PANIMALAR ENGINEERING COLLEGE

An Autonomous Institution, Affiliated to Anna University, Chennai

(JAISAKTHI EDUCATIONAL TRUST)

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

Department of Electronics and Communication Engineering

B.E- Electronics and Communication Engineering

Curriculum and Syllabus

Regulation 2023

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

VISION

To emerge as a centre of excellence in providing quality education and produce technically competent Electronics and Communication Engineers to meet the needs of the industry and society.

MISSION

M1: To Provide the best facilities, infrastructure and environment to our students, researchers and faculty members to meet the challenges in the field of Electronics and Communication Engineering.

M2: To provide quality education through effective teaching learning process for their future career, viz placement and higher education.

M3: To provide insight in to the core domains with industry interaction.

M4: To prepare graduates adaptable to the changing requirements of the society through lifelong learning

PROGRAMME EDUCATIONAL OBJECTIVES (PEO)

PEO 1: To prepare students to analyze, design and implement electronic circuits and systems using the knowledge acquired from basic science and mathematics.

PEO 2: To train students with good scientific and engineering knowledge so as to comprehend, analyze, design and create novel products and solutions for real life problems.

PEO 3: To introduce the research world to the graduates not only in their own domain but also in multidisciplinary domain, so that they feel motivated for higher studies.

PEO 4: To prepare graduates to exhibit professionalism, ethical attitude, communication skills, team work and leadership qualities in their profession and adapt to current trends by engaging in lifelong learning.

PEO 5: To practice professionalism in a collaborative, team-oriented manner that embraces the multicultural environment of today's business world.

PROGRAM OUTCOMES (PO)

PO1 (Engineering knowledge): Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2 (Problem Analysis): Identify, formulate, research literature, and analyze complex engineering problem reaching substantiated conclusions using first principles of mathematics,natural sciences, and engineering sciences.

PO3 (Design/development of solutions): Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4 (Conduct investigations of complex problems): Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5 (Modern tool usage): Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6 (The engineer and society): Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the Professional engineering practice.

PO7 (Environment and sustainability): Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8 (Ethics): Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice

PO9 (Individual and team work): Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings

PO10(Communication): Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 (Project management and finance): Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12 (Life-long learning): Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAMME SPECIFIC OUTCOMES (PSO)

PSO1: Graduates should demonstrate an understanding of the basic concepts in the primary area of Electronics and Communication Engineering, including: analysis of circuits containing both active and passive components, electronic systems, control systems, electromagnetic systems, digital systems, computer applications and communications.

PSO2: Graduates should demonstrate the ability to utilize the mathematics and the fundamental knowledge of Electronics and Communication Engineering to design complex systems which may contain both software and hardware components to meet thedesired needs.

PSO3: The graduates are capable of excelling in Electronics and Communication Engineering industry/Academic /Software companies through professional careers.
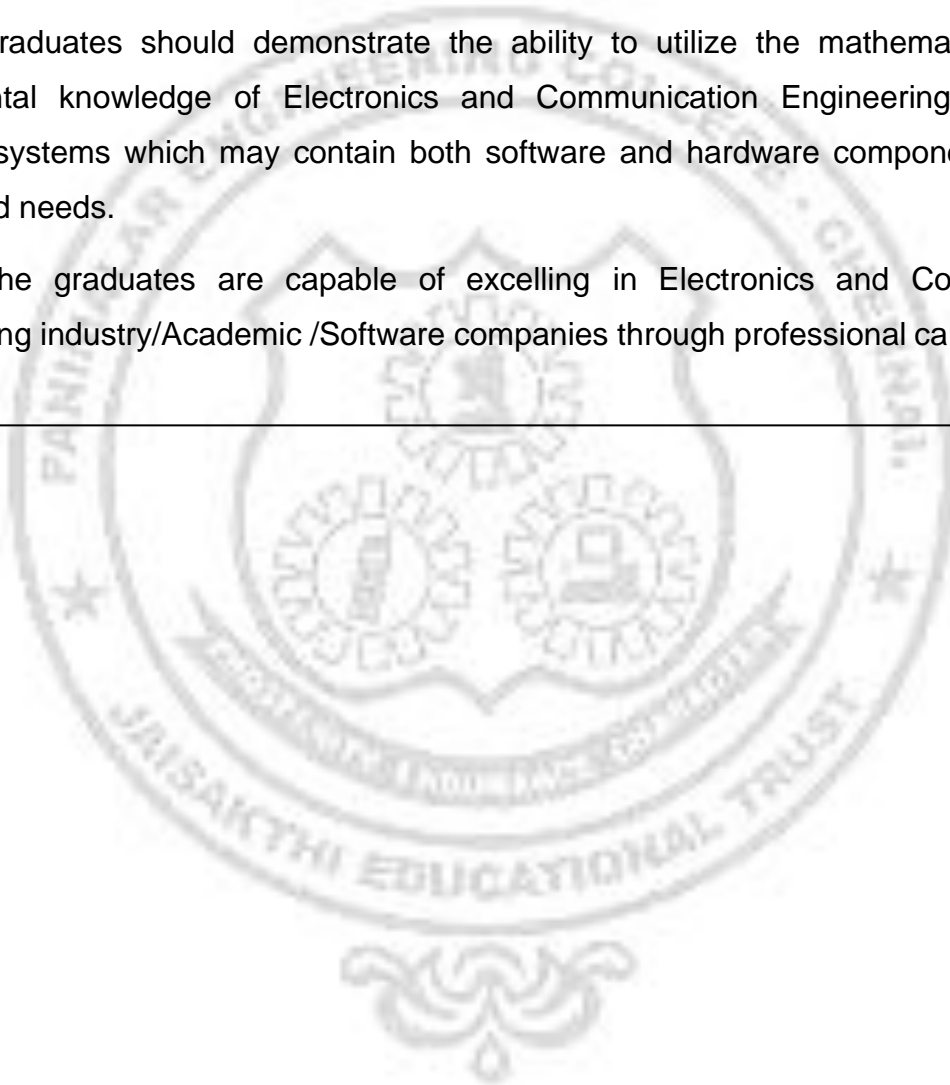
B.E.- ELECTRONICS AND COMMUNICATION ENGINEERING

CHOICE BASED CREDIT SYSTEM (CBCS)

I - II SEMESTERS CURRICULUM AND SYLLABI (REGUALTION 2023)

S. No	COURSE CODE	COURSE TITLE	Category	L/T/P	Contact Hours	Credit	Ext / Int Weightage
Semester I							
Theory Courses							
1.	23MA1101	Matrices and Calculus	BS	3/1/0	4	4	60/40
2.	23ES1101	Problem solving using C Programming	ES	3/0/0	3	3	60/40
3.	23ES1103	Engineering Graphics	ES	2/0/2	4	3	60/40
Theory Cum Practical Courses							
4.	23HS1101	Communicative English and Language Skills	HS	2/0/2	4	3	50/50
5.	23PH1101	Engineering Physics	BS	2/0/2	4	3	50/50
Laboratory Courses							
6.	23ES1111	Problem solving using C Programming Laboratory	ES	0/0/4	4	2	40/60
Mandatory Course							
7.	23TA1101	தமிழர்மரபு/ Heritage of Tamils	HS	1/0/0	1	1	60/40
				TOTAL	24	19	

S. No	COURSE CODE	COURSE TITLE	Category	L/T/P	Contact Hours	Credit	Ext / Int Weightage
Semester II							
Theory Courses							
1.	23MA1201	Complex Variables and Laplace Transform	BS	3/1/0	4	4	60/40
2.	23EC1201	Electronic Devices	PC	3/0/0	3	3	60/40
3.	23ES1201	Python Programming	ES	3/0/0	3	3	60/40
Theory Cum Practical Courses							
4.	23HS1201	Communicative and Aptitude Skills	HS	2/0/2	4	3	50/50
5.	23ES1204	Basic Electrical Circuits and Engineering	PC	3/0/2	5	4	50/50
Laboratory Courses							
6.	23EC1211	Circuits and Devices Lab	PC	0/0/4	4	2	40/60
7.	23ES1211	Python Programming Laboratory	ES	0/0/4	4	2	40/60
8.	23ES1212	Technical Skill Practices-I	EEC	0/0/2	2	1	40/60
Mandatory Course							
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		**32**	**23**	

23MA1101	MATRICES AND CALCULUS	L	T	P	C
		3	1	0	4

COURSE OBJECTIVE
- Matrix algebra can be readily applied to the structural properties of graphs from an algebraic point of view.
- To introduce the concepts of limits, continuity, derivatives and maxima and Minima.
- To familiarize the functions of two variables and finding its extreme points.
- To provide understanding of various techniques of integration.
- To introduce integral ideas in solving areas, volumes and other practical problems.

UNIT I   MATRICES   9+3

Eigenvalues and Eigenvectors of a real matrix - Characteristic equation -Properties of Eigenvalues and Eigenvectors -Cayley Hamilton theorem -Diagonalization of matrices-Reduction of a quadratic form to canonical form by orthogonal transformation - Nature of quadratic forms.

UNIT II   DIFFERENTIAL CALCULUS   9+3

Representation of functions - Limit of a function - Continuity - Derivatives - Differentiation rules (Sum, Product & Quotient rule, Chain rule, logarithmic and implicit differentiation) - Maxima and Minima of functions of one variable and its applications.

UNIT III   FUNCTIONS OF SEVERAL VARIABLES   9+3

Partial differentiation - Total derivative - Change of variables –Jacobian's- Taylor's series for functions of two variables - Maxima and minima of functions of two variables -Lagrange's method of undetermined multipliers.

UNIT IV   INTEGRAL CALCULUS   9+3

Definite and Indefinite integrals - Substitution rule - Techniques of Integration - Integration by parts -Bernoulli's formula- Integration of rational functions by partial fraction - Improper integrals - Applications: Hydrostatic force and pressure, moments and centres of mass.

UNIT V   MULTIPLE INTEGRALS   9+3

Doubleintegrals in Cartesian and polar coordinates - Change of order of integration in Cartesian coordinates - Area enclosed by plane curves - Change of variables in double integrals -Triple integrals - Volume of Solids.

TOTAL: 60 PERIODS

COURSE OUTCOME

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

CO1 Find Eigen values and Eigen vectors, diagonalization of a matrix, symmetric matrices, positive definite matrices.

CO2 Apply limit definition and rules of differentiation to differentiate functions.

CO3 Understand familiarity in the knowledge of Maxima and Minima, Jacobian,Taylor series and apply the problems involving Science and Engineering.

CO4 Understand the knowledge of Integration by parts, Integration of rational functions by partial fraction.

CO5 Understand the knowledge of Area enclosed by plane curves, Change of variables in double integrals, Triple integrals, Volume of Solids.

TEXT BOOKS

1. Grewal B.S., "Higher Engineering Mathematics", Khanna Publishers, NewDelhi,44rd Edition,2018.
2. James Stewart, "Calculus: Early Transcendental", Cengage Learning, 9th Edition, NewDelhi,2015.
3. Bali N., Goyal M. and Walkins C., "Advanced Engineering Mathematics", Firewall Media (An imprint of Lakshmi Publications Pvtt. Ltd.,), New Delhi, 7th Edition, 2015.

REFERENCE BOOKS

1. Sundar Raj. M and Nagarajan. G, "Engineering Mathematics-I",3rd Edition, Sree Kamalamani Publications, Chennai, 2020.
2. Sivaramakrishna Dass, C. Vijayakumari, "Engineering Mathematics", Pearson Education India, 4th Edition 2019.
3. Srimantha Pal and Bhunia,S.C, "Engineering Mathematics "Oxford University Press, 2015.
4. Erwin Kreyzig, Advanced Engineering Mathematics, JohnWiley sons, 10th Edition,2015.
5. Narayanan, S. and Manicavachagom Pillai, T. K., "Calculus" Volume I and II, S. Viswanathan Publishers Pvt., Ltd., Chennai, 2007.
6. B.V. Ramana "Higher Engineering Mathematics", McGraw Hill Education, India.

ONLINE COURSES / RESOURCES

1. https://onlinecourses.nptel.ac.in/noc21_ma60/preview
2. https://onlinecourses.nptel.ac.in/noc21_ma58/preview

CO-PO MAPPING

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

	L	T	P	C
23ES1101 **PROBLEM SOLVING USING C PROGRAMMING**	3	0	0	3

COURSE OBJECTIVE

- To learn the syntax for C programming
- To develop C Programs using basic programming constructs
- To develop C programs using arrays and strings
- To develop applications in C using functions, pointers
- To develop applications using structures and union

UNIT I   **BASICS OF C PROGRAMMING**   **9**

Introduction to programming paradigms – Algorithms – Flowchart - Structure of C program - C programming: Data Types – Storage classes - Constants – Enumeration Constants - Type Conversion Keywords – Operators: Precedence and Associativity - Expressions - Input/Output statements, Format specifiers, Assignment statements – Decision making statements - Switch statement – Break – Continue - Goto statement - Looping statements – Pre-processor directives - Compilation process.

UNIT II   **ARRAYS AND STRINGS**   **9**

Introduction to Arrays: Declaration, Initialization – One dimensional array – Example Program: Computing Mean, Median and Mode - Two dimensional arrays – Example Program: Matrix Operations (Addition, Multiplication, Determinant and Transpose) - String operations: length, compare, concatenate, copy, Reverse and Palindrome – Selection sort, Insertion sort - linear and binary search.

UNIT III   **FUNCTIONS AND POINTERS**   **9**

Introduction to functions: Function prototype, function definition, function call, Built-in functions (string functions, math functions) – Recursion – Example Program: Computation of Sine series, Scientific calculator using built-in functions, Binary Search using recursive functions – Pointers – Pointer operators – Pointer arithmetic – Arrays and pointers – Array of pointers – Example Program: Sorting of names – Parameter passing: Pass by value, Pass by reference – Example Program: Swapping of two numbers and changing the value of a variable using pass by reference.

UNIT IV   **STRUCTURES AND UNION**   **9**

Structure - Nested structures– Pointer and Structures– Array of structures – Example Program using structures and pointers – Self-referentials structures – Dynamic memory allocation – Singly linked list– typedef and Union.

UNIT V   **FILE PROCESSING**   **9**

Files – Types of file processing: Sequential access, Random access – Sequential access file - Example Program: Finding average of numbers stored in sequential access file - Random access file - Example Program: Transaction processing using random access files – Command line arguments.

TOTAL: 45 PERIODS

COURSE OUTCOME

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

CO1 Learn the syntax for C programming
CO2 Develop simple applications in C using basic constructs
CO3 Design and implement applications using arrays and strings
CO4 Develop and implement applications in C using functions and pointers.
CO5 Develop applications in C using structures and union.
CO6 Design applications using sequential and random access file processing.

TEXT BOOKS

1. Reema Thareja, —Programming in C, Oxford University Press, Second Edition, 2016.
2. Kernighan, B.W and Ritchie,D.M, —The C Programming language, Second Edition, Pearson Education, 2006.

REFERENCE BOOKS

1. Paul Deitel and Harvey Deitel, — C How to Program, Seventh edition, Pearson Publication, 2015
2. Juneja, B. L and Anita Seth, —Programming in C, CENGAGE Learning India pvt. Ltd., 2011.
3. Anita Goel and Ajay Mittal, —Computer Fundamentals and Programming in C, Dorling Kindersley (India) pvt., Ltd., Pearson Education in South Asia, 2011.
4. Pradip Dey, Manas Ghosh, —Fundamentals of Computing and Programming in C, First Edition, Oxford University Press, 2009.
5. Byron S. Gottfried, "Schism's Outline of Theory and Problems of Programming with C", McGraw-Hill Education, 1996.

WEB REFERENCES

1. https://github.com/tscheffl/ThinkC/blob/master/PDF/Think-C.pdf
2. https://freecomputerbooks.com/langCBooks.html

ONLINE COURSES / RESOURCES

1. https://www.programiz.com/c-programming
2. https://www.tutorialspoint.com/cprogramming/index.htm
3. https://www.javatpoint.com/c-programming-language-tutorial
4. https://www.geeksforgeeks.org/c-programming-language/
5. https://en.wikibooks.org/wiki/C_Programming
6. https://www.cprogramming.com/tutorial/c-tutorial.html?inl=hp

CO-PO MAPPING

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

23ES1103	ENGINEERING GRAPHICS	L	T	P	C
		2	0	2	3

COURSE OBJECTIVE
- Drawing Engineering curves
- Drawing orthographic projections of lines and planes
- Drawing orthographic projections of solids
- Drawing section and development of the surfaces of objects
- Drawing isometric views and intersection curves of simple solids
- Drawing free hand sketches of basic geometrical shapes, multiple views of objects and Applications of Engineering Graphics

UNIT 0　　　　　　**CONCEPTS AND CONVENTIONS (Not for Examination)**　　　　**2**

Importance of drawing in engineering applications - Use of drafting instruments - BIS conventions and specifications - Size, layout and folding of drawing sheets - Lettering and dimensioning - Introduction to Scales - Geometric construction - to draw perpendiculars, parallel lines, divide a line and circle, to draw equilateral triangle, square, regular polygons. Introduction to drafting packages like CAD and demonstration of their use in engineering fields.

UNIT I　　　　**ENGINEERING CURVES AND PROJECTION OF POINTS AND LINES**　　**6+6**

Basic construction of cycloid, epicycloid and hypocycloid - Drawing of tangents and normal to the above curves. Construction of involutes of square, pentagon and circle - Drawing of tangents and normal to the above involutes.
Orthographic projection – Introduction to Principal Planes of projections - First angle projection - Projection of points. Projections of straight lines (only in First angle projections) inclined to both the principal planes - Determination of true lengths, true inclinations and traces by rotating line method

UNIT II　　　　**PROJECTIONS OF PLANES AND PROJECTIONS OF SOLIDS**　　**6+6**

Projection of planes (polygonal and circular surfaces) inclined to both the principal planes by rotating object method and auxillary plane method.
Projection of simple solids like prisms, pyramids, cylinder, and cone when the axis is inclined to one principle planes by rotating object method.

UNIT III　　　　**SECTIONS of SOLIDS AND DEVELOPMENT OF SURFACES**　　**6+6**

Sectioning of solids in simple vertical position when the cutting plane is inclined to the one of the principal planes and perpendicular to the other – obtaining true shape of section.
Development of lateral surfaces of simple solids and frustum and truncated solids – Prisms, pyramids cylinders and cones.

UNIT IV　　　　**INTERSECTION OF SOLIDS AND ISOMETRIC PROJECTIONS**　　**6+6**

Line of intersection - Determining the line of intersection between surfaces of two interpenetrating two square prisms and Intersection of two cylinders with axes of the solids intersecting each other perpendicularly, using line method.
Principles of isometric projection – isometric scale –Isometric projections and isometric views of simple solids and frustum and truncated solids - Prisms, pyramids, cylinders, cones- combination of two solid objects in simple vertical positions.

UNIT V   **FREE-HAND SKETCHING**   **5+5**

Steps in free hand sketching - Orthographic views (front, top and side views) of simple blocks from their Isometric view, Isometric view of simple blocks from their Orthographic views (front, top and side views)

TOTAL: 60 PERIODS

COURSE OUTCOME

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

CO1   Draw the engineering curves and draw orthographic projections of lines and planes

CO2   Draw orthographic projections of planes and solids

CO3   Draw the sections and development of the surfaces of objects

CO4   Draw isometric projections and intersection of curves of simple solids.

CO5   Draw free hand sketching of basic geometrical shapes, multiple views of objects

TEXT BOOKS

1. Natarajan, K. V., "A text book of Engineering Graphics", 28th Ed., Dhanalakshmi Publishers, Chennai, 2015.
2. Venugopal, K. and Prabhu Raja, V., "Engineering Graphics", New Age Publications, 2008.

REFERENCE BOOKS

1. Parthasarathy, N. S. and Vela Murali, "Engineering Drawing", Oxford University Press, 2015.
2. Bhatt, N.D.,Panchal V M and Pramod R. Ingle, "Engineering Drawing", Charotar Publishing House, 53rd Edition, 2014.
3. Agrawal, B. and Agrawal C.M., "Engineering Drawing", Tata McGraw, N.Delhi, 2008.

WEB REFERENCES

1. https://nptel.ac.in/courses/105/104/105104148/
2. https://www.youtube.com/channel/UCkCk0nvNyWhEOLge9JtDLDg

ONLINE COURSES / RESOURCES

1. https://nptel.ac.in/courses/112/103/112103019/

CO-PO MAPPING

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

		L	**T**	**P**	**C**
23HS1101	**COMMUNICATIVE ENGLISH AND LANGUAGE SKILLS**	**2**	**0**	**2**	**3**

COURSE OBJECTIVE
- To induce the basic reading and writing skills among the first year engineering and technology students.
- To assist the learners to develop their listening skills, which will enable them listening to lectures and comprehend them by asking questions and seeking clarifications
- To succor the learners to develop their speaking skills and speak fluently in real contexts.
- To motivate the learners to develop vocabulary of a general kind by developing their reading skills for meeting the competitive exams like GATE, TOFEL, GRE, IELTS, and other exams conducted by Central and State governments
- To learn to use basic grammatical structures in suitable contexts

UNIT I   **INFORMAL COMMUNICATION**   **6**

Listening: Listening and filling details, Listening to Speeches by Specialists and Completing Activities such as Answering Questions, Identifying the Main Ideas, Style, etc. **Speaking**: Introducing One-self – Introducing a Friend/ Family. **Reading**: Descriptive Passages (From Newspapers / Magazines).**Writing**: Autobiographical Writing, Developing Hints. **Grammar**: Noun, Pronoun & Adjective. **Vocabulary Development**: One Word Substitution

UNIT II   **CONVERSATIONAL PRACTICE**   **6**

Listening: Listening to Conversations (Asking for and Giving Directions).**Speaking**: Making Conversation Using (Asking for Directions, Making an Enquiry), Role Plays, and Dialogues. **Reading**: Reading a Print Interview and Answering Comprehension Questions. **Writing**: Writing a Checklist, Dialogue Writing **Grammar**: Tenses and Voices, Regular and Irregular Verbs. **Vocabulary Development**: Prefix &Suffix, Word formation.

UNIT III   **OFFICIAL COMMUNICATIONS**   **6**

Listening: Listening for specific information. Speaking: Giving Short Talks on a given Topic. **Reading**: Reading Motivational Essays on Famous Engineers and Technologists (Answering Open-Ended and Closed Questions).**Writing**: Writing Permission Letters/Editor, Complaint, and Invitation. Emails and Review Writing-Books, Films. **Grammar**: Adverb, Prepositions & Conjunctions. **Vocabulary Development**: Collocations – Fixed Expressions.

UNIT IV   **COMMUNICATION AT WORK PLACE**   **6**

Listening: Listening to Short Talks (5 Minutes Duration and Fill a Table, Gap-Filling Exercise) Note Taking/Note Making .**Speaking**: Small Group Discussion, Giving Recommendations. **Reading**: Reading Problem – Solution Articles/Essays Drawn From Various Sources .**Writing**: Making Recommendations. **Grammar**: Subject-Verb Agreement, Framing Questions. **Vocabulary Development**: Infinitives and Gerunds, Reference Words, Technical Vocabulary.

UNIT V   **DEFINITIONS AND PRODUCT DESCRIPTION**   **6**

Listening: Listening to a Product Description (Labelling and Gap Filling) Exercises. **Speaking**: Describing a Product and Comparing and Contrasting it with Other Products. **Reading**: Reading Graphical Material for Comparison (Advertisements).**Writing**: Essay Writing. Compare and Contrast Paragraphs, Essay writing. **Grammar**: Phrasal Verbs – Cause and Effect Sentences – Compound Nouns and Definitions. **Vocabulary Development:** Use of Discourse Markers.

TOTAL: 30 PERIODS

TEXT BOOKS

1. N P Sudharshana& C Savitha. English for Technical Communication Delhi: CUP, 2019.
2. Board of Editors. English for Engineers and Technologists Volume 1 Orient Black Swan Limited, 2020.

REFERENCE BOOKS

1. Board of Editors. Using English-A course book for Undergraduate engineers and Technologists Orient Black Swan Limited, 2017.
2. Bailey, Stephen. Academic Writing: A Practical Guide for Students. New York: Rutledge, 2011.
3. Comfort, Jeremy, et al. Speaking Effectively: Developing Speaking Skills for Business English. Cambridge University Press, Cambridge: Reprint 2011.
4. Means, L. Thomas and Elaine Langlois. English & Communication for Colleges. Cengage Learning, USA:2007.
5. Redston, Chris &Gillies Cunningham Face2Face (Pre-intermediate Student's Book& Workbook) Cambridge University Press, New Delhi: 2005.

WEB REFERENCES

1. https://learnenglishteens.britishcouncil.org/exams/grammar-and-vocabulary-exams/wordformation
2. https://cdn.s3waas.gov.in/s347d1e990583c9c67424d369f3414728e/uploads/2018/02/201 80316 21.pdf
3. http://xn--englishclub-ql3f.com/grammar/parts-of-speech.html
4. https://www.edudose.com/english/grammar-degree-of-comparison-rules/

ONLINE COURSES / RESOURCES

1. https://basicenglishspeaking.com/wh-questions/
2. https://agendaweb.org/verbs/modals-exercises.html
3. https://cdn.s3waas.gov.in/s347d1e990583c9c67424d369f3414728e/uploads/2018/02/201 8031621.pdf
4. https://www.ego4u.com/en/cram-up/grammar/prepositions

LIST OF EXPERIMENTS

1. Listen to lectures- articulate a complete idea as opposed to producing fragmented utterances- Tedtalks, Science Fiction- My Fair Lady
2. Listening – following, responding to explanations, giving directions and instructions in academic and business contexts- IELTS,TOEFL.
3. Listening to transcripts and answer to the questions.
4. Listening for specific information: accuracy and fluency – BEC.
5. Reading: Different Text Type.
6. Reading: Predicting Content using pictures and titles.
7. Reading: Use of Graphic Organizers to review.
8. Reading: Aid Comprehension.
9. Reading: Speed Reading Techniques.
10. Reading and Comprehending the passages in the competitive exams like GATE, TOEFL, GRE, IELTS, and other exams conducted by Central and state governments.

TOTAL: 30 PERIODS

REFERENCE BOOKS

1. SureshKumar.E and et al. Enriching Speaking and Writing Skills. Second Edition. Orient Blackswan: Hyderabad,2012
2. Davis, Jason and Rhonda Liss. Effective Academic Writing (level 3) Oxford University Press: Oxford,2006
3. Withrow, Jeans and et al. Inspired to write. Reading and Tasks to develop writing skills. Cambridge University Press: Cambridge,2004

COURSE OUTCOME

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

CO1 Comprehend conversation and short talks delivered in English.

CO2 Participate effectively in informal conversation; introduce themselves and their friends and express opinions English.

CO3 Read articles of a general kind in magazines and newspaper

CO4 Write short essays of a general kind and personal letters and emails in English.

CO5 Gain understanding of basic grammatical structures and use them in right context.

CO6 Use appropriate words in a professional context.

CO-PO MAPPING

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

	L	T	P	C
23PH1101 **ENGINEERING PHYSICS**	2	0	2	3

COURSE OBJECTIVE
- To impart knowledge in basic concepts of physics relevant to engineering applications
- To introduce advances in technology for engineering applications

UNIT I   **PROPERTIES OF MATTERS**   **6**

Elasticity: Stress, strain, Hooke's law and elastic moduli – stress-strain diagram – twisting couple per unit twist for solid cylinder – torsional pendulum (theory) – bending moment of beam – non-uniform and uniform bending (theory)– I-shape girder.
Thermal Physics: Mode of heat transfer: conduction, convection and radiation – thermal expansion of solids – bimetallic strips – thermal conductivity – Forbe's method and Lee's disc method; theory and experiment – thermal insulation – applications

UNIT II   **SEMICONDUCTING AND MAGNETIC MATERIALS**   **6**

Semiconducting Materials: Intrinsic Semiconductors – energy band diagram – carrier concentration in intrinsic semiconductors – extrinsic semiconductors (N-type & P-type) – variation of carrier concentration with temperature – variation of Fermi level with temperature and impurity concentration –Zener and avalanche breakdown in p-n junctions – Ohmic contacts – Schottky diode – tunnel diode.
Magnetic Materials: Magnetism in materials – Basic definitions – Classifications of Magnetic Materials- Ferromagnetic Domain theory – M versus H behavior - Hard and Soft Magnetic materials- Magnetic principle in Computer data storage – Magnetic Hard Disc and Embedded systems**.**

UNIT III   **MODERN OPTICS**   **6**

Laser: Population of energy levels, Einstein's A and B coefficients derivation – optical amplification (qualitative) – Semiconductor lasers: homojunction and heterojunction**– Fiber Optics**: components and principle of fiber optics – numerical aperture and acceptance angle derivation – types of optical fibers (material, refractive index, mode) – losses associated with optical fibers– fiber as pressure and displacement sensors.

UNIT IV   **QUANTUM PHYSICS AND NANOSCIENCE**   **6**

Quantum Physics: Blackbody radiation – Planck's hypothesis and derivation – wave particle duality of light: concepts of photon – de Broglie hypotheses – concept of wave function and its physical significance – Schrödinger's wave equation – time independent and time dependent equations.
Nanoscience: Introduction – Classification of nanomaterials – preparation (bottom up and top down approaches), mechanical, optical and electrical properties – applications: NEMS and MEMS– carbon nanotubes: types.

UNIT V   **ELECTROMAGNETIC WAVES**   **6**

Divergence – curl – integral calculus – Gauss divergence theorem – Stoke's theorem – equation of continuity – displacement current – Maxwell's equations – Gauss's laws – Faraday's law –Ampere-Maxwell law – mechanism of electromagnetic wave propagation – Hertz observation – production and detection of electromagnetic wave – properties of electromagnetic waves.

TOTAL: 30 PERIODS

LIST OF EXPERIMENTS

1. Determination of Moment of Inertia of the disc and Rigidity Modulus of the material of the wire – Torsional Pendulum
2. Determination of Young's Modulus – Non - Uniform Bending
3. Determination of Thermal Conductivity of the Bad Conductor – Lee's Disc Method
4. Determination of thickness of a thin wire – Air wedge method
5. (i) Determination of wavelength of Laser using Grating and Particle size determination
   (ii) Determination of Numerical Aperture and Acceptance angle of an Optical Fibre
6. Determination of Velocity of ultrasonic waves in a liquid and compressibility of the liquid – Ultrasonic Interferometer.
7. Determination of wavelength of Hg source using Grating by normal incidence method using spectrometer
8. Determine the band gap energy of a semiconductor.

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. Basics of laser physics: for students of science and engineering http://www.springer.com/978-3- 319- 50650-0

REFERENCE BOOKS

1. Halliday, D., Resnick, R. & Walker, J.-Principles of Physics, Wiley, 2015.
2. Tipler, P.A. &Mosca, G.- Physics for Scientists and Engineers with Modern Physics'. W.H.Freeman, 2007.
3. Ruby Das, C.S. Robinson, Rajesh Kumar, Prashant Kumar Sahu, A Textbook of Engineering Physics Practical, University Science Press, Delhi, II Edition (2016),ISBN 978-93-80386-86-7

COURSE OUTCOME

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

CO1 Understand the basics properties of materials, especially elastic and thermal properties of materials.
CO2 Adequate knowledge on the concepts of semiconducting and magnetic materials and their applications in memory storage.
CO3 Acquire the knowledge on the concepts of lasers, fiber optics and their technological applications.
CO4 Knowledge on fundamental concepts of quantum theory, nanoscience its applications
CO5 Gain knowledge on the basics of electromagnetic waves and its properties.

CO-PO MAPPING

	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						1
CO4	3	3	1	1	2	1						
CO5	3	3	1	1	2	1						

23ES1111	PROBLEM SOLVING USING C PROGRAMMING LABORATORY	L	T	P	C
		0	0	4	2

COURSE OBJECTIVE
- To write, test, and debug simple C programs.
- To implement C programs with conditional and looping statement
- To develop applications in C using strings, pointers, functions.
- To implement C programs with structures and union.
- To develop applications in C using file processing
- To develop an application in real time situation

LIST OF EXPERIMENTS

1. Programs using I/O statements and expressions.
2. Programs using decision-making constructs.
3. Write a program to find whether the given year is leap year or Not? (Hint: not every centurion year is a leap. For example 1700, 1800 and 1900 is not a leap year)
4. Design a calculator to perform the operations, namely, addition, subtraction, multiplication, division and square of a number.
5. Check whether a given number is Armstrong number or not?
6. Given a set of numbers like <10, 36, 54, 89, 12, 27>, find sum of weights based on the following conditions
   a) if it is a perfect cube
   b) if it is a multiple of 4 and divisible by 6
   c) if it is a prime number
   d) Sort the numbers based on the weight in the increasing order as shown below <10,its weight>,<36,its weight><89,its weight>
7. Populate an array with height of persons and find how many persons are above the average height.
8. Given a string —a$bcd./fgll find its reverse without changing the position of special characters. (Example input:a@gh%;j and output:j@hg%;a)
9. Convert the given decimal number into binary, octal and hexadecimal numbers using userdefined functions.
10. From a given paragraph perform the following using built-in functions:
    a) Find the total number of words.
    b) Capitalize the first word of each sentence.
    c) Replace a given word with another word.
11. a) Sort the list of numbers using Selection sort and insertion sort
    b) Sort the list of numbers using pass by reference.
12. a) Search an element from an unsorted array using linear search
    b) Search an element in an array using Binary search recursion call.
13. Generate salary slip of employees using structures and pointers.

14. a) Programs using Pointers
    b) Pointer demonstration the use of & and *
    c) Access Elements of an Array Using Pointer
    d) Perform the string operations like Length of the String , Concatenation of string and compare the string using Pointer
    e) Count number of words, digits, vowels using pointers
    f) Add two matrices using Multidimensional Arrays with pointers
    g) Multiply two matrices using pointers
    h) Multiply two numbers using Function Pointers
15. Compute internal marks of students for five different subjects using structures and functions.
16. Program to demonstrate the difference between unions and structures
17. Insert, update, delete and append telephone details of an individual or a company into atelephone directory using random access file.
18. Count the number of account holders whose balance is less than the minimum balance usingsequential access file.
19. **MINI PROJECT**
    Create a —Railway reservation system‖ with the following modules
    a) Booking
    b) Availability checking
    c) Cancellation
    d) Prepare chart

TOTAL: 60 PERIODS

COURSE OUTCOME

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

CO1   Write, test, and debug simple C programs.

CO2   Implement C programs with conditionals and loops.

CO3   Develop C programs for simple applications making use arrays and strings.

CO4   Develop C programs involving functions, recursion, pointers, and structures and union.

CO5   Design applications using sequential and random access file processing.

CO6   Perform task as an individual and / or team member to manage the task in time

WEB REFERENCES

1. https://www.programiz.com/c-programming/examples
2. https://beginnersbook.com/2015/02/simple-c-programs/
3. https://www.programmingsimplified.com/c-program-examples
4. https://www.tutorialgateway.org/c-programming-examples/
5. https://www.javatpoint.com/c-programs
6. https://www.tutorialspoint.com/learn_c_by_examples/simple_programs_in_c.html

CO-PO MAPPING

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

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

UNIT I   LANGUAGE AND LITERATURE   3

Language Families in India - Dravidian Languages –Tamilas 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, VilluPattu, KaniyanKoothu, 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   3
INDIAN CULTURE

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. கணினித்தமிழ் – முனைவர் இல. சுந்தரம். (விகடன்பிரசுரம்).
3. கீழடி – வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
4. பொருநை – ஆற்றங்கரை நாகரிகம். (தொல்லியல்துறை)
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–(inprint)
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)

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

UNIT I   **மொழி மற்றும் இலக்கியம்**   **3**

இந்திய மொழிக்குடும்பங்கள் – திராவிட மொழிகள் – தமிழ் ஒரு செம்மொழி – தமிழ் செவ்விலக்கியங்கள் – சங்க இலக்கியத்தின் சமயசார்பற்றதன்மை – சங்க இலக்கியத்தில் பகிர்தல் அறம் – திருக்குறளில் மேலாண்மைக்கருத்துக்கள் – 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 -**   **3**
                              சிற்பக்கலை

நடுகல் முதல் நவீன சிற்பங்கள் வரை – ஐம்பொன் சிலைகள் – பழங்குடியினர் மற்றும் அவர்கள் தயாரிக்கும் கைவினைப்பொருட்கள், பொம்மைகள் – தேர்செய்யும் கலை – சுடுமண் சிற்பங்கள் - நாட்டுப்புறத்தெய்வங்கள் – குமரி முனையில் திருவள்ளுவர் சிலை - இசைக்கருவிகள் - மிருதங்கம், பறை, வீணை, யாழ், நாதஸ்வரம் – தமிழர்களின் சமூக பொருளாதார வாழ்வில் கோவில்களின் பங்கு.

UNIT III   **நாட்டுப்புறக்கலைகள் மற்றும் வீரவிளையாட்டுகள்**   **3**

தெருக்கூத்து, கரகாட்டம், வில்லுப்பாட்டு, கணியான்கூத்து, ஒயிலாட்டம், தோல்பாவைக்கூத்து, சிலம்பாட்டம், வளரி, புலியாட்டம், தமிழர்களின் விளையாட்டுகள்.

UNIT IV   **தமிழர்களின் திணைக்கோட்பாடுகள்**   **3**

தமிழகத்தின் தாவரங்களும், விலங்குகளும் – தொல்கப்பியம் மற்றும் சங்க இலக்கியத்தில் அகம் மற்றும் புறக்கோட்பாடுகள் – தமிழர்கள் போற்றிய அறக்கோட்பாடு – சங்ககாலத்தில் தமிழகத்தில் எழுத்தறிவும், கல்வியும் – சங்ககால நகரங்களும் துறைமுகங்களும் – சங்ககாலத்தில் ஏற்றுமதி மற்றும் இறக்குமதி – கடல் கடந்த நாடுகளில் சோழர்களின் வெற்றி.

இந்திய விடுதலைப்போரில் தமிழர்களின் பங்கு – இந்தியாவின் பிறப்பகுதிகளில் தமிழ்ப்பண்பாட்டின் தாக்கம் – சுயமரியாதை இயக்கம் – இந்திய மருத்துவத்தில், சித்த மருத்துவத்தின் பங்கு - கல்வெட்டுகள், கையெழுத்துப்படிகள் – தமிழ்ப்புத்தகங்களின் அச்சுவரலாறு.

TOTAL: 15 PERIODS

TEXT-CUM REFERENCE BOOKS

1. தமிழக வரலாறு – மக்களும் பண்பாடும் - கே.கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணினித்தமிழ் – முனைவர் இல. சுந்தரம். (விகடன்பிரசுரம்).
3. கீழடி – வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
4. பொருநை – ஆற்றங்கரை நாகரிகம். (தொல்லியல்துறை)
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–(inprint)
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)

23MA1201	COMPLEX VARIABLES AND LAPLACE TRANSFORM	L	T	P	C
		3	1	0	4

COURSE OBJECTIVE

- To solve the linear differential equations with constant coefficients.
- To understand the concepts of vectors as it gives the insight into how to trace along the different types of curves.
- To understand the standard technique of a complex variable theory in particular of analytics functions and its mapping property.
- Complex variable techniques have been used in a wide area of engineering.
- To Apply the basic ideas of Laplace Transform to solve the problems in engineering and technology

UNIT I   **ORDINARY DIFFERENTIAL EQUATIONS**   **9+3**

Higher order linear differential equations with constant coefficients -Method of variation of parameters – Homogenous equation of Euler's and Legendre's type – System of simultaneous first order linear differential equations with constant coefficients.

UNIT II   **VECTOR CALCULUS**   **9+3**

Gradient, divergence and curl – Directional derivative – Irrotational and solenoidal vector fields – Vector integration: Green's theorem in a plane - Gauss divergence and Stokes' theorem (excluding proofs) – Simple applications involving cubes, rectangular parallelepiped, sphere and cylinder**.**

UNIT III   **ANALYTIC FUNCTIONS**   **9+3**

Functions of a complex variable–Analytic functions -Cauchy-Riemann equations – Necessaryandsufficientconditions–Harmonicandorthogonalpropertiesofanalytic function – Harmonic conjugate – Construction of analytic functions by Milne Thomson method– Conformal mapping: w =z+c,cz,1/z and bilinear transformation.

UNIT IV   **COMPLEX INTEGRATION**   **9+3**

Line integrals- Cauchy's integral theorem-Cauchy's integral formula - Singularities – Residues– Cauchy's residue theorem - Taylor's and Laurent's series expansions – Application of residue theorem for evaluation of real definite integrals – Use of circular contour and semi- circular contour (excluding poles on the real axis).

UNIT V   **LAPLACE TRANSFORM**   **9+3**

Laplace transform: Sufficient conditions for existence – Transform of elementary functions –Basic properties–Transforms of derivatives and integrals of functions-Derivatives and integrals of transforms - Transforms of unit function, unit step function and unit impulse functions – Transforms of periodic functions– Initial and final value theorems. Inverse Laplace transforms: Convolution theorem–Solution of linear ODE of second order with constant coefficients using the techniques of Laplace transformation.

TOTAL: 60 PERIODS

COURSE OUTCOME

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

- **CO1** Apply various techniques in solving differential equations.
- **CO2** Identify the gradient, divergence and curl of a vector point function and related identities. Evaluation of line, surface and volume integrals using Gauss, Stokes and Green's theorems and their verification.
- **CO3** Understand the concepts of analytic functions, harmonic functions and conformal mapping.
- **CO4** Determine the types of singularities, residues and contour integration.
- **CO5** Solve differential equations using Laplace transform.

TEXT BOOKS

1. Grewal B.S.,- "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 44th Edition,2018.
2. B.V. Ramana, "Higher Engineering Mathematics", McGraw Hill Education, India.
3. Bali N., Goyal M. and Walkins C., "Advanced Engineering Mathematics", Firewall.

REFERENCE BOOKS

1. Kreyszig Erwin, "Advanced Engineering Mathematics", John wiley and Sons, 10th Edition, New Delhi.
2. Sastry, S.S, "Engineering Mathematics", Vol.I& II, PHI LearnigPvt. Ltd, 4th Edition, New Delhi, 2014.
3. Wyile, R.C. and Barrett, L.C., "Advanced Engineering Mathematics "Tata McGraw Hill Education Pvt Ltd, 6thEdition, New Delhi, 2012.
4. Jain R.K. and Iyengar S.R.K., "Advanced Engineering Mathematics", Narosa Publications, New Delhi, 3rd Edition, 2007.
5. O'Neil, P.V. "Advanced Engineering Mathematics", Cengage Learning India Pvt. Ltd, New Delhi, 2007.

ONLINE COURSES / RESOURCES

1. https://onlinecourses.nptel.ac.in/noc21_ma69
2. https://onlinecourses.nptel.ac.in/noc21_ma57

CO-PO MAPPING

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

		L	T	P	C
23EC1201	**ELECTRONIC DEVICES**	**3**	**0**	**0**	**3**

COURSE OBJECTIVE

- To understand the working of PN junction diode.
- To study the basic working of BJT.
- To gain knowledge on FET.
- To acquaint the knowledge on special semiconductor and power devices.
- To know the operation of optical devices.

UNIT I	SEMICONDUCTOR DIODE	9

PN junction behavior, PN junction diode, Current equations, Energy Band diagram, Diffusion and drift current densities, forward and reverse bias characteristics, Transition and Diffusion Capacitances, Switching Characteristics, Breakdown in PN Junction Diodes.
Characteristics of PN diode using simulation tool.

UNIT II	BIPOLAR JUNCTION TRANSISTORS	9

NPN -PNP - Operations-Early effect -Current equations – Input and Output characteristics of CE, CB, CC - h-parameter model, Ebers Moll Model, Multi Emitter Transistor. Case studies.
Characteristics of BJT using simulation tool.

UNIT III	FIELD EFFECT TRANSISTORS	9

JFETs – Drain and Transfer characteristics, -Current equations -Pinch off voltage and its significance- MOSFET- Characteristics- Threshold voltage -Channel length modulation, D-MOSFET, E- MOSFET- Characteristics – Comparison of MOSFET with JFET.
Characteristics of JFET and MOSFET using simulation tool.

UNIT IV	SPECIAL SEMICONDUCTOR DEVICES AND POWER DEVICES	9

Semiconductor Devices: Metal-Semiconductor Junction- MESFET, DUAL GATE MOSFET, Zener diode-Varactor diode - Gallium Arsenide device, LDR.
Power Devices: UJT, SCR, Diac, Triac, Power BJT.
Characteristics of Zener diode, UJT, and SCR using simulation tool.

UNIT V	OPTICAL DEVICES	9

Optical absorption, solar cells, Photodetector, Photoluminescence, electroluminescence, Photo transistor, Opto- Coupler, LCD, CCD.

TOTAL: 45 PERIODS

COURSE OUTCOME

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

- **CO1** Explain the V − I characteristics of semiconductor diode.
- **CO2** Classify the configurations of BJT and understand its equivalence circuits.
- **CO3** Understand the drain – transfer characteristics of FET.
- **CO4** Illustrate the concepts of special semiconductor devices and power devices.
- **CO5** Outline the operation of optical devices.

TEXT BOOKS

1. Donald A Neaman, —Semiconductor Physics and Devices‖, Fourth Edition, Tata Mc Graw Hill Inc. 2012.
2. Salivahanan. S, Suresh Kumar. N, Vallavaraj.A, —Electronic Devices and circuits, Third Edition, Tata McGraw- Hill, 2008.

REFERENCE BOOKS

1. Robert Boylestad and Louis Nashelsky, —Electron Devices and Circuit Theory Pearson Prentice Hall, 10th edition, July 2008.
2. R.S.Sedha, — A Text Book of Applied Electronics Chand Publications, 2006.
3. Yang, —Fundamentals of Semiconductor devices, McGraw Hill International Edition.

WEB REFERENCES

1. https://www.youtube.com/watch?v=w8Dq8blTmSA
2. https://www.youtube.com/watch?v=w8Dq8blTmSA&t=1351s
3. https://www.youtube.com/watch?v=w8Dq8blTmSA&t=1024s
4. https://www.digimat.in/nptel/courses/video/108101091/L01.html

CO-PO MAPPING

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

		L	**T**	**P**	**C**
23ES1201	**PYTHON PROGRAMMING**	**3**	**0**	**0**	**3**

COURSE OBJECTIVE

- To know the basic programming constructs and control structures in python
- To use python data structures – Lists, Tuples and Dictionary
- To define Python functions and use Strings
- To learn about input/output with files in Python.
- To understand python packages and GUI concepts

UNIT I **INTRODUCTION TO PYTHON PROGRAMMING AND CONTROL** **9**
STRUCTURES

Introduction to Python, Demo of Interactive and script mode, Tokens in Python – Variables, Keywords, Comments, Literals, Data types, Indentation, Operators and its precedence, Expressions, Input and Print functions, Type Casting. Illustrative problems: find minimum in a list, guess an integer number in a range, Towers of Hanoi.
Control Structures: Selective statements – if, if-else, nested if, if – elif ladder statements ; Iterative statements - while, for, range functions, nested loops, else in loops, break, continue and pass statements. Illustrative programs: exchange the values of two variables,circulate the values of n variables, distance between two points.

UNIT II **FUNCTIONS AND STRINGS** **9**

Functions: Types, parameters, arguments: positional arguments, keyword arguments, parameters with default values, functions with arbitrary arguments, Scope of variables: Local and global scope, Recursion and Lambda functions.Illustrative programs:power of a number,sorting,Fibonacci series using lambda.
Strings: Formatting, Comparison, Slicing, Splitting, Stripping, Negative indices, String functions, Regular expression: Matching the patterns, Search and replace. Illustrative programs:check whether the string is symmetrical,reverse a string,length of a string.

UNIT III **COLLECTIONS** **9**

List: Create, Access, Slicing, Negative Indices, List Methods, and comprehensions
Tuples: Create, Indexing and Slicing, Operations on tuples.
Dictionary: Create, add, and replace values, operations on dictionaries.
Sets: Create and operations on set.
Illustrative programs: Interchange first and last element in a list,maximum and minimum N elements in a tuple, sort dictionary by key or value, size of a set.

UNIT IV   **FILES AND EXCEPTION HANDLING**   **9**

Files: Open, Read, Write, Append and Close. Tell and seek methods. Illustrative programs: word count, copy file.

Command line arguments, Errors and Exceptions: Syntax Errors, Exceptions, Handling Exceptions, Raising Exceptions, Exception Chaining, User-defined Exceptions, Defining Clean-Up actions.

Illustrative programs: prompt the user to input an integer and raises a ValueError exception if the input is not a valid integer, open a file and handles a FileNotFoundError exception if the file does not exist, prompt the user to input two numbers and raises a TypeError exception if the inputs are not numerical, executes an operation on a list and handles an IndexError exception if the index is out of range.

UNIT V   **PACKAGES & GUI**   **9**

Python packages: Simple programs using the built-in functions of packages matplotlib, numpy, pandas etc. Illustrative programs:create a pandas series using numpy, make a pandas dataframe with 2D list.

GUI Programming: Tkinter introduction, Tkinter and Python Programming, Tk Widgets, Tkinter examples. Python programming with IDE. Illustrative programs: create a GUI mark sheet, calendar, file explorer using Tkinter.

TOTAL: 45 PERIODS

COURSE OUTCOME

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

CO1   Develop and execute simple Python programs using conditionals and loops for solving problems.
CO2   Express proficiency in the handling of strings and functions
CO3   Represent compound data using Python lists, tuples, dictionaries, sets, etc.,
CO4   Read and write data from/to files and handle exceptions in Python programs
CO5   Implement python packages in data analysis and design GUI
CO6   Examine various problem solving concepts in python to develop real time applications.

TEXT BOOKS

1. Paul Deitel and Harvey Deitel, "Python for Programmers", Pearson Education, 1st Edition, 2021.
2. ReemaThareja,"Problem Solving and Programming with Python'', 2nd edition, Oxford University Press, New Delhi, 2019.
3. Alan D. Moore, Python GUI Programming with Tkinter, Design and Build Functional and User-friendly GUI Applications, Packt Publishing, 2021.

REFERENCE BOOKS

1. Eric Matthes, "Python Crash Course, A Hands - on Project Based Introduction to Programming", 2nd Edition, No Starch Press, 2019.
2. Martin C. Brown, "Python: The Complete Reference", 4th Edition, Mc-Graw Hill, 2018
3. Allen B. Downey, "Think Python: How to Think like a Computer Scientist", 2nd Edition, O'Reilly Publishers, 2016.

ONLINE COURSES / RESOURCES

1. https://docs.python.org/3/tutorial/
2. https://www.w3schools.com/python/
3. https://www.tutorialspoint.com/python/index.htm
4. https://www.javatpoint.com/python-tutorial
5. https://nptel.ac.in/courses/

CO-PO MAPPING

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

23HS1201	COMMUNICATIVE AND APTITUDE SKILLS	L	T	P	C
		2	0	2	3

COURSE OBJECTIVE
- To develop linguistic and strategic competence in workplace context and to enhance language proficiency and thereby the employability of budding engineers and technologists.
- To improve the relevant language skills necessary for professional communication.
- To help learners to develop their listening skills, which will, enable them to listen to lectures and comprehend them by asking questions; seeking clarification and developing their speaking skills and to speak fluently in real contexts.
- To improve the verbal ability skill and communicative skill of the students.
- To enhance the analytical and problem solving skills of the students.
- To prepare them for various public and private sector exams & placement drives.

UNIT I   **INTERPERSONAL COMMUNICATION**   **6**

Listening: Listening to Telephone Etiquettes and Conversations. **Speaking**: Role Play Exercises Based on Workplace Contexts, Introducing Oneself - PEP Talks. **Reading**: Reading the Interview of an Achiever and Completing Exercises (Skimming, Scanning and Predicting). **Writing**: Writing a Short Biography of an Achiever Based on Given Hints, **Grammar**: Comparative Adjective, Numerical Expressions and Sentence pattern. **Vocabulary Development**: Idioms and Phrases

UNIT II   **TECHNICAL COMMUNICATION**   **6**

Listening: Listening to Talks/Lectures Both General and Technical and Summarizing the Main Points. **Speaking**: Participating in Debates, TED Talks.**Reading**: Reading Technical Essays/ Articles and Answering Comprehension Questions.**Writing**: Summary Writing, Minutes of the meeting.**Grammar**: Prepositional Phrases and Relative Clauses.**Vocabulary Development:** Abbreviations and Acronyms.

UNIT III   **PROCESS DESCRIPTION**   **6**

Listening: Listening to a Process Description and Drawing a Flowchart. **Speaking**: Participating in Group Discussions, Giving Instructions, Presentation. **Reading**: Reading Instruction Manuals **Writing**: Process Descriptions – Writing Instructions **Grammar**: Use of Imperatives, Tenses, Impersonal Passive Voice and Phrasal verbs **Vocabulary Development**: Misspelt words. Homophones and Homonyms.

UNIT IV   **REPORT WRITING**   **6**

Listening: Listening to a Presentation and Completing Gap-Filling Exercises. **Speaking**: Making Formal Presentations, **Reading**: Reading and Interpreting Charts/Tables and diagrams. **Writing**: Interpreting Charts/Tables and Diagrams, Writing a Report. **Grammar**: Reported Speech; Interrogatives- Question Tags and Articles – omission of articles **Vocabulary Development**: Technical Jargon

UNIT V   **INTERVIEW SKILLS**   **6**

Listening: Listening to a Job Interview and Completing Gap-Filling Exercises **Speaking**: Mock Interview, Telephone Interviews & Etiquette, and Group Discussion .**Reading:** Reading a Job Interview, SOP, Company Profile and Completing Comprehension Exercises **Writing**: Job Applications and Resume. **Grammar**: Conditional Clauses, Modal verbs **Vocabulary Development:** Technical Vocabulary, Purpose Statement. **Aptitude Skills: Ratio and Proportion** – Ratio, Proportion, Simple equations, Problems on Ages. **Percentages** - Percentages increase/decrease, Simple and Compound interest. **Number system -** Factors, Multiples - HCF and LCM. **Permutation** - Combination and Probability

TOTAL: 30 PERIODS

TEXT BOOKS
1. Board of Editors. English for Engineers and Technologists Volume 2 Orient Black Swan Limited, 2020
2. Richards, C. Jack. Interchange, New Delhi: CUP, 2017
3. Aggarwal R.S. (2017). Quantitative Aptitude for Competitive Examinations 3rd (Ed.) New Delhi: S.Chand Publishing.

REFERENCE BOOKS
1. Sharma Arun.(2016). Quantitative Aptitude, 7th (Ed.). Noida: McGraw Hill Education Pvt. Ltd.
2. Kumar, Suresh. E. Engineering English. Orient Blackswan: Hyderabad,2015
3. Raman, Meenakshi and Sharma, Sangeetha- Technical Communication Principles and Practice. Oxford University Press: New Delhi, 2014.
4. Grussendorf, Marion, English for Presentations, Oxford University Press, Oxford: 2007.
5. Means, L. Thomas and Elaine Langlois, English & Communication For Colleges. Cengage Learning, USA: 2007.

WEB REFERENCES
1. https://learnenglishteens.britishcouncil.org/exams/grammar-and-vocabularyexams/word-formation.
2. https://cdn.s3waas.gov.in/s347d1e990583c9c67424d369f3414728e/uploads/2018.
3. http://xn--englishclub-ql3f.com/grammar/parts-of-speech.html.
4. https://www.edudose.com/english/grammar-degree-of-comparison-rules/
5. https://www.math-only-math.com/practice-test-on-ratio-and-proportion.html
6. https://www.hitbullseye.com/Simple-Interest-and-Compound-Interest.php

ONLINE COURSES / RESOURCES
1. https://basicenglishspeaking.com/wh-questions/
2. https://agendaweb.org/verbs/modals-exercises.html
3. https://cdn.s3waas.gov.in/s347d1e990583c9c67424d369f3414728e/uploads/2018/02/2018031621.pdf
4. https://www.ego4u.com/en/cram-up/grammar/prepositions
5. https://www.classcentral.com/course/quantitative-methods-4340
6. https://www.classcentral.com/subject/qualitative-research

LIST OF EXPERIMENTS

1. Speaking- sharing personal information- self introduction
2. Speaking- Group Discussion, Small talk or Peb Talk
3. Speaking- Presentation- Formal and Informal
4. Speaking- Mock Interview
5. Speaking- FAQ's on Job Interview
6. Speaking – JAM
7. Speaking- Debate and Story Narration
8. Writing: Error Detection- Spotting and reasoning the errors from the passages in competitive exams.
9. Writing: Letter of recommendation
10. Writing: Elements of a good essay
11. Writing: Types of essays. Descriptive – Narrative-Issue based.

TOTAL: 30 PERIODS

REFERENCE BOOKS

1. Sharma Arun.(2016). Quantitative Aptitude, 7th (Ed.). Noida: McGraw Hill Education Pvt. Ltd.,
2. Kumar, Suresh. E. Engineering English. Orient Blackswan: Hyderabad,2015
3. Raman, Meenakshi and Sharma, Sangeetha- Technical Communication Principles and Practice. Oxford University Press: New Delhi, 2014.
4. Grussendorf, Marion, English for Presentations, Oxford University Press, Oxford: 2007.
5. Means, L. Thomas and Elaine Langlois, English & Communication For Colleges. Cengage Learning, USA: 2007.

COURSE OUTCOME

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

CO1	Recognise the need for life skills; apply them to different situations, the basic communication practices in different types of communication.
CO2	Gain confidence to communicate effectively in various situations to acquire employability skills.
CO3	Develop knowledge, skills, and judgment around human communication that facilitate their ability to work collaboratively with others.
CO4	Communicate effectively & appropriately in real life situation and enhance student's problem solving skill.
CO5	Prepare for various public and private sector exams & placement drives.
CO6	Enhance students' problem solving skills.

CO-PO MAPPING

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

		L	**T**	**P**	**C**
23ES1204	**BASIC ELECTRICAL CIRCUITS AND ENGINEERING**	**3**	**0**	**2**	**4**

COURSE OBJECTIVE
● To learn the basic concepts and behaviour of DC and AC circuits.
● To understand various methods of circuit/ network analysis using network theorems.
● To impart knowledge in types, construction and working of Electrical machines
● To introduce the functional elements and working of measuring instruments
● To understand the concepts of Solar PV system &Hybrid Electric Vehicle.

UNIT I   BASIC CIRCUITS ANALYSIS   9

Basic Components of electric Circuits, Ohms Law, Kirchoff's Law, Resistors in Series and Parallel, Voltage and current division, Nodal analysis, Mesh analysis.

UNIT II   NETWORK THEOREMS AND TWO PORT NETWORK   9

Thevenin's and Norton's Theorems – Superposition Theorem – Maximum power transfer theorem – Two port Parameter: Z,Y and h parameters

UNIT III   ELECTRICAL MACHINES   9

Principles and operation, characteristics of DC Motors, DC Generators, Single Phase Transformer, single phase induction Motor.

UNIT IV   MEASUREMENTS & INSTRUMENTATION   9

Functional elements of an instrument, Standards and calibration, Operating Principle , types - Moving Coil and Moving Iron meters, Measurement of three phase power, Energy Meter, Instrument Transformers-CT and PT,DSO- Block diagram- Data acquisition

UNIT V   SOLAR PV SYSTEM AND ELECTRIC VEHICLE   9

Solar PV system- Introduction-Comparison with Electrical and Hybrid Electrical vehicle-Construction and working of PHEV-Block diagram and components-Charging mechanisms-Advantages of PHEVs- Solar and Battery powered Electric Vehicle

TOTAL: 45 PERIODS

TEXT BOOKS
1. Hayt Jack Kemmerly, Steven Durbin, "Engineering Circuit Analysis",McGraw Hill education, 9th Edition, 2018.
2. Kothari DP and I.J Nagrath, "Basic Electrical and Electronics Engineering", Second Edition, McGraw Hill Education, 2020.
3. Advanced Electric Drive Vehicles, Ali Emadi, CRC Press, First edition 2017.
4. A.K. Sawhney, Puneet Sawhney 'A Course in Electrical & Electronic Measurements & 49 Instrumentation', DhanpatRai and Co, New Delhi, 2015

REFERENCE BOOKS

1. Kothari DP and I.J Nagrath, "Basic Electrical Engineering", Fourth Edition, McGraw Hill Education, 2019.
2. Joseph Edminister and MahmoodNahvi, —Electric Circuits, Schaum's Outline Series, Tata McGraw Hill Publishing Company, New Delhi, Fifth Edition Reprint 2016
3. Richard C. Dorf and James A. Svoboda, "Introduction to Electric Circuits", 7th Edition, John Wiley & Sons, Inc. 2015.
4. Mehrdad Ehsani, Yimin Gao, Sebastian E. Gay, Ali Emadi, 'Modern Electric, Hybrid Electric and Fuel Cell Vehicles: Fundamentals, Theory and Design', CRC Press, 2004.
5. Chakrabarti A, "Circuits Theory (Analysis and synthesis), Dhanpath Rai& Sons, New Delhi, 1999.

WEB REFERENCES

1. https://www.electrical4u.com/electrical-engineering-articles/basic-electrical/
2. https://library.automationdirect.com/basic-electrical-theory/

ONLINE COURSES / RESOURCES

1. https://onlinecourses.nptel.ac.in/noc22_ee90/preview
2. https://onlinecourses.nptel.ac.in/noc22_ee53/preview

LIST OF EXPERIMENTS

1. Electrical House Wiring:
   (i)Residential house wiring using switches, fuse, indicator, lamp and energy meter.
   (ii)Fluorescent lamp wiring.
   (iii)Stair case wiring
   (iv)Study of Home Appliances- wiring and assembly
   (v)Study of Protective Devices
2. Measurement of electrical quantities – voltage, current, power, &power factor in RLC circuit.
3. (i)Study of Electronic components and equipment's – Resistor color coding
   (ii)Soldering practice – Components Devices and Circuits – Using general purpose PCB.
4. Experimental verification of Kirchhoff's current and voltage law
5. Simulation and Experimental verification of Thevenin's and Norton's theorem
6. Simulation and Experimental verification of Superposition theorem
7. PCB design using Suitable Software.

SOFTWARE REQUIRED:MATLAB, Fusion 360

TOTAL: 30 PERIODS

COURSE OUTCOME

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

CO1 Apply the basic concepts of circuit analysis such as Kirchoff's laws, mesh current and node voltage method for analysis of DC and AC circuits.
CO2 Apply network theorems to analyse AC and DC circuits
CO3 Explain the Construction and working of DC machines.
CO4 Understand the construction and working principle of Ac Machines
CO5 Explain the types and operating principles of measuring instruments
CO6 Illustrate the concepts related in the solar PV system and Hybrid Electric Vehicles

CO-PO MAPPING

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

23EC1211	CIRCUITS AND DEVICES LABORATORY	L	T	P	C
		0	0	4	2

COURSE OBJECTIVE
- To learn the characteristics of basic electronic devices.
- To learn the characteristics of transistors and SCR
- To design RL, RC and RLC circuits
- To understand Thevenin & Norton theorem KVL & KCL, and Super Position Theorems.
- To demonstrate the characteristics of semiconductor devices using a simulation software.

LIST OF EXPERIMENTS
1. Characteristics of PN Junction Diode
2. Characteristics of Zener diode & Zener diode Load Regulation
3. Common Emitter input-output Characteristics
4. Common Base input-output Characteristics
5. FET Characteristics
6. SCR Characteristics
7. Observe Transistor as an Electronic Switch
8. V-I Characteristics of UJT
9. Characteristics of LDR, Photo Diode and Photo Transistor
10. Characteristics of TRIAC and DIAC
11. Characteristics of LED
12. Transient analysis of RL and RC circuits

Demonstration: Characteristics of semiconductor devices like PN diode, Zener diode, BJT, FET, and SCR using a simulation tool.

TOTAL: 60 PERIODS

COURSE OUTCOME

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

CO1 Understand the characteristics of electronic devices

CO2 Understand the behavior of the transistors, UJT and SCR

CO3 Analyze the characteristics of LED, LDR, Photo Diode and Photo Transistor

CO4 Analyze the characteristics of TRIAC and DIAC

CO5 Demonstration of simulated semiconductor devices and compare the characteristics.

REFERENCE BOOKS

1. H. Hayt, Jr. Jack E. Kemmerly and steven M. Durbin, "Engineering Circuit Analysis", McGraw Hill Science Engineering, Eighth Edition, 11th Reprint 2016.
2. Donald A Neaman, "Semiconductor Physics and Devices", Tata McGrawHill Inc. 2012.
3. Robert Boylestad and Louis Nashelsky, -Electron Devices and Circuit Theory Pearson prentice Hall,10th edition, July 2008.

CO-PO MAPPING

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

23ES1211	PYTHON PROGRAMMING LABORATORY	L	T	P	C
		0	0	4	2

COURSE OBJECTIVE
- To write, test, and debug simple Python programs
- To implement Python programs with conditions and loops
- To use functions for structuring Python programs.
- To represent compound data using Python lists, tuples, dictionaries.
- To learn to implement string functions and file operations
- To understand python packages and GUI development.

LIST OF EXPERIMENTS

1. Basic Python Programs
2. Write programs to demonstrate different number data types in python
3. Develop python programs to demonstrate various conditional statements
4. Implement user defined functions using python
5. Develop python scripts to demonstrate built-in functions
6. Develop python programs to perform various string operations like slicing, indexing & formatting
7. Develop python programs to perform operations on List & Tuple
8. Demonstrate the concept of Dictionary with python programs
9. Develop python programs to perform operations on Sets.
10. Develop python codes to perform matrix addition, subtraction and transpose of the given matrix
11. Develop python codes to demonstrate the concept of function composition and anonymous functions.
12. Demonstrate python codes to print try, except and finally block statements
13. Implement python programs to perform file operations
14. Write a python code to raise and handle various built in exceptions.
15. Implement python programs using packages numpy and pandas
16. UI development using tkinter

Mini Project :Suggested Topics(but not limited to)
- Dice roll simulator
- Guess the number game
- Random password generator

TOTAL: 60 PERIODS

COURSE OUTCOME

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

CO1 Develop and execute simple Python programs

CO2 Implement programs in Python using conditionals and loops for solving problems.

CO3 Deploy functions to decompose a Python program.

CO4 Develop programs using string operations.

CO5 Utilize Python packages in data analysis

CO6 Create GUI for python applications

WEB REFERENCE

1. https://www.programiz.com/python-programming/examples
2. https://www.geeksforgeeks.org/python-programming-examples/
3. https://beginnersbook.com/2018/02/python-programs/
4. https://www.javatpoint.com/python-programs
5. https://www.w3schools.com/python/python_examples.asp

CO-PO MAPPING

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

	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

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

UNIT I   WEAVING AND CERAMIC TECHNOLOGY   3

Weaving Industry during Sangam Age – Ceramic technology –Black and Red Ware Potteries (BRW) –Graffition 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 - Archaeological evidences - Gem stone types described in Silappathikaram.

UNIT IV   AGRICULTUREAND IRRIGATION TECHNOLOGY   3

Dam, Tank, ponds, Sluice, Significance of Kumizhi Thoompu 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. கணினித்தமிழ் – முனைவர் இல. சுந்தரம். (விகடன்பிரசுரம்).
3. கீழடி – வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
4. பொருநை – ஆற்றங்கரை நாகரிகம். (தொல்லியல்துறை)
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–(inprint)
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)

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

UNIT I   **நெசவு மற்றும் பானைத்தொழில்நுட்பம்**   **3**

சங்க காலத்தில் நெசவுத்தொழில் - பானைத்தொழில்நுட்பம் – கருப்பு சிவப்பு பாண்டங்கள் – பாண்டங்களில் கீறல் குறியீடுகள்.

UNIT II   **வடிவமைப்பு மற்றும் கட்டிடத்தொழில்நுட்பம்**   **3**

சங்ககாலத்தில் வடிவமைப்பு மற்றும் கட்டுமானங்கள் & சங்ககாலத்தில் வீட்டுப்பொருட்களில் வடிவமைப்பு – சங்ககாலத்தில் கட்டுமானப்பொருட்களும் நடுகல்லும் – சிலப்பதிகாரத்தில் மேடை அமைப்பு பற்றிய விவரங்கள் - மாமல்லபுரச்சிற்பங்களும், கோவில்களும் – சோழர்காலத்துப்பெருங்கோயில்கள் மற்றும் பிற வழிபாட்டுத்தலங்கள் – நாயக்கர் காலக்கோயில்கள் – மாதிரி கட்டமைப்புகள் பற்றி அறிதல், மதுரை மீனாட்சி அம்மன் ஆலயம் மற்றும் திருமலை நாயக்கர் மஹால் – செட்டிநாடு வீடுகள் – பிரிட்டிஷ் காலத்தில் சென்னையில் இந்தோ-சாரோசோனிக்கட்டிடக்கலை.

UNIT III   **உற்பத்தி தொழில்நுட்பம்**   **3**

கப்பல் கட்டும்கலை - உலோகவியல் - இரும்புத்தொழிற்சாலை – இரும்பை உருக்குதல், எஃகு – வரலாற்றுச்சான்றுகளாக செம்பு மற்றும் தங்க நாணயங்கள் – நாணயங்கள் அச்சடித்தல் – மணி உருவாக்கும் தொழிற்சாலைகள் – கல்மணிகள், கண்ணாடிமணிகள் - சுடுமண்மணிகள் - சங்குமணிகள் - எலும்புத்துண்டுகள் - தொல்லியல்சான்றுகள் – சிலப்பதிகாரத்தில் மணிகளின் வகைகள்.

UNIT IV   **வேளாண்மை மற்றும் நீர் பாசனத்தொழில்நுட்பம்**   **3**

அணை, ஏரி, குளங்கள், மதகு – சோழர் காலக்குழிழித்தூம் பின் முக்கியத்துவம் – கால்நடை பராமரிப்பு – கால்நடைகளுக்காக வடிவமைக்கப்பட்ட கிணறுகள் – வேளாண்மை மற்றும் வேளாண்மைச்சார்ந்த செயல்பாடுகள் – கடல்சார் அறிவு - மீன்வளம் – முத்து மற்றும் முத்துக்குளித்தல் – பெருங்கடல் குறித்த பண்டைய அறிவு - அறிவுசார்சமூகம்.

UNIT V   **அறிவியல் தமிழ் மற்றும் கணினித்தமிழ்**   **3**

அறிவியல்தமிழின் வளர்ச்சி - கணினித்தமிழ் – தமிழ் நூல்களை மின்பதிப்பு செய்தல் – தமிழ்மென் பொருட்கள் உருவாக்கம் – தமிழ் இணையக்கல்விக்கழகம் – தமிழ்மின் நூலகம் – இணையத்தில் தமிழ் அகராதிகள் - சொற்குவைத்திட்டம்.

TOTAL: 15 PERIODS

TEXT-CUM REFERENCE BOOKS

1. தமிழக வரலாறு – மக்களும் பண்பாடும் - கே.கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணினித்தமிழ் – முனைவர் இல. சுந்தரம். (விகடன்பிரசுரம்).
3. கீழடி – வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
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23MC1201	ENVIRONMENTAL SCIENCE	L	T	P	C
		2	0	0	0

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 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

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, student will be able to

CO1   Recognize and understand the functions of environment, ecosystems   and biodiversity and their conservation.

CO2   Identify the causes, effects and environmental pollution and natural disasters and contribute to the preventive measures in the immediate society.

CO3   Identify and apply the understanding of renewable and non-renewable resources and contribute to the sustainable measures to preserve them for future generations.

CO4   Recognize different forms of energy and apply them for suitable applications in for technological advancement and societal development.

CO5   Demonstrate the knowledge of societal activities 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. AnubhaKaushik 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.
2. ErachBharucha "Textbook of Environmental Studies for Undergraduate Courses" Orient BlackswanPvt. Ltd. (2013).
3. Dharmendra S. Sengar, 'Environmental law', Prentice hall of India PVT. LTD, New Delhi, 2007.
4. Cunningham, W.P. Cooper, T.H. Gorhani, 'Environmental Encyclopedia', Jaico Publ., House, Mumbai, 2001.

CO-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