estimation of Total Hardness of Water	Level 1	Instrumentation, Data Analysis, Psychomotor Skills	CO1, CO2, CO3, CO4, CO5
2	Estimation of Calcium in a Milk Sample	Level 1	Experimentation, Data Analysis, Psychomotor Skills	CO2, CO3, CO5, CO6
3	Estimation of Chemical Oxygen Demand in Effluent	Level 2	Experimentation, Data Analysis, Safety	CO1, CO2, CO4, CO5, CO7
4	Determination of the Surface Tension of a Liquid	Level 2	Instrumentation, Models, Psychomotor Skills	CO1, CO2, CO3, CO5
5	Estimation of Antacid in a Tablet	Level 1	Experimentation, Data Analysis,	CO2, CO3, CO5

			Psychomotor Skills	
6	Estimation of Acid Strength in Citrus Fruit	Level 1	Experimentation, Data Analysis, Psychomotor Skills	CO2, CO3, CO5, CO6
7	Determination of the Molecular Weight of a Polymer by the Ostwald Viscometer	Level 2	Models, Instrumentation, Data Analysis	CO1, CO2, CO5, CO7
8	Estimation of Acidic Impurities in Soft Drinks by the Conductometric Method	Level 2	Instrumentation, Data Analysis, Learn from Failure	CO1, CO2, CO5, CO7
9	Estimation of the pH of a Soil Sample	Level 1	Instrumentation, Psychomotor Skills, Data Analysis	CO1, CO3, CO4, CO5
10	Estimation of Fe^{2+} using the Potentiometric Method	Level 2	Instrumentation, Experimentation, Data Analysis	CO1, CO2, CO5, CO7
11	Green Synthesis of Plasmonic Silver Nanoparticles Using Plant Extract and Quantitative Analysis by Photocolorimetry	Level 2	Instrumentation, Experimentation, Data Analysis, Creativity	CO1, CO2, CO5, CO7, CO8
12	Estimation of the rate of Corrosion of a Metal Specimen by Electrochemical Method	Level2	Instrumentation, Experimentation, Data Analysis,	CO1, CO2, CO5, CO7, CO8

Course Designer(s):

1. Dr. V. Velkannan, Assistant Professor and Head (i/c), Chemistry velkannan@tce.edu
2. Dr. S. Sivailango, Assistant Professor, Chemistry drssilango@ tce.edu
3. Dr. M. Velayudham, Assistant Professor, Chemistry mvchem@tce.edu
4. Dr. A. Ramalinga Chandra Sekar, Assistant Professor, Chemistry arcchem@ tce.edu
5. Dr. B. Shankar, Assistant Professor, Chemistry bsrchem@ tce.edu
6. Dr. R. Sivakumar, Assistant Professor, Chemistry rsrchem@ tce.edu
7. Dr. P. Ramkumar, Assistant Professor, Chemistry prrchem@ tce.edu

26TAAB0	TAMILS AND TECHNOLOGY	Category	L	T	P	Credits
		Audit	1	0	0	0

1. Preamble

The Tamil language is not merely a tool for communication; it is a repository of the knowledge, way of life, and scientific thought of the Tamil people, spanning millennia.

Today, Tamils are making their mark in the realms of computing and the internet. Their contributions are immense, ranging from leading global technology companies to playing pivotal roles in Artificial Intelligence (AI) and space exploration (ISRO/NASA). Simultaneously, the development of 'Computational Tamil' and internet-based Tamil is gaining momentum, ensuring the language is passed on to the next generation.

The technological acumen of the Tamil people did not emerge overnight; it is ingrained in their very DNA. By cherishing tradition, embracing innovation, and keeping pace with global technological advancements, Tamils continue to stand as pioneers.

2. Prerequisite

NIL

3. Course Outcome:

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

No	Course Outcome	TPS Level	PO Addressed	CO Weightage	SDG addressed	SDG Level
CO1	Explain the historical Sangam Age Ceramic Technology Graffiti on Potteries	TPS2	PO1 – M PO2 – L	20	SDG 4	1
CO2	Explain the durig Sangam Age Strucural Contution House & Designs in Household materials	TPS2	PO1 – M PO2 – L	20	SDG 4	1
CO3	Metallurgical studies Art of Ship steel – Copper and gold- Coins as source of history Shell beads	TPS3	PO1 – S PO2 – M PO3 – L	20	SDG 4	1
CO4	Agricuture and Agro Procesing Ancient Knowledge of Ocean	TPS3	PO1 – S PO2 – M PO3 – L	20	SDG 4	1
CO5	Development of Scientific Tamil And Tamil computing	TPS3	PO1 – S PO2 – M PO3 – L	20	SDG 4	1

4. Assessment Pattern

CO	CAT1	Assignment 1	CAT 2 (MCQ)	Assignment 2	Terminal Exam (MCQ)*
	% of marks	% of Marks	% of Marks	% of Marks	% of Marks
CO1	-	-	10	10	10
CO2	-	-	10	10	10
CO3	-	-	20	20	20
CO4	-	-	30	30	30
CO5	-	-	30	30	30
Total	**-**	**-**	**100**	**100**	**100**

* The Terminal Examination and CAT 2 shall be conducted as a Multiple-Choice Question (MCQ) examination.

5. Syllabus

Module 1:

Weaving Industry Sangam Age – Ceramic Technology – Black and Red Ware Potteries (BRW)- Graffiti on Potteries.

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Module 2:

Desiging and Strucural Contution House & Designs in Household materials durig Sangam Age – Building materials and Hero stone os Sangam age – Details of Stage Constructions in Silappathikaram – sculptures and Temples of Mamallapuram- Great Temples of Cholas and other Worship places- Temples of Nayaka Period- Type study (Madurai Meenakshi Temple)- Thirumalai Nayakar Mahal – Chetti Nadu House, Indo-Saracenic Architecture at Madras during British Peroiod.

Module 3:

Art of Ship Building – Metallurgical studies – iron industry –iron smelting, steel – Copper and gold- Coins as source of history – Minting of Coins – Beads making – industries Stone beads- Glass beads-Terracotta beads – Shell beads / bone beats – Archeological evidences- Gen stone types described in Silappathikaram.

Module 4:

Dam,Tank,Ponds,Stuice,Signification of Kumizhi Thoompu of Cholo Period, Animal Husbandry-Wells designed for cattle use – Agricuture and Agro Procesing – Knowledge of Sea – Fisheries-Pearl-Conche diving –Ancient Knowledge of Ocean – Knowledge Specific Society.

Module 5:

Development of Scientific Tamil – Tamil computing – Digitalization of Tamil Books- Development of Tamil Software – Tamil Virtual Academy – Tamil Digital Library – Online Dictionaries – Sorkuvai Project.

6. Learning Resources

- தமிழக வரலாறு - மக்களும் பண்பாடும் தமிழ்நாடு பாடநூல் :வெளியீடு) (மற்றும் கல்வியியல் பணிகள் கழகம்
- கணித் தமிழ் - முனைவர் இல.சுந்தரம் விகடன் பிரசுர)ம்(
- கீழடி - வைகை நதிக்கரையில் சங்ககால நாகரீகம் தொல்லியல் துறை) (வெளியீடு
- பொருநை ஆற்றங்கரை நாகரீகம் (தொல்லியல் துறை வெளியீடு)
- Social Life of the Tamil – The Classical Period (Dr.K.K.Pillay) A joint publication of TNTB&ESC and RMRL – (inprint)
- Social Life of the Tamils- The Classical Period (Dr.S.Singaravelu) Published by: International Institute of TamilStuies.
- Historial Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D.Thirunavukkarasu)) Published by: International Institute of TamilStuies.
- The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) Published by: International Institute of TamilStuies.
- Keeladi – Sangam City Civilzation on the banks of river Vaigai (Jointly Published Department of Archaeology & Tamil Nadu Text Book and Educational Servics Corporation,Tamilnadu)

- Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillai, Publisher by The Author)
- Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Education Service Corporation, TamilNadu)
- Journey of Civization indus to Vaigai (R.Balakrishnan) Published by: RMRL – Reference Book

2. Course Contents and Lecture Schedule

Module No.	Topics	No. of Periods
1	**WEAVING AND CERAIC TECHNOLOGY**	
1.1	Weaving Industry Sangam Age – CeramicTechnology	1
1.2	Black and Red Ware Potteries(BRW)	1
1.3	Graffiti on Potteries.	1
2	**DESIGN AND CONSTRUCTION TECHNOLOGY**	
2.1	Desiging and Strucural Contution House & Designs in Household materials durig Sangam Age – Building materials and Hero stone os Sangam age	1
2.2	Details of Stage Constructions in Silappathikaram – sculptures and Temples of Mamallapuram- Great Temples of Cholas and other Worship places- Temples of Nayaka Period- Type study (Madurai Meenakshi Temple)	1
2.3	Thirumalai Nayakar Mahal – Chetti Nadu House, Indo-Saracenic Architecture at Madras during British Peroiod.	1
3	**MANUFACTURING TECHNOLOGY**	
3.1	Art of Ship Building – Metallurgical studies – iron industry –iron smelting, steel – Copper and gold- Coins as source of history – Minting of Coins	1
3.2	Beads making – industries Stone beads- Glass beads-Terracotta beads – Shell beads / bone beats	1
3.3	Archeological evidences- Gen stone types described in Silappathikaram.	1
4	**ARGRICULTURE AND IRRIATION TECHNOLOGY**	
4.1	Dam,Tank,Ponds,Stuice,Signification of Kumizhi Thoompu of Cholo Period	1
4.2	Animal Husbandry-Wells designed for cattle use – Agricuture and Agro Procesing	1
4.3	Knowledge of Sea – Fisheries-Pearl-Conche diving –Ancient Knowledge of Ocean – Knowledge Specific Society.	1
5	**SCIENTIFIC TAMIL & TAML COMPUTING**	
5.1	Development of Scientific Tamil – Tamil computing	1
5.2	Digitalization of Tamil Books- Development of Tamil Software – Tamil Virtual Academy	1
5.3	Tamil Digital Library – Online Dictionaries – Sorkuvai Project	1
	Total	15

Course Designers:

Mr. M Babu.mbutce@tce.edu

26CCAB0	FOUNDATIONS OF PROBLEM SOLVING-1 (Common to all Programmes)	Category	L	T	P	Credits
		AC	0	0	2	0

1. Preamble

This course introduces students to the core habits of structured problem solving. Through algorithmic thinking exercises across numeric, visual, and word-puzzle formats, students learn to decompose problems, identify patterns, and design solution strategies that transfer to both academic problem solving and early recruitment-test contexts.

2. Course Outcomes

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

No.	Course Outcome	TPS Level	Performance Indicator	CO Weightage
CO1	Explain the principles of algorithmic thinking and structured problem solving.	TPS2	3.3.1	20%
CO2	Apply quantitative reasoning techniques to numeric problems.	TPS3	2.1.2	20%
CO3	Use visual pattern recognition to solve diagram-based puzzles.	TPS3	2.1.2	20%
CO4	Identify shortest-path and optimization strategies in problem solving.	TPS3	2.4.1	20%
CO5	Solve complex word puzzles by decomposing them into smaller logical units.	TPS4	2.2.1	20%

3. Assessment Pattern

CO	CA1 (% of Marks)	CA2 (% of Marks)	Terminal Exam (% of Marks)
CO1	50	—	10
CO2	50	—	10
CO3	—	50	20
CO4	—	50	20
CO5	—	—	40
Total	**100**	**100**	**100**

The assessment will be conducted by the Training Team, and the marks will be submitted by the respective faculty in charge.

4. Syllabus

Module 1: Introduction to Problem Solving and Algorithmic Thinking

Problem-solving framework – Algorithmic mindset – Decomposition – Pattern recognition

Module 2: Thinking with Numbers

Numeric reasoning – Quantitative pattern recognition – Mental shortcuts

Module 3: Thinking with Visual

Diagram-based reasoning – Visual patterns – Figure analogies and series

Module 4: Shortest Path

Shortest-path problems – Optimisation – Route and grid problems

Module 5: Word Puzzles (Part 1 & 2)

Lateral thinking – Word arrangement – Logical inference puzzles – Brain teasers

5. Learning Resources

5.1 Text Book

George Polya — "How to Solve It", Princeton University Press.

5.2 Reference Books & Web Resources

1. R. G. Dromey — "How to Solve It by Computer", Pearson.
2. Edward de Bono — "Lateral Thinking: A Textbook of Creativity", Penguin.
3. Arun Sharma — "How to Prepare for Logical Reasoning", McGraw Hill.

6. Course Designer(s)

1. Mr. S. A. R. Sheik Masthan, Asst. Professor, Mechatronics, sarsmech@tce.edu
2. Dr. R. Rajan Praksah, Associate Professor, EEE, r_rajanprakash@tce.edu