

PANIMALAR ENGINEERING COLLEGE

An Autonomous Institution, Affiliated to Anna University, Chennai

(JAISAKTHI EDUCATIONAL TRUST)

*Bangalore Trunk Road, Varadharajapuram,
Poonamallee, Chennai – 600 123.*

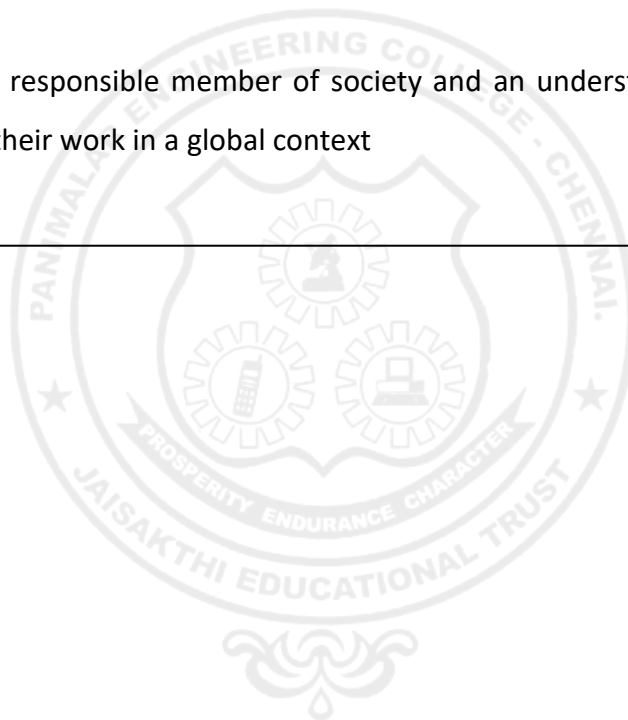


**DEPARTMENT OF COMPUTER SCIENCE AND BUSINESS SYSTEMS
B.TECH- COMPUTER SCIENCE AND BUSINESS SYSTEMS**

**CURRICULUM AND SYLLABUS
REGULATION-2023**

PROGRAMME EDUCATIONAL OBJECTIVES (PEO)

1. To acquire technical knowledge and proficiency required for the employment and lifelong learning and recognized as a valued professional and effective communicator in industries related to computer science and computing technologies.
2. To engage in lifelong learning and Practice their profession in a cooperative, team- oriented manner that holds the multidisciplinary and multicultural environment of suits the current business world.
3. To Function as a responsible member of society and an understanding of the ethics and responsibility of their work in a global context



PROGRAM OUTCOMES (PO)

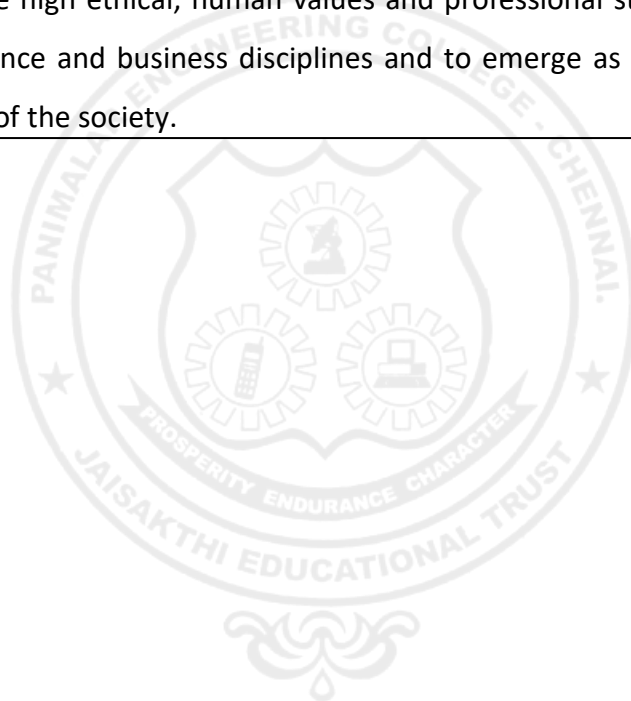
1. Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles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

PROGRAMME SPECIFIC OUTCOMES (PSO)

PSO 1: Ability to apply the analytical and business skills to provide sustainable solutions as an engineer/researcher for the real-world problems using core topics in Computer Science with equal appreciation to IT Management.

PSO 2: Ability to understand the evolutionary changes in computing, apply innovative ideas by adapting to a rapidly changing environment by applying their knowledge in technology abstraction and common business principles to solve the real world problems and meet the challenges of the future.

PSO 3: Ability to practice high ethical, human values and professional standards with soft- skills qualities in computer science and business disciplines and to emerge as an entrepreneur for the growth and development of the society.



PANIMALAR ENGINEERING COLLEGE, CHENNAI

(An Autonomous Institution, Affiliated to Anna University, Chennai)

B.Tech - COMPUTER SCIENCE AND BUSINESS SYSTEMS
CHOICE BASED CREDIT SYSTEM (CBCS)

I - VIII SEMESTERS CURRICULUM AND SYLLABI (REGULATION 2023)

Semester I							
S. No	COURSE CODE	COURSE TITLE	Category	L/T/P	Contact Hours	Credit	Ext / Int Weightage
Theory Courses							
1	23MA1103	Introductory Topics and Statistics, Probability and Calculus	BS	3/0/0	3	3	60/40
2	23ES1104	Fundamentals of Computer Science	ES	3/0/0	3	3	60/40
3	23HS1102	Business Communication and Value Science –I	HS	2/0/2	4	3	60/40
Theory Cum Practical Courses							
4	23PH1102	Physics for Computing Science	BS	2/0/2	4	3	50/50
5	23ES1105	Principles of Electrical Engineering	BS	2/0/2	4	3	50/50
6	23MA1102	Discrete Mathematics for Computer Science	BS	3/0/2	5	4	50/50
Laboratory Course							
7	23ES1112	Fundamentals of Computer Science Laboratory	ES	0/0/4	4	2	40/60
Mandatory Course							
8	23TA1101	தமிழர் மரபு / Heritage of Tamils	HS	1/0/0	1	1	60/40
TOTAL					28	22	

Semester II							
S. No	COURSE CODE	COURSE TITLE	Category	L/T/P	Contact Hours	Credit	Ext / Int Weightage
Theory Courses							
1	23CB1201	Data Structures and Algorithms	PC	3/0/0	3	3	60/40
2	23CB1202	Fundamental of Economics	PC	3/0/0	3	3	60/40
3	23HS1202	Business Communication and Value Science –II	HS	2/0/2	4	3	60/40
Theory Cum Practical Courses							
4	23EE1204	Principles of Electronics Engineering	ES	2/0/2	4	3	50/50
5	23MA1204	Linear Algebra	BS	3/0/2	5	4	50/50
6	23MA1205	Statistical Methods and Modelling	BS	3/0/2	5	4	50/50
Laboratory Courses							
7	23CB1211	Data Structures and Algorithms Laboratory	PC	0/0/4	4	2	40/60
8	23ES1212	Technical Skill Practices I	EEC	0/0/2	2	1	40/60
Mandatory Courses							
9	23TA1201	தமிழரும் தொழில்நுட்பமும் Tamils and Technology	HS	1/0/0	1	1	60/40
10	23MC1201	Environmental Science	MC	2/0/0	2	0	0/100
TOTAL					33	24	

23MA1103	INTRODUCTORY TOPICS IN STATISTICS, PROBABILITY AND CALCULUS	L	T	P	C
		3	0	0	3

COURSE OBJECTIVE

- Analyse the various data by different statistical sampling techniques
- Understand the basic concepts of probability and the distributions with characteristics of one and two dimensional random variables
- Develop enough confidence to identify and model mathematical patterns in real world and offer appropriate solutions, using the skills learned in their interactive and supporting environment

UNIT I

STATISTICS

9

Definition of Statistics. Basic COURSE OBJECTIVES, Applications in various branches of science with examples. Collection of Data: Internal and external data, Primary and secondary Data. Population and sample, Representative sample

UNIT II

DESCRIPTIVES STATISTICS

9

Classification and tabulation of univariate data, graphical representation, Frequency curves. Descriptive measures - central tendency and dispersion. Bivariate data. Summarization, marginal and conditional frequency distribution

UNIT III

PROBABILITY AND MOMENTS

9

Probability: Concept of experiments, sample space, event. Definition of Combinatorial Probability, Conditional Probability, Bayes Theorem. Expected values: moments, and their properties, Moment generating function

UNIT IV

PROBABILITY DISTRIBUTIONS

9

Discrete Probability distributions: Binomial, Poisson and Geometric distributions. Continuous Probability distributions: Uniform, Exponential, Normal distributions

UNIT V

CALCULUS

9

Basic concepts of Differential and integral calculus, application of double and triple integral

TOTAL :45 PERIODS

COURSE OUTCOME

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

- CO1** Demonstrate and apply the basic probability axioms and concepts in their core areas of random phenomena
- CO2** Execute the concepts of probability distributions in an appropriate place of science and Engineering
- CO3** Exemplify the basics concepts of statistics through various representations of data
- CO4** Analyze the various collections of data in science / engineering problems using statistical inference techniques
- CO5** Apply differential and integral calculus concepts to calculate the area and volume by appropriate vector integral theorems

TEXT BOOKS

- Introduction of Probability Models, S. M. Ross, Academic Press, N.Y, 1997.
- Fundamentals of Statistics, vol. I & II, A. Goon, M. Gupta and B. Dasgupta, World Press
- Higher Engineering Mathematics, B. S. Grewal, Khanna Publication, Delhi. 44th edition, 2018.

REFERENCE BOOKS

- A first course in Probability, S. M. Ross, Prentice Hall, 2010.
- Probability and Statistics for Engineers, (Fourth Edition), I. R. Miller, J.E. Freund and R. Johnson, PHI, 2023.
- Introduction to the Theory of Statistics, A. M. Mood, F.A. Graybill and D.C. Boes, McGraw Hill Education, 1974.
- Advanced Engineering Mathematics, (Seventh Edition), Peter V. O'Neil, Thomson Learning, 7th edition, 2012.

23ES1104	FUNDAMENTALS OF COMPUTER SCIENCE	L	T	P	C
		3	0	0	3

COURSE OBJECTIVE

- To develop simple algorithms for arithmetic and logical problems.
- To develop C Programs using basic programming constructs.
- To develop C programs using arrays and strings.
- To develop applications in C using functions, pointers and structures.
- To do input/output and file handling in C.
- To learn some basic Unix system interface.

UNIT - I GENERAL PROBLEM-SOLVING CONCEPTS AND IMPERATIVE LANGUAGE 9

Algorithm, and Flowchart for problem solving with Sequential Logic Structure, Decisions and Loops. Imperative languages: Introduction to imperative language; syntax and constructs of a specific language (ANSI C). Types Operator and Expressions with discussion of variable naming and Hungarian Notation: Variable Names, Data Type and Sizes (Little Endian Big Endian), Constants, Declarations.

UNIT - II TYPES OF OPERATOR, EXPRESSIONS AND CONTROL FLOW 9

Arithmetic Operators, Relational Operators, Logical Operators, Type Conversion, Increment and Decrement Operators, Bitwise Operators, Assignment Operators and Expressions, Precedence and Order of Evaluation proper variable naming and Hungarian Notation. If-Else-If, Switch, Loops – while, do, for, break and continue, goto Labels-structured and unstructured programming.

UNIT - III FUNCTIONS, ARRAYS AND POINTERS 9

Functions and Program Structure with discussion on standard library: Basics of functions, parameter passing and returning type, C main return as integer, External, Auto, Local, Static, Register Variables, Scope Rules, Block structure, Initialisation, Recursion, Pre-processor, Standard Library Functions and return types.

Pointers and Arrays: Pointers and address, Pointers and Function Arguments, Pointers and Arrays, Address Arithmetic, character Pointers and Functions, Pointer Arrays, Pointer to Pointer, Multi-dimensional array and Row/column major formats, Initialisation of Pointer Arrays, Command line arguments, Pointer to functions, complicated declarations and how they are evaluated.

UNIT -IV STRUCTURES, INPUT AND OUTPUT 9

Structures: Basic Structures, Structures and Functions, Array of structures, Pointer of structures, Self-referral structures, Table look up, typedef, unions, Bit-fields

Input and Output: Standard I/O, Formatted Output – printf, Formated Input – scanf, Variable length argument list, file access including FILE structure, fopen, stdin, sdtout and stderr, Error Handling including exit, perror and error.h, Line I/O, related miscellaneous functions

UNIT -V INTRODUCTION TO UNIX 9

Unix system Interface: File Descriptor, Low level I/O – read and write, open, create, close and unlink, Random access – lseek, Discussions on Listing Directory, Storage allocator.

TOTAL: 45 PERIODS

COURSE OUTCOME

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

- CO1** Ability to implement the algorithms and flow chart for solving Mathematical and Engineering problems
- CO2** Develop C programs for real world/technical application using basic constructs
- CO3** Explore the usage of arrays, pointers and functions in C.
- CO4** Implement Programs with structures and union in C.
- CO5** Design applications using sequential and random access file processing.
- CO6** Identify and use UNIX utilities to create and manage simple file processing operations, organize directory structures.

TEXT BOOKS

1. Herbert Schildt, C: The Complete Reference, Fourth Edition, , McGraw Hill, 2017
2. Paul Love, Joe Merlino, Craig Zimmerman, Jeremy C. Reed, and Paul Weinstein, Beginning Unix, Wiley Publishing, In, 2005
3. Reema Thareja, —Programming in C, Oxford University Press, Second Edition, 2016.

REFERENCE BOOKS

1. B. Gottfried, Programming in C, Third Edition, Schaum Outline Series, 2017
2. Kernighan, B.W and Ritchie,D.M, —The C Programming language, Second Edition, Pearson Education, 2006
3. W.Richard Stevens, Stephen A.Rago, Advanced Programming in the UNIX Environment, Addison-Wesley , 2013

CO-PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	2	1						2	2
CO2	3	2	2	1	1						2	2
CO3	1	1	2	2	2						1	1
CO4	1	1	2	2	2						1	1
CO5	2	2	3	2	1						2	1
CO6	1	1	2	1	1						1	1

23HS1102	BUSINESS COMMUNICATION AND VALUE SCIENCE – I	L	T	P	C
		2	0	2	3

COURSE OBJECTIVE

- Understand what life skills are and their importance in leading a happy and well-adjusted life.
- Motivate students to look within and create a better version of self.
- Understand and apply the key concepts of values of life skills and business communication.
- Improve the language proficiency of students in English with an emphasis on Vocabulary and Grammar.
- Improve the relevant technical writing skills necessary for Business Communication.

UNIT - I

HUMAN VALUES

6+6

Values – Self exploration – Values of individuals: Presentation on favourite personality and the skills and values they demonstrate – interviewing a maid, watchman, sweeper, cab driver, beggar and narrate what you think are the values that drive them

Writing: newspaper report on an IPL match – record conversation between a celebrity and an interviewer

UNIT - II

GRAMMAR AND LANGUAGE DEVELOPMENT

6+6

Parts of Speech - Applications of tenses - Sentence formation, sentence structure, show sequence - Voices – Questioning – Vocabulary

Word formation: - Synonyms, antonyms, abbreviations - compound words –single word substitution.

UNIT -III

ESSENTIALS OF TECHNICAL COMMUNICATION

6+6

Email -: Formal and informal emails - words from General Service List (GSL) by West, Academic word list (AWL) - technical specific terms related to the field of technology - phrases, idioms, significant abbreviations - formal business vocabulary.

UNIT -IV

BASIC WRITING SKILLS

6+6

Reading articles – Summary writing, story writing - **writing your comprehensive CV** -Create a podcast on a topic.

UNIT -V

APPLICATION OF LIFE SKILLS

6+6

Life Skills: Movie based learning – identifying skills and values - critical life skills - appreciation of diversity - **Community service** – work with an NGO and makes a presentation.

TOTAL: 60 PERIODS

COURSE OUTCOME

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

- CO1** Recognize the need for life skills and values
- CO2** Recognize own strengths and opportunities
- CO3** Apply the life skills to different situations
- CO4** Understand the basic tenets of communication
- CO5** To gain understanding of basic grammatical structures and use them in right context.
- CO6** Apply the basic communication practices in different types of communication

TEXT BOOKS

1. Alan McCarthy and O'dell, "English vocabulary in use", Cambridge.
2. Ashraf Rizvi. M, "Effective Technical Communication", Second Edition, McGraw Hill, New Delhi, 2018.
3. Dhanavel, S.P., "English and Communication Skills for Students of Science and Engineering", Orient Blackswan, Chennai, 2011
4. Dr. Alex K, Soft Skills, S. Chand Publications, New Delhi, 1997.
5. Dr.Saroj Hiremath, "Business Communication"

WEB REFERENCES

1. Train your mind to perform under pressure- Simon sinek
2. Brilliant way one CEO rallied his team in the middle of layoffs
3. Will Smith's Top Ten rules for success
4. APAART: Speak Well 1 (English language and communication)
5. APAART: Speak Well 2 (Soft Skills)

ONLINE RESOURCES

1. <https://www.coursera.org/learn/learning-how-to-learn>
2. <https://www.coursera.org/specializations/effective-business-communication>

CO-PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1								2	3	3		3
CO2								2	3	3		3
CO3								2	2	3		3
CO4									3	3		2
CO5									2	3		3
CO6									3	3		2

23PH1102	PHYSICS FOR COMPUTING SCIENCE	L	T	P	C
		2	0	2	3

COURSE OBJECTIVE

- Understand the characteristics of simple and damped harmonic motion and illustrate the interference, diffraction and polarization of light.
- Exemplify the dual nature of matter and apply the Schrodinger wave equation to determine the wave function of particle in one dimensional box and assess the crystallographic parameters of seven crystal systems
- Compare the different types of lasers based on pumping method, active medium and energy levels and analyze the laws of thermodynamics and different thermodynamic processes

UNIT - I

OSCILLATIONS

6

Periodic motion-simple harmonic motion-characteristics of simple harmonic motion- vibration of simple spring mass system. Resonance-definition. damped harmonic oscillator - heavy, critical and light damping, energy decay in a damped harmonic oscillator, quality factor, forced mechanical and electrical oscillators – analogy with LCR circuits and mechanical oscillation.

UNIT - II

INTERFERENCE-PRINCIPLE OF SUPERPOSITION -YOUNG'S EXPERIMENT

6

Theory of interference fringes-types of interference-Fresnel's prism-Newton's rings, Diffraction-Two kinds of diffraction-Difference between interference and diffraction- Fresnel's half period zone and zone plate-Fraunhofer diffraction at single slit-plane diffraction grating. Temporal and Spatial Coherence.

Polarization of light: Polarization - Concept of production of polarized beam of light from two SHM acting at right angle; plane, elliptical and circularly polarized light, Brewster's law, double refraction.

UNIT - III

BASIC IDEA OF ELECTROMAGNETISMS AND SEMICONDUCTOR PHYSICS

6

Basic Idea of Electromagnetisms: Continuity equation for current densities, Maxwell's equation in vacuum and non-conducting medium.

Semiconductor Physics: Conductor, Semiconductor and Insulator; Basic concept of Band theory.

UNIT -IV

LASER AND FIBER OPTICS

6

Einstein's theory of matter radiation interaction and A and B coefficients; amplification of light by population inversion, different types of lasers: Ruby Laser, CO₂ and Neodymium lasers; Properties of laser beams: monochromaticity, coherence, directionality and brightness, laser speckles, applications of lasers in engineering. Fiber optics and Applications, Types of optical fibers.

UNIT -V

THERMODYNAMICS

6

Zeroth law of thermodynamics, first law of thermodynamics, brief discussion on application of 1st law, second law of thermodynamics and concept of Engine, entropy, change in entropy in reversible and irreversible processes, third law of thermodynamics.

TOTAL: 30 PERIODS

LIST OF EXPERIEMENTS

1. Magnetic field along the axis of current carrying coil – Stewart and Gee
2. Determination of Hall coefficient of semi-conductor
3. Determination of Plank constant
4. Determination of wave length of light by Laser diffraction method
5. Determination of wave length of light by Newton's Ring method

6. Determination of laser and optical fiber parameters
7. Determination of Stefan's Constant.
8. Determination of thermal conductivity of a bad conductor – Lee's Disc method

TOTAL: 30 PERIODS

TEXT BOOKS

1. Ajoy Ghatak, Optics, 5th Ed., Tata McGraw Hill, 2012
2. Arthur Beiser, Shobhit Mahajan and S Rai Choudhury, Concepts of Modern Physics, 6th Edition, Tata McGraw Hill Education Pvt. Ltd., New Delhi, 2014
3. B. K. Pandey and S. Chaturvedi, Engineering Physics, 1st edition, Cengage Learning India Pvt Ltd., New Delhi, 2017
4. Halliday and Resnick, Fundamentals of Physics, 11 th edition, John Wiley and Sons, Inc, 2018
5. Basics of laser physics: for students of science and engineering
<http://www.springer.com/978-3-319-50650-0>

COURSE OUTCOME

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

- CO1** Explain the different types of harmonic oscillations and compare electrical oscillator with mechanical oscillator
- CO2** Illustrate the interference, diffraction and polarization of light in Newton'srings, diffraction grating and double refraction respectively
- CO3** Apply the concepts of quantum mechanics to solve the Schrodinger time dependent and time independent wave equations
- CO4** Assess the crystallographic parameters of seven crystal systems and compare the unit cell characteristics of SC, BCC, FCC and HCP crystal structures
- CO5** Outline the different types of lasers and compare the different types of optical fibers based on mode and refractive index profile for data communication system

CO-PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	1	1	1						
CO2	3	3	2	1	2	1						
CO3	3	3	2	2	2	1						
CO4	3	3	1	1	2	1						
CO5	3	3	1	1	2	1						

23ES1105	PRINCIPLES OF ELECTRICAL ENGINEERING	L	T	P	C
		2	0	2	3

COURSE OBJECTIVE

- To understand the basic concepts of electric circuits.
- To understand the basic concepts of magnetic circuits
- To identify the types of sensors and measure quantities in AC and DC systems

UNIT - I INTRODUCTION 6

Fundamental linear passive and active elements to their functional current-voltage relation, voltage source and current sources, ideal and practical sources, Kirchhoff's laws and applications to network solutions using mesh and nodal analysis. Concept of work, power, energy and conversion of energy.

UNIT - II BASIC NETWORK 6

Current voltage relations of electric network by mathematical equations to analyse the network (Thevenin's theorem, Norton's Theorem, Maximum Power Transfer theorem), Simplifications of networks using series- parallel, Star/Delta transformation. Superposition theorem.

UNIT - III CONCEPT OF AC 6

AC waveform definitions, form factor, peak factor, phasor representation in polar and rectangular form, concept of impedance, admittance, complex power, power factor, single phase and 3 phase concept.

UNIT - IV ELECTROSTATICS AND ELECTRO-MECHANICS 6

Electrostatic field, electric field strength, concept of permittivity in dielectrics, energy stored in capacitors, charging and discharging of capacitors, Electro Magnetism magnetic field and Faraday's law. Magnetic materials and B-H curve. self and mutual inductance, Ampere's law, Study of R-L, R-C, RLC series circuit, R-L-C parallel circuit, Electromechanical energy conversion.

UNIT - V MEASUREMENTS AND SENSORS 6

Measuring devices/sensors and transducers (Piezoelectric and thermo-couple) related to electrical signals, Elementary methods for the measurement of electrical quantities in DC and AC systems (Current & Single-phase power). Basic concept of indicating and integrating instruments
Practical considerations: Electrical Wiring types and accessories, Illumination system: Basic layout of the distribution system, Types of earthing, Safety devices & system. Battery principles and types.

TOTAL: 30 PERIODS

LIST OF EXPERIEMENTS

1. Familiarization of electrical circuits, sources, measuring devices and transducers.
2. Determination of resistance temperature coefficient
3. Verification of Network Theorem (Superposition, Thevenin, Norton, Maximum Power Transfer theorem)
4. Simulation of R-L-C series circuits for $X_L > X_C$, $X_L < X_C$
5. Simulation of Time response of RC circuit
6. Demonstration of measurement of electrical quantities in DC and AC systems.

TOTAL: 30 PERIODS

TEXT BOOKS

1. Electric Machinery, (Sixth Edition) A. E. Fitzgerald, Kingsely Jr Charles, D. Umans Stephen, Tata McGraw Hill, 2003
2. A Textbook of Electrical Technology, (vol. I), B. L. Theraja, Chand and Company Ltd., New Delhi 2014.
3. Basic Electrical Engineering, V. K. Mehta, S. Chand and Company Ltd., New Delhi.
4. Theory and problems of Basic Electrical Engineering, (Second Edition), J. Nagrath and Kothari, Prentice Hall of India Pvt. Ltd 2016.

REFERENCE BOOKS

1. T. K. Nagsarkar and M. S. Sukhija, Basic of Electrical Engineering, Oxford University Press, 2011.
2. Introduction to Electrodynamics, D. J. Griffiths, (Fourth Edition), Cambridge University Press 2012.
3. Engineering Circuit Analysis, William H. Hayt & Jack E. Kemmerly, McGraw-Hill Book Company Inc Eight Edition 2020.
4. Fundamentals of Electrical and Electronics Engineering, Smarjith Ghosh, Prentice Hall (India) Pvt. Ltd, Second Edition, 2007.

COURSE OUTCOME

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

- CO1** Understand the basic concepts and terminology of electrical quantities
CO2 Analyze the DC circuit using various network theorems
CO3 Analyze the electrical parameters of AC circuits with R-L-C elements
CO4 Analyze the Static and dynamic characteristics of Electro-static and Electromagnetic fields
CO5 Apply the concept of sensors in measurement of various electrical quantities

CO-PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2			1					1
CO2	3	3	2	2	2		1					1
CO3	3	3	2	2	2		1					1
CO4	3	3	2	2			1					1
CO5	3	2	2	2	2		1					1

23MA1102	DISCRETE MATHEMATICS FOR COMPUTER SCIENCE	L	T	P	C
		3	0	2	4

COURSE OBJECTIVE

- Understand the basic concepts of propositions by various discrete structure techniques
- Analyze the combinatorics techniques in solving the system by various methodology
- Apply the concepts of graph theory and logic in solving the real time engineering problem

UNIT I BOOLEAN ALGEBRA 9

Introduction of Boolean algebra, truth table, basic logic gate, basic postulates of Boolean algebra, principle of duality, canonical form, Karnaugh map.

UNIT II ABSTRACT ALGEBRA 9

Set, relation, group, ring, field.

UNIT III COMBINATORICS 9

Basic counting, balls and bins problems, generating functions, recurrence relations. Proof techniques, principle of mathematical induction, pigeonhole principle.

UNIT IV GRAPH THEORY 9

Graphs and digraphs, complement, isomorphism, connectedness and reachability, adjacency matrix, Eulerian paths and circuits in graphs and digraphs, Hamiltonian paths and circuits in graphs and tournaments, trees; Planar graphs, Euler's formula, dual of a planer graph, independence number and clique number, chromatic number, statement of Four-color theorem.

UNIT V LOGIC 9

Propositional calculus - propositions and connectives, syntax; Semantics - truth assignments and truth tables, validity and satisfiability, tautology; Adequate set of connectives; Equivalence and normal forms; Compactness and resolution; Formal reducibility - natural deduction system and axiom system; Soundness and completeness.

TOTAL:45 PERIODS

LIST OF EXPERIEMENTS

1. Write a program in C to Display the Boolean Truth Table for AND, OR , NOT
2. Write a C Program to find Cartesian Product of two sets
3. Practice of various set operations
4. Recursion and Induction
5. Implementation of a recursive counting technique
6. Write a program in C for minimum cost spanning tree.
7. Write a program in C for finding shortest path in a GraphNote.

TOTAL: 30 PERIODS

TEXT BOOKS

1. Topics in Algebra, I. N. Herstein, John Wiley and Sons second edition, 1975.
2. Digital Logic & Computer Design, M. Morris Mano, Pearson 2016.
3. Elements of Discrete Mathematics, (Second Edition) C. L. LiuMcGraw Hill, New Delhi, 2012.
4. Graph Theory with Applications, J. A. Bondy and U. S. R. Murty, Macmillan Press, London 1976.
5. Mathematical Logic for Computer Science, L. Zhongwan, World Scientific, Singapore, 1989.

REFERENCE BOOKS

1. Grimaldi, R.P. "Discrete and Combinatorial Mathematics: An Applied Introduction", 4thEdition, Pearson Education Asia, Delhi,2007.
2. Lipschutz, S. and Mark Lipson., "Discrete Mathematics", Schaum's Outlines, Tata McGraw Hill Pub. Co. Ltd., New Delhi, 3rdEdition, 2010.
3. Koshy, T. "Discrete Mathematics with Applications", Elsevier Publications, 2006.

COURSE OUTCOME

Upon successful completion of the course, the student will be able to

CO1 Understand the concepts and significance of lattices and boolean algebra.

CO2 Familiarize the applications of algebraic structures

23ES1112	FUNDAMENTALS OF COMPUTER SCIENCE LABORATORY	L	T	P	C
		0	0	4	2

COURSE OBJECTIVE

- To develop programs in C using basic constructs.
- To develop applications in C using arrays
- To develop applications in C using strings, pointers
- To develop applications in C using functions, structures
- To develop applications in C using file processing
- To build solutions for real world problems

LIST OF EXPERIMENTS

1. Algorithm and flowcharts of small problems like GCD
2. Structured code writing with:
 - i. Small but tricky codes
 - ii. Proper parameter passing
 - iii. Command line Arguments
 - iv. Variable parameter
 - v. Pointer to functions
 - vi. User defined header
 - vii. Make file utility
 - viii. Multi file program and user defined libraries
 - ix. Interesting substring matching / searching programs
 - x. Parsing related assignments
3. Mini Project

TOTAL: 60 PERIODS

COURSE OUTCOME

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

- CO1** Develop the use of the C programming language to implement various algorithms.
- CO2** Acquire decision making and looping concepts in C.
- CO3** Develop C programs using Array and Pointers.
- CO4** Ability to define structures, functions in solving real world problem
- CO5** Design applications using sequential and random access file processing
- CO6** Able to interpret real world problems into software solutions in C.

WEB REFERENCES

1. <https://www.programiz.com/C-programming/examples>
2. <https://www.geeksforgeeks.org/C-programming-examples/>
3. <https://beginnersbook.com/2018/02/C-programs/>
4. <https://www.javatpoint.com/C-programs>
5. <https://www.w3schools.com/C/C-examples.asp>
6. <https://www.includehelp.com/c-programs/c-programs-pointers-solvedexamples.asp>

CO-PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	2	1						2	2
CO2	3	2	2	1	1						2	2
CO3	1	1	2	2	2						1	1
CO4	1	1	2	2	2						1	1
CO5	2	2	3	2	1						2	1
CO6	1	1	2	1	1						1	1

23TA1101	HERITAGE OF TAMILS	L	T	P	C
		1	0	0	1

UNIT – I LANGUAGE AND LITERATURE 3

Language Families in India - Dravidian Languages – Tamil as a Classical Language - Classical Literature in Tamil – Secular Nature of Sangam Literature – Distributive Justice in Sangam Literature - Management Principles in Thirukural - Tamil Epics and Impact of Buddhism & Jainism in Tamil Land Bakthi Literature Azhwars and Nayanmars - Forms of minor Poetry - Development of Modern literature in Tamil - Contribution of Bharathiyar and Bharathidhasan.

UNIT – II HERITAGE - ROCK ART PAINTINGS TO MODERN ART – SCULPTURE 3

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 - Mridhangam, Parai, Veenai, Yazh and Nadhaswaram - Role of Temples in Social and Economic Life of Tamils.

UNIT – III FOLK AND MARTIAL ARTS 3

Therukoothu, Karagattam, Villu Pattu, Kaniyan Koothu, Oyillattam, Leather puppetry, Silambattam, Valari, Tiger dance - Sports and Games of Tamils.

UNIT –IV THINAI CONCEPT OF TAMILS 3

Flora and Fauna of Tamils & Aham and Puram Concept from Tholkappiyam 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.

UNIT –V CONTRIBUTION OF TAMILS TO INDIAN NATIONAL MOVEMENT AND INDIAN CULTURE 3

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 Systems of Medicine – Inscriptions & Manuscripts – Print History of Tamil Books

Total : 15 PERIODS

TEXT-CUM REFERENCE BOOKS:

1. தமிழக வரலாறு - மக்களும் பண்பாடும் - கே.கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணினித் தமிழ் - முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்).
3. கீழடி - வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
4. பொருறை - ஆற்றங்கரை நாகரிகம். (தொல்லியல் துறை)
5. Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
6. Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies)
7. Historical by: International Institute of Tamil Studies).
8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)

9. Keeladi - 'Sangam City Civilization on the banks of river Vaigai' (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by: The Author)
11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book

23TA1101	தமிழர் மரபு	L	T	P	C
		1	0	0	1

UNIT – I

மொழி மற்றும் இலக்கியம்

3

இந்திய மொழிக் குடும்பங்கள் - திராவிட மொழிகள் - தமிழ் ஒரு செம்மொழி - தமிழ் செவ்விலக்கியங்கள் - சங்க இலக்கியத்தின் சமய சார்பற்ற தன்மை - சங்க இலக்கியத்தில் பகிர்தல் அறம் - திருக்குறளில் மேலாண்மைக் கருத்துக்கள் - தமிழ் காப்பியங்கள், தமிழகத்தில் சமண பௌத்த சமயங்களின் தாக்கம் - பக்தி இலக்கியம், ஆழ்வார்கள் மற்றும் நாயன்மார்கள் - சிற்றிலக்கியங்கள் - தமிழில் நவீன இலக்கியத்தின் வளர்ச்சி - தமிழ் இலக்கிய வளர்ச்சியில் பாரதியார் மற்றும் பாரதிதாசன் ஆகியோரின் பங்களிப்பு.

UNIT – II

மரபு - பாறை ஓவியங்கள் முதல் நவீன ஓவியங்கள் வரை - சிற்பக் கலை

3

நடுகல் முதல் நவீன சிற்பங்கள் வரை - ஐம்பொன் சிலைகள் - பழங்குடியினர் மற்றும் அவர்கள் தயாரிக்கும் கைவினைப் பொருட்கள், பொம்மைகள் - தேர் செய்யும் கலை - சுடுமண் சிற்பங்கள் - நாட்டுப்புறத் தெய்வங்கள் - குமரிமுனையில் திருவள்ளுவர் சிலை - இசைக்கருவிகள் - மிருதங்கம், பறை, வீணை, யாழ், நாதஸ்வரம் - தமிழர்களின் சமூக பொருளாதார வாழ்வில் கோவில்களின் பங்கு.

UNIT – III

நாட்டுப்புறக் கலைகள் மற்றும் வீர விளையாட்டுகள்

3

தெருக்கூத்து, கரகாட்டம், வில்லுப்பாட்டு, கணியான் கூத்து, ஓயிலாட்டம், தோல்பாவைக் கூத்து, சிலம்பாட்டம், வளரி, புலியாட்டம், தமிழர்களின் விளையாட்டுகள்.

UNIT –IV

தமிழர்களின் திணைக் கோட்பாடுகள்

3

தமிழகத்தின் தாவரங்களும், விலங்குகளும் - தொல்காப்பியம் மற்றும் சங்க இலக்கியத்தில் அகம் மற்றும் புறக் கோட்பாடுகள் - தமிழர்கள் போற்றிய அறக்கோட்பாடு - சங்ககாலத்தில் தமிழகத்தில் எழுத்தறிவும், கல்வியும் - சங்ககால நகரங்களும் துறை முகங்களும் - சங்ககாலத்தில் ஏற்றுமதி மற்றும் இறக்குமதி - கடல் கடந்த நாடுகளில் சோழர்களின் வெற்றி.

UNIT –V

இந்திய தேசிய இயக்கம் மற்றும் இந்திய பண்பாட்டிற்குத் தமிழர்களின் பங்களிப்பு

3

இந்திய விடுதலைப் போரில் தமிழர்களின் பங்கு - இந்தியாவின் பிறப்பகுதிகளில் தமிழ்ப் பண்பாட்டின் தாக்கம் - சுயமரியாதை இயக்கம் - இந்திய மருத்துவத்தில், சித்த மருத்துவத்தின் பங்கு - கல்வெட்டுகள், கையெழுத்துப்படிக்கள் - தமிழ்ப் புத்தகங்களின் அச்ச வரலாறு.

Total : 15 PERIODS

TEXT-CUM REFERENCE BOOKS:

1. தமிழக வரலாறு - மக்களும் பண்பாடும் - கே.கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).

2. கணினித் தமிழ் – முனைவர். இல. சந்திரம். (விகடன் பிரசுரம்).
3. கீழடி - வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
4. பொருறை - ஆற்றங்கரை நாகரிகம். (தொல்லியல் துறை)
5. Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
6. Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies)
7. Historical by: International Institute of Tamil Studies).
8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
9. Keeladi - 'Sangam City Civilization on the banks of river Vaigai' (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by: The Author)
11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book

23CB1201	DATA STRUCTURES AND ALGORITHMS	L	T	P	C
		3	0	0	3

COURSE OBJECTIVE

- Understand the basics of abstract data types
- Impart knowledge about the principles of linear and nonlinear data structures
- Build an application using sorting and searching

UNIT - I BASIC TERMINOLOGIES AND INTRODUCTION TO ALGORITHM & DATA ORGANISATION 9

Algorithm specification, Recursion, Performance analysis, Asymptotic Notation - The Big-O, Omega and Theta notation, Programming Style, Refinement of Coding - Time-Space Trade Off, Testing, Data Abstraction

UNIT - II LINEAR DATA STRUCTURE 9

Array, Stack, Queue, Linked-list and its types, Various Representations, Operations & Applications of Linear Data Structures

UNIT - III NON-LINEAR DATA STRUCTURE 9

Trees (Binary Tree, Threaded Binary Tree, Binary Search Tree, B & B+ Tree, AVL Tree, Splay Tree) and Graphs (Directed, Undirected), Various Representations, Operations & Applications of Non-Linear Data Structures

UNIT -IV SEARCHING AND SORTING ON VARIOUS DATA STRUCTURES 9

Sequential Search, Binary Search, Comparison Trees, Breadth First Search, Depth First Search Insertion Sort, Selection Sort, Shell Sort, Divide and Conquer Sort, Merge Sort, Quick Sort, Heap sort, Introduction to Hashing

UNIT -V FILE AND GRAPH 9

Organisation (Sequential, Direct, Indexed Sequential, Hashed) and various types of accessing schemes.

Basic Terminologies and Representations, Graph search and traversal algorithms and complexity analysis

TOTAL: 45 PERIODS

COURSE OUTCOME

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

- CO1** Explore the basics of data structures and algorithm analysis.
- CO2** Demonstrate the concept of non- linear data structures
- CO3** Demonstrate the concept of non- linear data structures.
- CO4** Design algorithms for various searching and sorting techniques.
- CO5** Exemplify the concept of files and its operations
- CO6** Explain the concept of graph and its operations

TEXT BOOKS

1. Fundamentals of Data Structures in C, E. Horowitz, S. Sahni, S. A-Freed, Universities Press, 2012.
2. Data Structures and Algorithms, A. V.Aho, J. E.Hopperoft, J. D.Ullman, Pearson, 1985
3. Data Structure and Algorithm through C, Brijesh Bakariya, BPB Publication, 2018

REFERENCE BOOKS

1. The Art of Computer Programming: Volume 1: Fundamental Algorithms, Donald E. Knuth, 1997.
2. Introduction to Algorithms, Thomas, H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, The MIT Press, Fourth Edition 2022..

3. Open Data Structures: An Introduction (Open Paths to Enriched Learning), (Thirty First Edition), Pat Morin, UBC Press, 2013.

CO-PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	3	2						2	1
CO2	2	3	1	2	2						1	1
CO3	1	2	1	2	2						1	1
CO4	1	3	1	2	2						1	1
CO5	3	1		3	2						1	1
CO6	2	2	1	1	1						1	1

23CB1202	FUNDAMENTALS OF ECONOMICS	L	T	P	C
		3	0	0	3

COURSE OBJECTIVE

- To explain the fundamental principles of micro economics relevant to managing an organization.
- To understand the efficiency and equity implications of market interference, including government policy.
- To describe the fundamental principles of macroeconomics to have the understanding of economic environment of business.
- To understand the various aspects of India's economy

UNIT I INTRODUCTION 9

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)

UNIT II CONSUMER ANALYSIS 9

Welfare Analysis- Consumers' and Producers' Surplus - Price Ceilings and Price Floors; Consumer Behavior - 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

UNIT III PRODUCTION AND COSTING 9

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

UNIT IV MACROECONOMIC REFORMS 9

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; External Sector- Exports and Imports; Money- Definitions; Demand for Money- Transactionary and Speculative Demand; Supply of Money- Bank's Credit Creation Multiplier; Integrating Money and Commodity Markets- IS, LM Model

UNIT V POLICY GOVERNANCE 9

Business Cycles and Stabilization- Monetary and Fiscal Policy - Central Bank and the Government; The Classical Paradigm- Price and Wage Rigidities - Voluntary and Involuntary Unemployment

TOTAL: 45 PERIODS

COURSE OUTCOME

Upon Completion of the course, the students will be able to

- CO1** Understand the links between household behavior and the economic models of demand.
- CO2** Understand government policies and programs.
- CO3** Understand about approaches to consumer behaviour and relation between production and cost function
- CO4** Describe and discuss on interaction of product and factor market
- CO5** Get awareness about importance and development of Indian economy and economic reforms

CO6 Have thorough knowledge in the areas of inflation, unemployment, monetary policy, fiscal policy and international trade

TEXT BOOKS

1. Pindyck, Robert S., and Daniel L. Rubinfeld, "Microeconomics", 7th edition Pearson 2009
2. Dornbusch, Fischer and Startz," Macroeconomics", 12th edition McGraw Hill,2018
3. Paul Anthony Samuelson, William D. Nordhaus, "Economics", 19th edition, McGraw Hill,2009

REFERENCE BOOKS

1. Hal R, Varian, "Intermediate Microeconomics: A Modern Approach", 8th edition,2009
2. N. Gregory Mankiw, "Principles of Macroeconomics", 6th edition, Cengage India, 2008

CO-PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1						2		3	3	3	1	1
CO2						1		3				
CO3						1		2	3			
CO4						1		2	2			
CO5						2						
CO6								2	3		1	1

23HS1202	BUSINESS COMMUNICATION AND VALUE SCIENCE – II	L	T	P	C
		2	0	2	3

COURSE OBJECTIVE

- Develop effective writing, reading, presentation and group discussion skills.
- Help students identify personality traits and evolve as a better team player.
- Introduce them to key concepts of a) Morality b) Behavior and beliefs c) Diversity & Inclusion
- Facilitate students to broaden the writing skills in business communication
- Impart essentials life skills for professional and personal development

UNIT - I MECHANICS OF WRITING 6+3

Listening: social issues, causes and findings

Speaking: Icebreaker - Participating in „Join Hands Movement“ - Individual identification of social issues – addressing social issues.

Reading: Research Reports based on social issues

Writing: Good and bad writing - Common errors, punctuation rules, use of words - writing techniques of Catherine Morris and Joanie McMahon’s .

Group Activity: contribute articles to the magazine – Quiz Time

UNIT - II LAUNCHING E MAGAZINE 6+3

Listening: Listen to interactive e-magazines and presentations

Speaking: Introduction to basic presentation skills & ORAL app - Groups to present their ideas about e-magazine and share their findings

Reading: Introduction to skimming and scanning, speed reading techniques.

Writing: create vision, mission, value statement, and tagline and design a logo- individual write up for E- magazine and evaluation - preparation and publication of E-Magazine.

Group Activity: Plan & Design an e- magazine as a group - SATORI– Join the dots - Quiz Time

UNIT - III TEAM PLAY 6+3

Listening: Ad campaign - Brain storming session

Speaking: discussing and exploring the means of articulating and amplifying social issues

Reading: Articles on Team Building – secrets of team work

Writing: Berbin’s 8 Team roles and Lindgren’s big 5 personality traits

Group Activity: Designing skits: write the script - Promote the play through social media and gather audience - Enact the play- SATORI joining dots - Quiz Time

UNIT -IV DIVERSITY AND INCLUSION 6+3

Listening: Video recorded interviews of people from diverse groups -Touch the target, film: “The Fish and I” by Babak Habibifar - Learn from movies - film on diversity – discussion on key take away of the film - Theory to connect and concept of empathy.

Speaking: narration of story in first person - Feedbacks by other groups- Debate on diversity with an angle of ethics, morality and respect for individual. Prepared speech

Reading: Comprehension passages on diversity and human values

Writing: Write a review in a blog about their research on a book, incident or film - Diversity & Inclusion - Different forms of Diversityin our society.

Group Activity: Create story – a person's life affected by the social issue –Discussion on TCS values, Respect for Individual and Integrity. SATORI and Quiz Time.

UNIT -V

ORGANIZING AWARENESS CAMPAIGN

6+3

Listening: Listening to various activities by NGOs

Speaking: Creating awareness on social welfare programs

Reading: Articles and reports about activities of different NGOs

Writing: Draft your resume - Include your recent achievements in your resume.

Group Activity:

Project-

- 1) Each team to look for an NGO/ social group in the city which is working on the issue their college group is supporting.
- 2) Spend a day with the NGO/ social group to understand exactly how they work and the challenges they face.
- 3) Render voluntary service to the group for one day
- 4) Invite the NGO/ social group to address their university students for couple of hours. Plan the entire event, decide a suitable venue in the university, gather audience, invite faculty members etc. (they need to get their plan ratified their professor). COURSE OUTCOME-- Host an interactive session with the NGO spokesperson
- 5) The groups to present their experience of a day with the NGO and inspire students to work for the cause.

TOTAL: 45 PERIODS

COURSE OUTCOME

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

CO1 Understand and use tools of structured written communication

CO2 Develop materials to create an identity for an organization dedicated to a social cause

CO3 Identify individual personality types and role in a team.

CO4 Understand the basic concepts of Morality and Diversity

CO5 Gain confidence to communicate effectively in various situations to acquire employability skills.

CO6 Organize an event to generate awareness and get support for a cause

TEXT BOOKS

1. Dr. A.P.J Abdul Kalam, ArunTiwari, "Guiding Souls : Dialogues on the purpose of life",2005. 2 3 4 5 6 7
2. Dr. A.P.J Abdul Kalam, AcharyaMahapragya , "The Family and the Nation", 2015.
3. Dr. A.P.J Abdul Kalam, Y.S.Rajan, " The Scientific India: A twenty First Century Guide to the World around Us",2011.

REFERENCE BOOKS

1. Dr. A.P.J Abdul Kalam , "Forge Your Future: Candid, Fortright, Inspiring" ,2014
2. Peter H. Diamandis and Steven Kotler, "Abundance: The Future is Better Than You Think", 2012.
3. Simon Sinek , "Start With Why: How Great Leaders Inspire Everyone to Take Action", Penguin,2011.
4. Sandra Moriarty, Nancy D. Mitchell, William D. Wells," Advertising & IMC: Principles and Practice", Pearson Education India,2016

WEB REFERENCES

1. Ethics Fundamentals and approaches to ethics, <https://www.eolss.net/Sample-chapters/C14/E1-37-01-00.pdf>
2. A Framework for Making Ethical decisions <https://www.brown.edu/academics/science-and-technologystudies/framework-makingethical-decisions>.
3. Five Basic Approaches to Ethical Decision http://faculty.winthrop.edu/meelerd/docs/rolos/5_Ethical_Approaches.pdf

ONLINE RESOURCES

1. <https://youtu.be/CsaTslhSDI>
2. https://m.youtube.com/watch?feature=youtu.be&v=IIKvV8_T95M
3. <https://m.youtube.com/watch?feature=youtu.be&v=e80BbX05D7Y>

4. <https://m.youtube.com/watch?v=7sLLEdBgYYY&feature=youtu.be>

CO-PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1									3	3		3
CO2								2	2	2		2
CO3									3	3		3
CO4								2	2	2		2
CO5									3	3		3
CO6								2	2	3		2

23EE1204	PRINCIPLES OF ELECTRONICS ENGINEERING	L	T	P	C
		2	0	2	3

COURSE OBJECTIVE

- Understand about current, voltage and power, basic laws in circuits.
- Understand about semiconductor materials and its application
- Understand working principal of BJT and FET
- Understand about Integrated circuit and its application
- Understand about the fundamentals of Electronics and its applications.

UNIT - I INTRODUCTORY IDEA OF SEMICONDUCTORS 6

Formation of P-N junction, energy band diagram, built-in-potential, forward and reverse biased P-N junction, formation of depletion zone. Formation of PNP / NPN junctions, energy band diagram. Crystalline material: Mechanical properties, Energy band theory, Fermi levels; Conductors, Semiconductors & Insulators: electrical properties, band diagrams. Semiconductors: intrinsic & extrinsic, energy band diagram, P&N-type semiconductors, drift & diffusion carriers.

UNIT - II DIODES AND DIODE CIRCUITS 6

V-I characteristics, Zener breakdown, Avalanche breakdown and its reverse characteristics; Junction capacitance and Varactor diode. Simple diode circuits, load line, linear piecewise model; Rectifier circuits: half wave, full wave, PIV, DC voltage and current, ripple factor, efficiency, idea of regulation

UNIT - III TRANSISTORS AND TRANSISTOR CIRCUITS 6

Transistor mechanism and principle of transistors, CE, CB, CC configuration, transistor characteristics: cut-off active and saturation mode. Concept of Field Effect Transistors (channel width modulation), Gate isolation types, JFET Structure and characteristics, MOSFET Structure and characteristics, depletion and enhancement type; CS, CG, CD configurations; CMOS: Basic Principles

transistor action, injection efficiency, base transport factor and current amplification factors for CB and CE modes. Biasing and Bias stability: calculation of stability factor

UNIT -IV OPERATIONAL AMPLIFIER BASICS 6

Introduction to integrated circuits, operational amplified and its terminal properties; Application of operational amplifier; inverting and non-inverting mode of operation, Proportional, Integral, Derivative circuits

UNIT -V BASIC IDEAS OF DIGITAL ELECTRONICS 6

Basic idea of switching circuit, Realization of Logic gates, multiplexers and demultiplexers, Flip flop, Registers and Counters

TOTAL: 30 PERIODS

LIST OF EXPERIMENTS

1. To plot V-I characteristics of PN junction diode.
2. To plot regulation characteristics of half wave rectifier
3. To plot regulation characteristics of Full wave rectifier
4. To plot input-output characteristics of CE configuration of BJT.
5. To study Biasing techniques of BJT- to find stability factor of self-bias, collector to base bias, fixed bias circuits.
6. To plot frequency response of single stage FET amplifier (CS/CD configuration) and find its bandwidth.
7. To study Colpitts Oscillator.
8. Study of OP-AMP circuits: Inverting and Non-inverting Amplifier
9. Study of basic logic gates and De-Morgan's Theorem

- Study of half adder and full adder.

TOTAL: 30 PERIODS

TEXT BOOKS

- William Hayt, J. Van Valkenburg, Kenneth C. Smith, Engineering Circuits Analysis, Tata Graw-Hill, 2013
- L. Robert Boylestad, Louis Nashelsky, "Electronic Devices and Circuit Theory" Pearson Education, 2012.
- J. Millman, C. Halkias & Satyabrata Jit "Electronic Devices and Circuits", Tata McGraw-Hill, 2010
- Microelectronics Circuits, Adel S. Sedra and Kenneth Carless Smith, Oxford University Press, 2019.

REFERENCE BOOKS

- Ramakant A. Gayakwad, OP-AMP and Linear IC's, Prentice Hall of India, 2002.
- Thomas L. Floyd, Digital Fundamentals, Prentice Hall, 11th Edition, 2015.
- Millman's Integrated Electronics, Jacob Millman, Christos Halkias, Chetan Parikh, McGraw Hill Education, 2001.
- Digital Logic & Computer Design, M. Morris Mano, Pearson, second edition, 2012.

COURSE OUTCOME

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

- CO1** Apply Voltage-Current laws and transformation techniques to solve linear electric circuits.
- CO2** Apply the diodes in rectifier and regulator applications and also analyze its characteristics.
- CO3** Explain the working of Bipolar Junction and Field Effect Transistors with different configurations and also analyze their characteristics.
- CO4** Illustrate the working of analog IC with different configurations and its applications
- CO5** Simplification of Boolean expressions using K-map and implementation of combinational & sequential circuits

CO-PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	2				1				1
CO2	3	3	2	2				1				1
CO3	3	3	2	2				1				1
CO4	3	3	2	2				1				1
CO5	3	3	3	3	2			1				1

23MA1204	LINEAR ALGEBRA	L	T	P	C
		3	0	2	4

COURSE OBJECTIVE

- To gain knowledge in using matrix algebra techniques to solve system of linear equations.
- To understand the concept of vector spaces to use in the principal component analysis

UNIT I MATRICES AND DETERMINANTS 9
Introduction to Matrices and Determinants; Solution of Linear Equations; Cramer's rule; Inverse of a Matrix.

UNIT II APPLICATION OF MATRICES 9
Vectors and linear combinations; Rank of a matrix; Gaussian elimination; LU Decomposition; Solving Systems of Linear Equations using the tools of Matrices.

UNIT III VECTOR SPACE 9
Dimension; Basis; Orthogonality; Projections; Gram-Schmidt orthogonalization and QR decomposition.

UNIT IV EIGEN VALUES AND EIGEN VECTORS 9
Positive definite matrices; Linear transformations; Hermitian and Unitary matrices.

UNIT V PRINCIPAL COMPONENT ANALYSIS 9
Singular value decomposition and Principal component analysis (Non-credit and optional); Introduction to their applications in Image Processing and Machine Learning (one or two classes).

TOTAL: 45 PERIODS

LIST OF EXPERIMENTS

1. Write a program which demonstrate the following
 - I. Addition of two complex numbers.
 - II. Displaying the conjugate of a complex number.
 - III. Plotting a set of complex numbers.
 - IV. Creating a new plot by rotating the given number by a degree 90, 180, 270 degrees and also by scaling b a number $a=1/2$, $a=1/3$, $a=2$ etc.
2. Write a program to do the following
 - I. Enter a vector u as a n-list.
 - II. Enter another vector v as a n-list.
 - III. Find the vector $au +bv$ for different values of a and b.
 - IV. Find the dot product of u and v
3. Write a program to do the following
 - I. Enter an r by c matrix M(r and c being positive integers).
 - II. Display M in matrix format.
 - III. Display the row and columns of the matrix M.
 - IV. Find the scalar multiplication of M for a given scalar.
 - V. Find the transpose of the matrix M
4. Write a program to do the following
 - I. Find the vector-matrix multiplication of a r by c matrix M with an c- vector u.
 - II. Find the matrix- matrix product of M with a c by p matrix N.
5. Write a program to do the following
 - I. Enter a vector b and find the projection of b orthogonal to a given vector u.
 - II. Find the projection of b orthogonal to a set of given vectors.

TOTAL: 30 PERIODS

TEXT BOOKS

1. Higher Engineering Mathematics, B. S. Grewal, Khanna Publishers.

REFERENCE BOOKS

23MA1205	STATISTICAL METHODS AND MODELLING	L	T	P	C
		3	0	2	4

COURSE OBJECTIVE

- To gain knowledge of sampling techniques and use testing of hypothesis for parameter estimation.
- To understand the use of statistical models for forecasting
- To gain the knowledge of using R programming in simulation and modelling

UNIT-I SAMPLING AND ESTIMATION THEORY 9

Random sampling. Sampling from finite and infinite populations. Estimates and standard error (sampling with replacement and sampling without replacement), Sampling distribution of sample mean, stratified random sampling - Point estimation, criteria for good estimates (un-biasedness, consistency), Methods of estimation including maximum likelihood estimation. Concept & examples, complete sufficiency, their application in estimation

UNIT-II LINEAR STATISTICAL MODELS 9

Scatter diagram. Linear regression and correlation. Least squares method. Rank correlation. Multiple regression & multiple correlation, Analysis of variance (one way, two way with as well as without interaction).

UNIT-III TEST OF HYPOTHESIS 9

Concept & formulation, Type I and Type II errors, Neyman Pearson lemma, Procedures of testing .Non-parametric Inference: Comparison with parametric inference, Use of order statistics.

UNIT-IV NON-PARAMETRIC INFERENCE 9

Sign test, Wilcoxon signed rank test, Mann-Whitney test, Run test, Kolmogorov-Smirnov test. Spearman's and Kendall's test. Tolerance region.

UNIT-V BASICS OF TIME SERIES ANALYSIS & FORECASTING 9

. Stationary, ARIMA Models: Identification, Estimation and Forecasting.

TOTAL: 45 PERIODS

LIST OF EXPERIMENTS

1. Introduction to R, Functions, Control flow and Loops
2. Working with Vectors and Matrices
3. Reading in and Writing Data
4. Working with Data
5. Manipulating Data
6. Simulation
7. Linear model
8. Data Frame
9. Graphics in R

TOTAL: 30 PERIODS

TEXT BOOKS

1. Probability and Statistics for Engineers (9th Edition), I.R. Miller, J.E. Freund and R. Johnson, 2023.
2. Fundamentals of Statistics (Vol. I & Vol. II), A. Goon, M. Gupta and B.Dasgupta, 8th edition 2002.
3. The Analysis of Time Series: An Introduction, Chris Chatfield, 7th edition 2019.

REFERENCE BOOKS

1. Introduction to Linear Regression Analysis, D.C. Montgomery & E. Peck, 2006
2. Introduction to the Theory of Statistics, A.M. Mood, F.A. Graybill & D.C. Boes, 2017

23CB1211	DATA STRUCTURES AND ALGORITHMS LABORATORY	L	T	P	C
		0	0	4	2

COURSE OBJECTIVE

- To provide the knowledge of basic data structures and their implementations.
- To understand the Linear data structures
- To be aware of the Non Linear data structures
- To solve problems using data structures binary search trees, and graphs and writing programs for these solutions.
- To efficiently implement the different data structures and solutions for specific problems.

LIST OF EXPERIMENTS

1. Stack using array
2. Queue using array
3. Towers of Hanoi using user defined stacks.
4. Singly Linked List
5. Stack using Linked List
6. Queue using Linked List
7. Reading, writing, and addition of polynomials.
8. Line editors with line count, word count showing on the screen.
9. Trees with all operations.
10. Binary Search Tree
11. Breadth First Search
12. Depth First Search
13. Reading the data from file using file operation
14. Writing the data into file using file operation
15. Mini Project

TOTAL: 60 PERIODS

COURSE OUTCOME

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

- CO1** Implement linear data structure such as stacks, queues and linked lists
- CO2** Apply linear data structure applications.
- CO3** Execute Non-linear data structure applications.
- CO4** Realize basic operations on binary trees
- CO5** Demonstrate the representation and traversal techniques of graphs and their applications
- CO6** Demonstrate the file concepts using file operations

WEB REFERENCES:

1. <https://www.geeksforgeeks.org/data-structures/>
2. <https://www.javatpoint.com/data-structure-tutorial>
3. <https://www.programiz.com/dsa/data-structure-types>

CO-PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	3	2						2	1
CO2	2	3	1	2	2						1	1
CO3	1	2	1	2	2						1	1
CO4	1	3	1	2	2						1	1
CO5	3	1		3	2						1	1
CO6	2	2	1	1	1						1	1

23ES1212	TECHNICAL SKILL PRACTICES - I	L	T	P	C
		0	0	2	1

COURSE OBJECTIVE

- To impart essential problem solving skills through general problem solving concepts.
- To provide basic knowledge on programming essentials using C as implementation tool.
- To introduce various programming methods using C.

LIST OF EXPERIMENTS

1. Data Types, Variables, Operators
2. Expressions, Precedence , Operators
3. Conditional Statements , Switch Statements
4. Looping, Nested Loops
5. Problems on Bit Manipulation
6. Patterns
7. Number Problems
8. Array Basics , Static vs Dynamic Array, Two Dimensional Matrix
9. Structure , Union ,Storage Classes
10. Function , Parameters passing
11. Recursion
12. Strings
13. Pointers
14. Command Line Arguments, Pre-processors
15. File Handling & Exception Handling.

TOTAL: 30 PERIODS

COURSE OUTCOME

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

- CO1** Propose solutions for a given problem.
- CO2** Infer the fundamental programming elements in C language and learn to apply basic control structures in C.
- CO3** Demonstrate the applications of structures and unions.
- CO4** Visualize the capabilities of modular programming approach in C.
- CO5** Understand the basic principles of pointers and their association during implementations.
- CO6** Apply various input, output and error handling functions in C.

TEXT BOOKS

1. Reema Thareja, ``Programming in C'', 2nd edition, OXFORD University Press, New Delhi, 2019.
2. Paul Deitel and Harvey Deitel, "C How to Program", Seventh edition, Pearson Publication,2016.

REFERENCE BOOKS

1. Stephen G. Kochan, "Programming in C", 3rd edition, Pearson Education, 2014.
2. Herbert Schildt, "C: The Complete Reference", Fourth Edition, McGraw Hill, 2000.

ONLINE COURSES / RESOURCES:

1. <https://www.javatpoint.com/c-programming-language-tutorial>
2. <https://www.tutorialspoint.com/cprogramming/>

3. <https://nptel.ac.in/Courses/>

CO-PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	3							3
CO2	3	3	3	3	3							3
CO3	3	3	3	3	3							3
CO4	3	3	3	3	3							3
CO5	3	3	3	3	3							3
CO6	3	3	3	3	3							3

23TA1201	TAMILS AND TECHNOLOGY	L	T	P	C
		1	0	0	1

UNIT – I WEAVING AND CERAMIC TECHNOLOGY 3

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

UNIT – II DESIGN AND CONSTRUCTION TECHNOLOGY 3

Designing and Structural construction House & Designs in household materials during Sangam Age - Building materials and Hero stones of 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 Houses, Indo - Saracenic architecture at Madras during British Period.

UNIT – III MANUFACTURING TECHNOLOGY 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 - Gem stone types described in Silappathikaram.

UNIT –IV AGRICULTURE AND IRRIGATION TECHNOLOGY 3

Dam, Tank, ponds, Sluice, Significance of Kumizhi Thoempu of Chola Period, Animal Husbandry - Wells designed for cattle use - Agriculture and Agro Processing - Knowledge of Sea - Fisheries — Pearl - Conche diving - Ancient Knowledge of Ocean - Knowledge Specific Society.

UNIT –V SCIENTIFIC TAMIL & TAMIL COMPUTING 3

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

Total : 15 PERIODS

TEXT-CUM REFERENCE BOOKS:

1. தமிழக வரலாறு - மக்களும் பண்பாடும் - கே.கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணினித் தமிழ் - முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்).
3. கீழடி - வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
4. பொருறை - ஆற்றங்கரை நாகரிகம். (தொல்லியல் துறை)
5. Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu)(Published Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
6. Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: InternationalInstitute of Tamil Studies
7. Historical by: International Institute of Tamil Studies).
8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)

9. Keeladi - 'Sangam City Civilization on the banks of river Vaigai' (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by: The Author)
11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book

23TA1201	தமிழரும் தொழில்நுட்பமும்	L	T	P	C
		1	0	0	1

UNIT – I நெசவு மற்றும் பானைத் தொழில்நுட்பம் 3

சங்க காலத்தில் நெசவுத் தொழில் - பானைத் தொழில்நுட்பம் - கருப்பு சிவப்பு பாண்டங்கள் - பாண்டங்களில் கீறல் குறியீடுகள்.

UNIT – II வடிவமைப்பு மற்றும் கட்டிடத் தொழில்நுட்பம் 3

சங்க காலத்தில் வடிவமைப்பு மற்றும் கட்டுமானங்கள் & சங்க காலத்தில் வீட்டுப் பொருட்களில் வடிவமைப்பு - சங்க காலத்தில் கட்டுமானப் பொருட்களும் நடுகல்லும் - சிலப்பதிகாரத்தில் மேடை அமைப்பு பற்றிய விவரங்கள் - மாமல்லபுரச் சிற்பங்களும், கோவில்களும் - சோழர் காலத்துப் பெருங்கோயில்கள் மற்றும் பிற வழிபாட்டுத் தலங்கள் - நாயக்கர் காலக் கோயில்கள் - மாதிரி கட்டமைப்புகள் பற்றி அறிதல், மதுரை மீனாட்சி அம்மன் ஆலயம் மற்றும் திருமலை நாயக்கர் மஹால் - செட்டிநாடு வீடுகள் - பிரிட்டிஷ் காலத்தில் சென்னையில் இந்தோ-சாரோசோனிக் கட்டிடக் கலை.

UNIT – III உற்பத்தி தொழில்நுட்பம் 3

கப்பல் கட்டும் கலை - உலோகவியல் - இரும்புத் தொழிற்சாலை - இரும்பை உருக்குதல், எஃகு - வரலாற்றுச் சான்றுகளாக செம்பு மற்றும் தங்க நாணயங்கள் - நாணயங்கள் அச்சடித்தல் - மணி உருவாக்கும் தொழிற்சாலைகள் - கல்மணிகள், கண்ணாடி மணிகள் - சுடுமண் மணிகள் - சங்கு மணிகள் - எலும்புத் துண்டுகள் - தொல்லியல் சான்றுகள் - சிலப்பதிகாரத்தில் மணிகளின் வகைகள்.

UNIT – IV வேளாண்மை மற்றும் நீர்பாசனத் தொழில்நுட்பம் 3

அணை, ஏரி, குளங்கள், மதகு - சோழர்காலக் குமிழித் தூம்பின் முக்கியத்துவம் - கால்நடை பராமரிப்பு - கால்நடைகளுக்காக வடிவமைக்கப்பட்ட கிணறுகள் - வேளாண்மை மற்றும் வேளாண்மைச் சார்ந்த செயல்பாடுகள் - கடல்சார் அறிவு - மீன்வளம் - முத்து மற்றும் முத்துக்குளித்தல் - பெருங்கடல் குறித்த பண்டைய அறிவு - அறிவுசார் சமூகம்.

UNIT – V அறிவியல் தமிழ் மற்றும் கணினித்தமிழ் 3

அறிவியல் தமிழின் வளர்ச்சி - கணினித்தமிழ் - தமிழ் நூல்களை மின்பதிப்பு செய்தல் - தமிழ் மென்பொருட்கள் உருவாக்கம் - தமிழ் இணையக் கல்விக் கழகம் - தமிழ் மின் நூலகம் - இணையத்தில் தமிழ் அகராதிகள் - சொற்குவைத் திட்டம்.

Total : 15 PERIODS

TEXT-CUM REFERENCE BOOKS:

1. தமிழக வரலாறு - மக்களும் பண்பாடும் - கே.கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணினித் தமிழ் - முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்).

3. கீழடி - வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
4. பொருறை - ஆற்றங்கரை நாகரிகம். (தொல்லியல் துறை)
5. Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
6. Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies
7. Historical by: International Institute of Tamil Studies).
8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
9. Keeladi - 'Sangam City Civilization on the banks of river Vaigai' (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by: The Author)
11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book

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COURSE OBJECTIVE

- To introduce the basic concepts of environment, ecosystems and biodiversity and emphasize on the biodiversity of India and its conservation.
- To impart knowledge on the causes, effects and control or prevention measures of environmental pollution and natural disasters.
- To facilitate the understanding of global and Indian scenario of renewable and non-renewable resources, causes of their degradation and measures to preserve them.
- To familiarize the influence of societal use of resources on the environment and introduce the legal provisions, National and International laws and conventions for environmental protection.
- To inculcate the effect of population dynamics on human and environmental health and inform about human right, value education and role of technology in monitoring human and environmental issues.

UNIT I ENVIRONMENT, ECOSYSTEMS AND BIODIVERSITY 6

Definition, scope and importance of environment – need for public awareness - concept of an ecosystem – structure and function of an ecosystem – producers, consumers and decomposers – energy flow in the ecosystem – ecological succession – food chains, food webs and ecological pyramids Introduction to biodiversity definition: genetic, species and ecosystem diversity – bio geographical classification of India – value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values – Biodiversity at global, national and local levels – India as a mega-diversity nation – hot-spots of biodiversity – threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – endangered and endemic species of India – conservation of biodiversity: In-situ and ex-situ conservation of biodiversity.

UNIT II ENVIRONMENTAL POLLUTION 6

Definition – causes, effects and control measures of: (a) Air pollution (b) Water pollution (c) Soil pollution (d) Marine pollution (e) Noise pollution (f) Thermal pollution (g) Nuclear hazards – solid waste management: causes, effects and control measures of municipal solid wastes, biomedical wastes and e-wastes – role of an individual in prevention of pollution – pollution case studies.

UNIT III NATURAL RESOURCES 6

Forest resources: Use and over-exploitation, deforestation, case studies- timber extraction, mining, dams and their effects on forests and tribal people – Water resources: Use and over utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies – Land resources.

UNIT IV SOCIAL ISSUES AND THE ENVIRONMENT 6

From unsustainable to sustainable development – urban problems related to energy – water conservation, rain water harvesting, watershed management – resettlement and rehabilitation of people; its problems and concerns, case studies – role of non-governmental organization environmental ethics: Issues and possible solutions – climate change, global warming, acidrain, ozone layer depletion. environment protection act – Air (Prevention and Control of Pollution) act – Water (Prevention and control of Pollution) act – Wildlife protection act – Forest conservation act – enforcement machinery involved in environmental legislation central and state pollution control boards- Public awareness.

UNIT V

HUMAN POPULATION AND THE ENVIRONMENT

6

Population growth, variation among nations – population explosion – family welfare programme – environment and human health – human rights – value education – HIV / AIDS – women and child welfare – role of information technology in environment and human health – Case studies

TOTAL :30 PERIODS

COURSE OUTCOME

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

- CO1** To recognize and understand the functions of environment, ecosystems and biodiversity and their conservation.
- CO2** To identify the causes, effects and environmental pollution and natural disasters and contribute to the preventive measures in the immediate society..
- CO3** To identify and apply the understanding of renewable and non-renewable resources and contribute to the sustainable measures to preserve them for future generations.
- CO4** To recognize different forms of energy and apply them for suitable applications in for technological advancement and societal development.
- CO5** To demonstrate the knowledge of societal activity on the long and short term environmental issues and abide by the legal provisions, National and International laws and conventions in professional and personal activities and to identify and analyse effect of population dynamics on human value education, consumerism and role of technology in environmental issues.

TEXT BOOKS

1. Anubha Kaushik and C. P. Kaushik's "Perspectives in Environmental Studies", 6th Edition, New Age International Publishers (2018).
2. Benny Joseph, 'Environmental Science and Engineering', Tata McGraw-Hill, New Delhi, (2016).
3. Gilbert M.Masters, 'Introduction to Environmental Engineering and Science', 2nd edition, Pearson Education (2004).

REFERENCE BOOKS

1. R.K. Trivedi, 'Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards', Vol. I and II, Enviro Media, 2009.
2. Cunningham, W.P. Cooper, T.H. Gorhani, 'Environmental Encyclopedia', Jaico Publ., House, Mumbai, 2001.
3. Dharmendra S. Sengar, 'Environmental law', Prentice hall of India PVT. LTD, New Delhi, 2007.
4. Rajagopalan, R, 'Environmental Studies-From Crisis to Cure', Oxford University Press (2005).
5. Erach Bharucha "Textbook of Environmental Studies for Undergraduate Courses" Orient Blackswan Pvt. Ltd. (2013).

O-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1				2	3					2
CO2	3	2				3	3					2
CO3	3		1			2	3					2
CO4	3	2	1	1		2	2					2
CO5	3	2	1			2	2					1