

PANIMALAR ENGINEERING COLLEGE

An Autonomous Institution, Affiliated to Anna University, Chennai

(JAISAKTHI EDUCATIONAL TRUST)

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

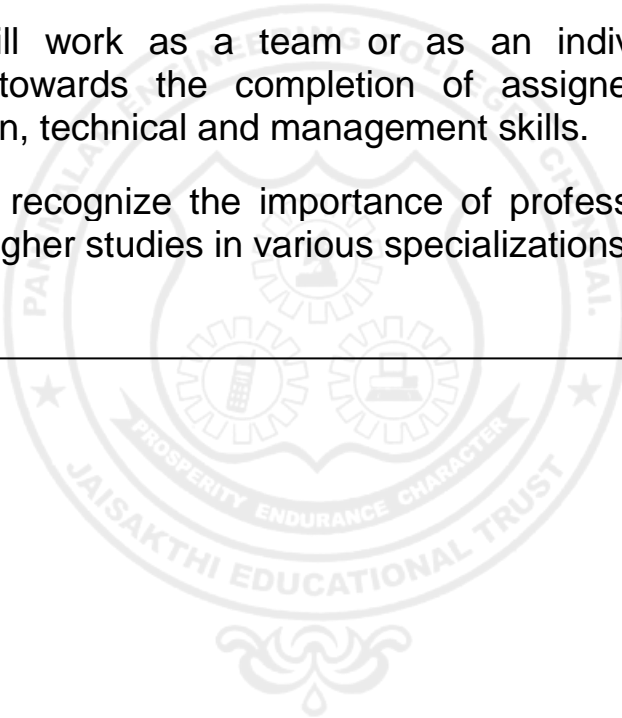


Department of Mechanical Engineering B.E- Mechanical Engineering

**CURRICULUM AND SYLLABUS
REGULATION-2023**

PROGRAMME EDUCATIONAL OBJECTIVES (PEO)

1. Graduates will contribute to the industrial and societal needs as per the recent developments using knowledge acquired through basic engineering education and training.
2. Graduates will be able to demonstrate technical knowledge and skills in their career with systems perspective, analyze, design, develop, optimize, and implement complex mechanical systems.
3. Graduates will be able to work in multidisciplinary environment developing complex mechanical systems.
4. Graduates will work as a team or as an individual with utmost commitment towards the completion of assigned task using apt communication, technical and management skills.
5. Graduate will recognize the importance of professional development by pursuing higher studies in various specializations.



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)

PSO 1: Fundamental Domain Knowledge: Design mechanical systems in various fields of machine elements, thermal, manufacturing, industrial and inter disciplinary fields using engineering/technological tools

PSO 2: Usage of software programs: Resolve new challenges in Mechanical Engineering using modern computer tools and software programs.

PSO 3: Continual learning and Research: Develop intellectual and technical solution to complex mechanical problems through continual learning and research.



B.E- Mechanical Engineering
CHOICE BASED CREDIT SYSTEM (CBCS)
I - II SEMESTERS CURRICULUM AND SYLLABI (REGUALTION 2023)

Semester I							
S. No	COURSE CODE	COURSE TITLE	Category	L/T/P	Contact Hours	Credit	Ext / Int Weightage
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	தமிழர் மரபு / Heritage of Tamils	HS	1/0/0	1	1	60/40
TOTAL				13/1/10	24	19	

Semester II							
S. No	COURSE CODE	COURSE TITLE	Category	L/T/P	Contact Hours	Credit	Ext / Int Weightage
Theory Courses							
1.	23MA1202	Complex Variables and Numerical Methods	BS	3/1/0	4	4	60/40
2.	23ME1201	Engineering Mechanics	PC	3/0/0	3	3	60/40
3.	23ES1203	Basic Electrical Engineering	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.	23ES1203	Fundamentals of Python programming	ES	2/0/2	4	3	50/50
Laboratory Courses							
6.	23ES1212	Technical Skills Practices -I	EEC	0/0/2	2	1	40/60
7.	23ES1213	Product Development Laboratory	ES	0/0/4	4	2	40/60
8.	23ES1214	Electrical Engineering Laboratory	ES	0/0/4	4	2	40/60
Mandatory Course							
9.	23TA1201	தமிழரும் தொழில்நுட்பமும்/ Tamil and Technology	HS	1/0/0	1	1	60/40
10.	23MC1201	Environmental Science	MC	2/0/0	2	0	0/100
TOTAL				16/1/14	31	22	

SEMESTER – I

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**

Eigen values and Eigenvectors of a real matrix - Characteristic equation -Properties of Eigen values 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**

Double integrals 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, students 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, 44th 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 Pvt. Ltd.), New Delhi, 7th Edition, 2015.

REFERENCE BOOKS

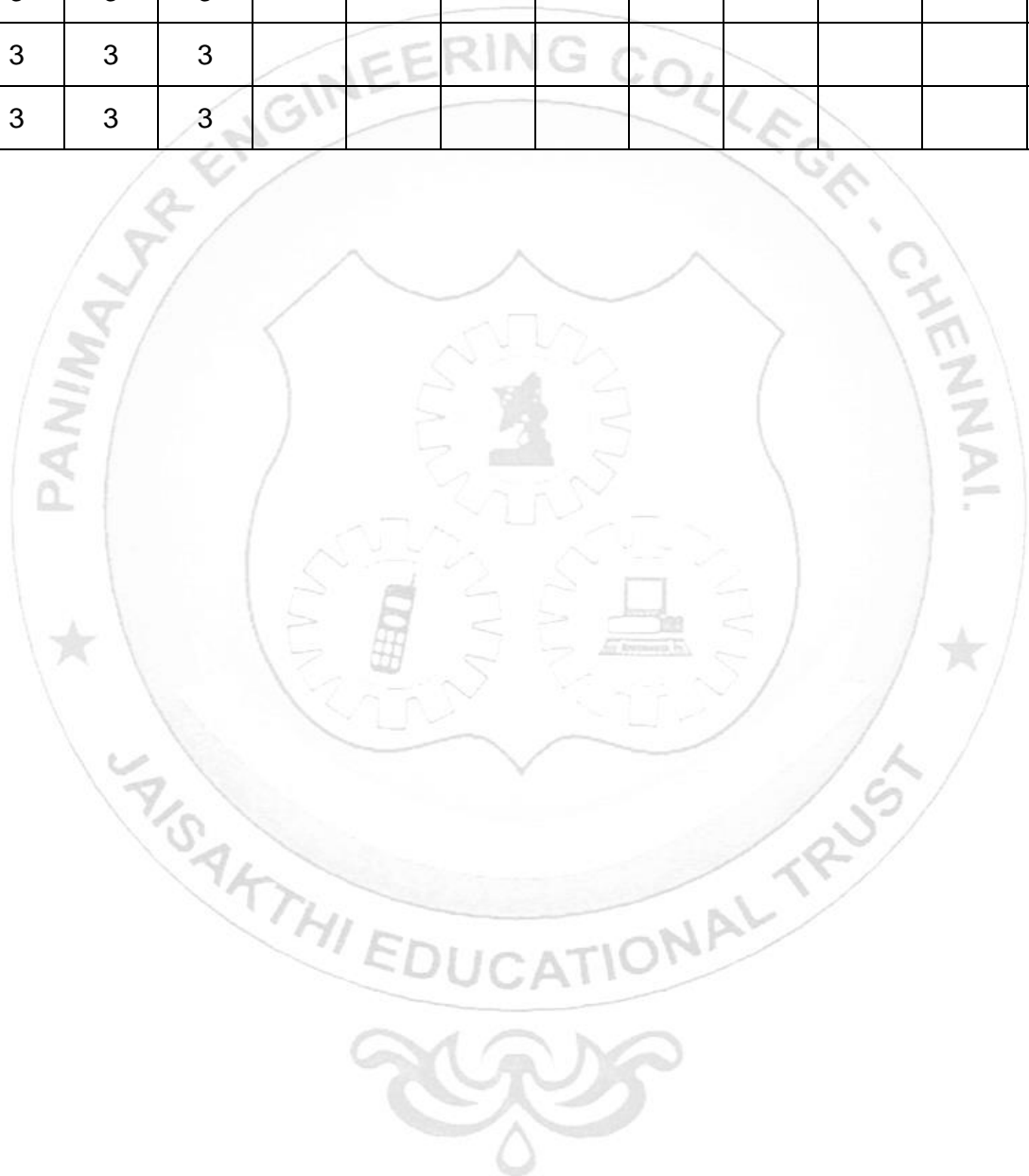
1. Narayanan, S. and Manicavachagom Pillai, T. K., "Calculus" Volume I and II, S. Viswanathan Publishers Pvt.Ltd.Chennai, 2007.
2. Srimantha Paland Bhunia, S.C., "Engineering Mathematics" Oxford University Press, 2015.
3. B.V. Ramana "Higher Engineering Mathematics", McGraw Hill Education, India.
4.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

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



23ES1101	PROBLEM SOLVING USING C PROGRAMMING	L	T	P	C
		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 9 **BASICS OF C PROGRAMMING**

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 9 **ARRAYS AND STRINGS**

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 9 **FUNCTIONS AND POINTERS**

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 9 **STRUCTURES AND UNION**

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.

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 completion of the course, students 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.

TEXT BOOKS

1. ReemaThareja, —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. PradipDey, Manas Ghosh, —Fundamentals of Computing and Programming in C, First Edition, Oxford University Press, 2009.
4. Anita Goel and Ajay Mittal, —Computer Fundamentals and Programming in C, Dorling Kindersley (India) Pvt. Ltd., Pearson Education in South Asia, 2011.
5. Byron S. Gottfried, "Schism"s Outline of Theory and Problems of Programming with C", McGraw-Hill Education, 1996.

WEB REFERENCES

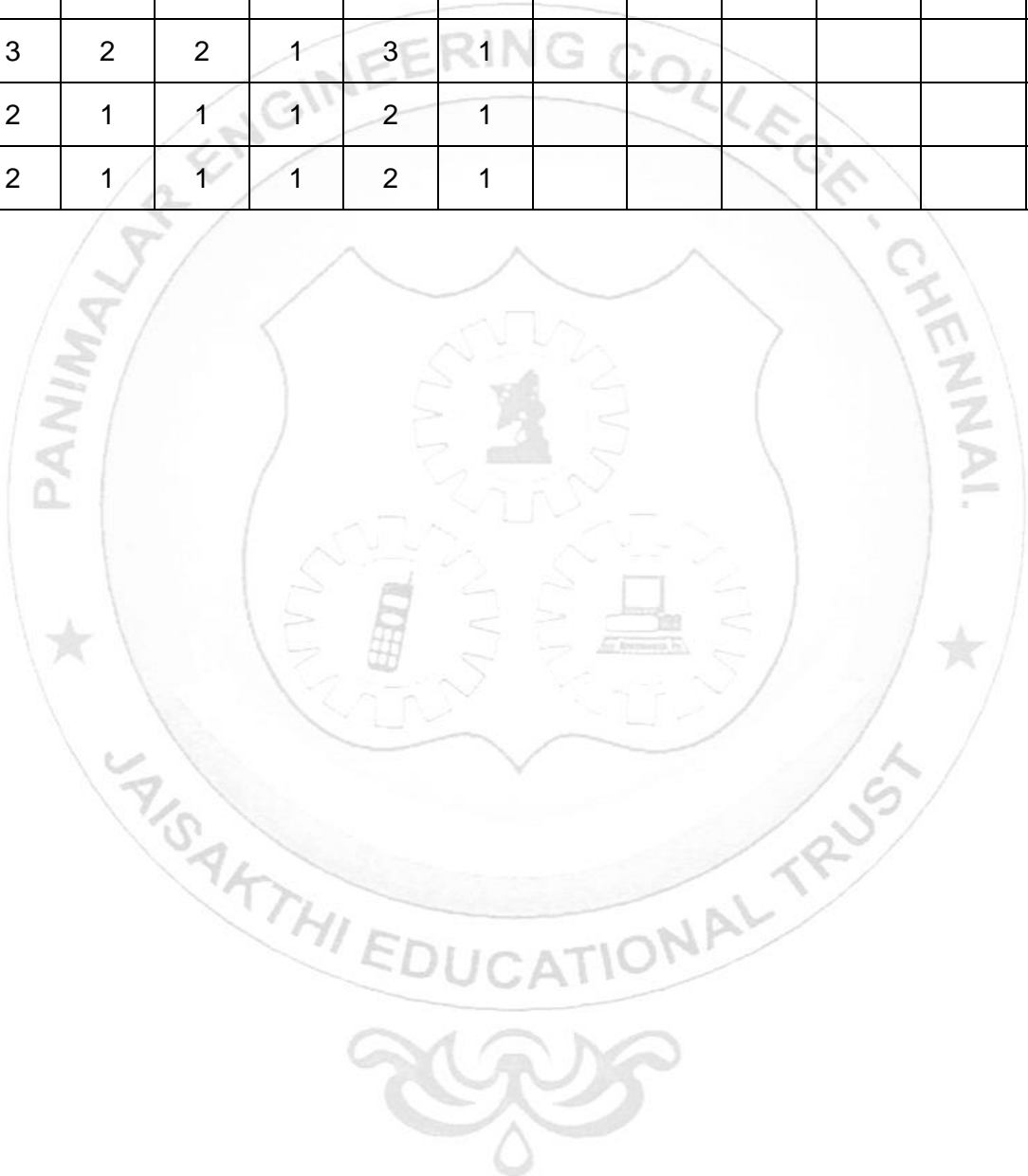
1. <https://github.com/tscheffl/ThinkC/blob/master/PDF/Think-C.pdf>
2. <https://freecomputerbooks.com/langCBooks.html>

ONLINE COURSES / RESOURCES

1. <https://www.programiz.com/c-programming>
2. <https://www.tutorialspoint.com/cprogramming/index.html>
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, students 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", 28thEd.,Dhanalakshmi Publishers, Chennai, 2015.
2. Venugopal, K. and Prabhu Raja, V., "Engineering Graphics", New Age Publications,2008.

REFERENCE BOOKS

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

WEB REFERENCES:

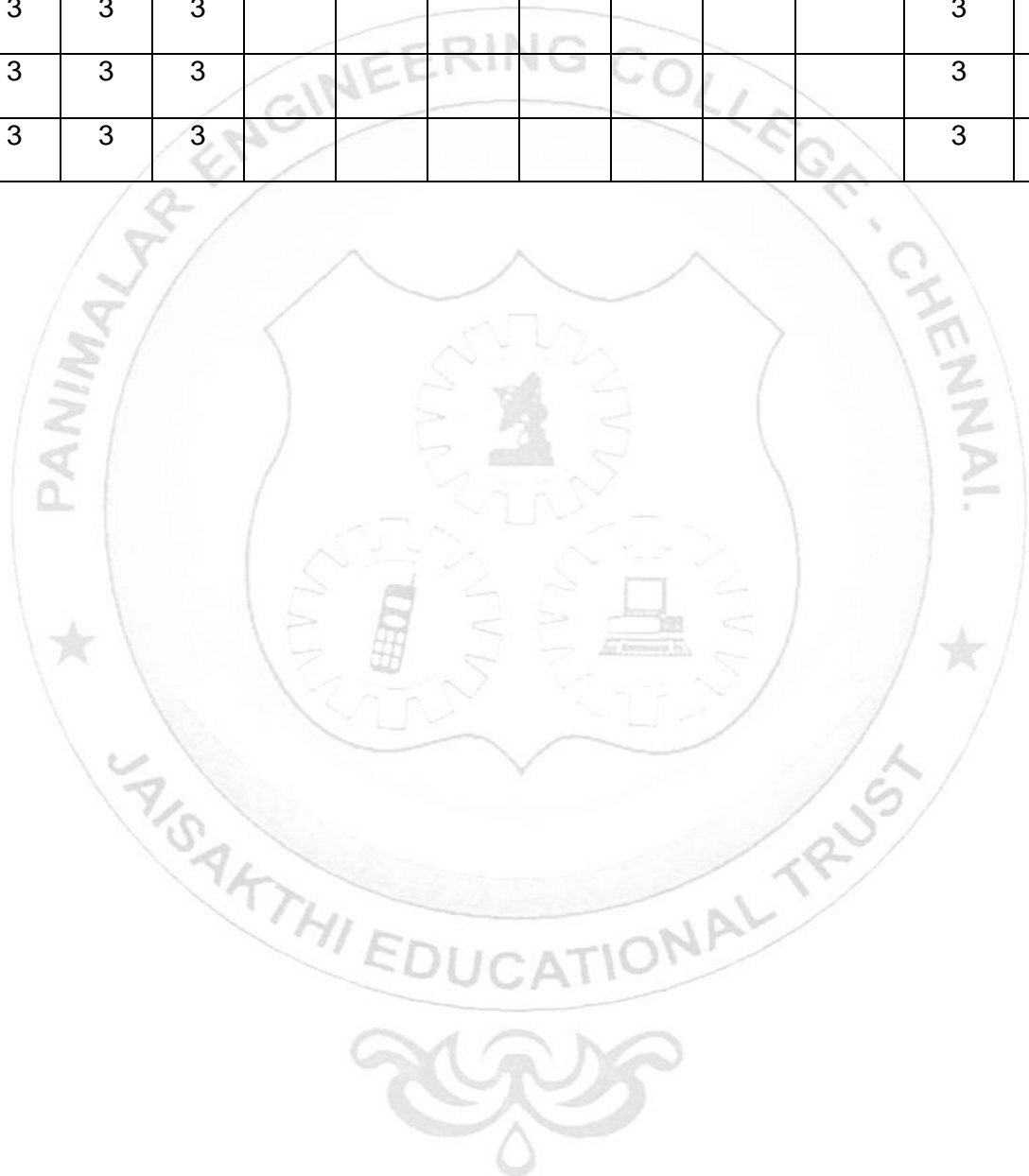
1. <https://nptel.ac.in/courses/105/104/105104148/>
2. <https://www.youtube.com/channel/UckCk0nvNyWhEOLge9JtDLDg>

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



23HS1101	COMMUNICATIVE ENGLISH AND LANGUAGE SKILLS	L	T	P	C
		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 6 INFORMAL COMMUNICATION

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 6 CONVERSATIONAL PRACTICE

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 6 OFFICIAL COMMUNICATIONS

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 6 COMMUNICATION AT WORK PLACE

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.

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
3. Means, L. Thomas and Elaine Langlois. English & Communication For Colleges. Cengage Learning, USA: 2007
4. Redston, Chris & Gillies Cunningham Face2Face (Pre-intermediate Student's Book & Workbook) Cambridge University Press, New Delhi: 2005.

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1. <https://learnenglishteens.britishcouncil.org/exams/grammar-and-vocabulary-exams/wordformation>
2. https://cdn.s3waas.gov.in/s347d1e990583c9c67424d369f3414728e/uploads/2018/02/20180316_21.pdf
3. <http://xn--englishclub-ql3f.com/grammar/parts-of-speech.htm>
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/2018/02/2018031621.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

REFERENCES

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, students 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

23PH1101	ENGINEERING PHYSICS	L	T	P	C
		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 MATERIAL 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.

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 EXPERIEMENTS

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, students will be able to:

- CO1** Understand the basics properties of materials, especially elastic and thermal properties of materials.
- CO2** 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 user defined 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 a telephone directory using random access file.
18. Count the number of account holders whose balance is less than the minimum balance using sequential access file.
19. MINI PROJECT
- Create a —Railway reservation systemll 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, students will be able to:

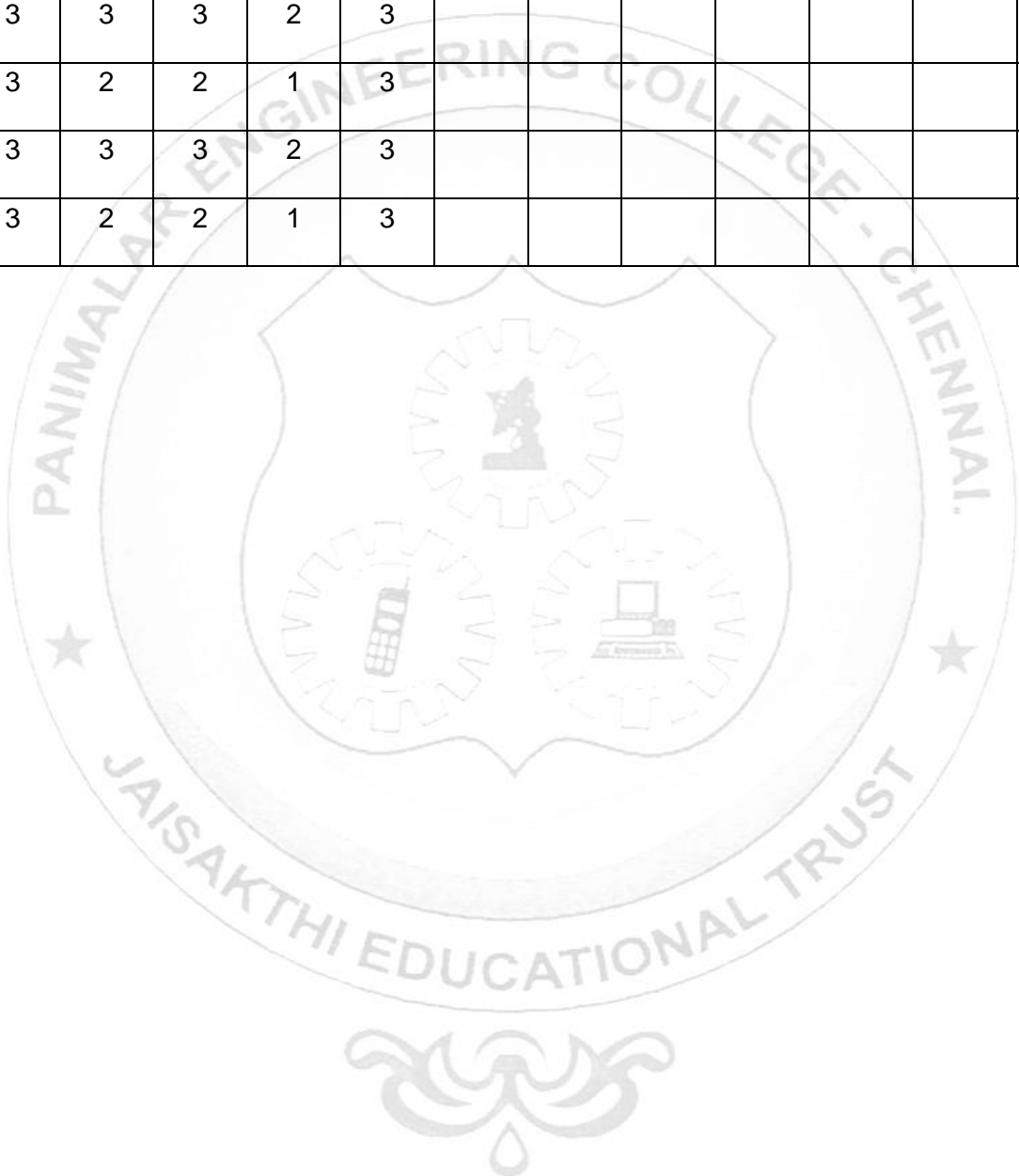
- CO1** Write, test, and debug simple C programs.
- CO2** Implement C programs with conditionals and loops.
- CO3** Develop C programs for simple applications making use arrays and strings.
- CO4** Develop C programs involving functions, recursion, pointers, and structures and union.
- CO5** Design applications using sequential and random access file processing.

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.htm

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–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-ROCKARTPAINTINGSTO MODERNART-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 Socia land Economic Life of Tamils.

UNIT-III FOLKANDMARTIALARTS 3

Therukoothu, Karagattam, VilluPattu, KaniyanKoothu, Oyillattam, Leather puppetry, Silambattam,Valari, Tigerdance-Sports and Games of Tamils.

UNIT-IV THINAICONCEPTOFTAMILS 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 ofSangamAge-ExportandImportduringSangamAge-OverseasConquestofCholas.

UNIT-V CONTRIBUTION OF TAMILS TO INDIAN NATIONAL MOVEMENT AND INDIANCULTURE 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 பணிகள்கழகம்).
2. கணினித்தமிழ் – முனைவர் இல. சந்திரம். (விகடன்பிரசுரம்).
3. கீழடி – வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல்துறைவெளியீடு)

4. பொருறை – ஆற்றங்கரை நாகரிகம். (தொல்லியல்துறை)
5. HeritageoftheTamils(Dr.S.V.Subatamanian,Dr.K.D.Thirunavukkarasu)(PublishedSo
cialLifeofTamils(Dr.K.K.Pillay) A joint publication of TNTB&ESC and RMRL–(inprint)
6. SocialLifeoftheTamils-
TheClassicalPeriod(Dr.S.Singaravelu)(Publishedby:InternationalInstitute ofTamil
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 &TamilNadu Text Book and Educational Services
Corporation, Tamil Nadu)
10. Studies in the History of India with Special Reference to TamilNadu
(Dr.K.K.Pillay) (Published by: The Author)
11. Porunai Civilization (Jointly Published by: Department of Archaeology &
TamilNadu 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 சமயசார்பற்ற தன்மை - சங்க இலக்கியத்தில் பகிர்தல் அறம் - திருக்குறளில் மேலாண்மைக் கருத்துக்கள் - தமிழ் காப்பியங்கள், தமிழகத்தில் சமணபௌத்த 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 3
வரை - சிற்பக்கலை

நடுகல் முதல் நவீன சிற்பங்கள் வரை - ஐம்பொன்சிலைகள் - பழங்குடியினர் மற்றும் அவர்கள் தயாரிக்கும் கைவினைப் பொருட்கள், பொம்மைகள் - தேர்செய்யும் கலை - சுடுமண் சிற்பங்கள் - நாட்டுப்புறத் தெய்வங்கள் - குமரிமுனையில் திருவள்ளூர்சிலை - இசைக்கருவிகள் - மிருதங்கம், பறை, வீணை, யாழ், நாதஸ்வரம் - தமிழர்களின் சமூக பொருளாதார வாழ்வில் கோவில்களின் பங்கு.

UNIT-III நாட்டுப்புறக்கலைகள் மற்றும் வீரவிளையாட்டுகள் 3

தெருக்கூத்து, கரகாட்டம், வில்லுப்பாட்டு, கணியான்கூத்து, ஓயிலாட்டம், தோல்பாவைக்கூத்து, சிலம்பாட்டம், வளரி, புலியாட்டம், தமிழர்களின்விளையாட்டுகள்.

UNIT-IV தமிழர்களின் திணைக் கோட்பாடுகள் 3

தமிழகத்தின் தாவரங்களும், விலங்குகளும் - தொல்காப்பியம் 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.

UNIT-V இந்திய தேசிய இயக்கம் மற்றும் இந்திய 3
பண்பாட்டிற்குத் தமிழர்களின் பங்களிப்பு

இந்திய விடுதலைப் போரில் தமிழர்களின் பங்கு - இந்தியாவின் பிறப்பகுதிகளில் தமிழ்ப்பண்பாட்டின் தாக்கம் - சுயமரியாதை இயக்கம் - இந்திய மருத்துவத்தில், சித்தமருத்துவத்தின் பங்கு - கல்வெட்டுகள், கையெழுத்துப்படிக்கள் - தமிழ்ப் புத்தகங்களின் அச்சுவரலாறு.

Total : 15 PERIODS

TEXT-CUM REFERENCE BOOKS:

1. தமிழகவரலாறு - மக்களும்பண்பாடும் - கே.கே. பிள்ளை (வெளியீடு: தமிழ்நாடுபாடநூல்மற்றும்கல்வியியல்பணிகள்கழகம்).
2. கணினித்தமிழ் - முனைவர்.இல. சுந்தரம். (விகடன்பிரசுரம்).
3. கீழடி - வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல்துறை வெளியீடு)
4. பொருறை - ஆற்றங்கரைநாகரிகம். (தொல்லியல்துறை)
5. HeritageoftheTamils(Dr.S.V.Subatamanian,Dr.K.D.Thirunavukkarasu)(PublishedSocialLifeofTamils(Dr.K.K.Pillay) A joint publication of TNTB&ESC and RMRL–(inprint)
6. SocialLifeoftheTamils-TheClassicalPeriod(Dr.S.Singaravelu)(Publishedby:InternationalInstitute ofTamil Studies
7. Historical by: International Institute of Tamil Studies).
8. The Contributions of the Tamils to Indian Culture(Dr.M.Valarmathi) (Publishedby:InternationalInstituteofTamil Studies.)
9. Keeladi-‘ Sangam City Civilization on the banks of river Vaigai’(Jointly Published by: Department of Archaeology &TamilNadu Text Book and Educational Services Corporation, Tamil Nadu)
10. Studies in the History of India with Special Reference to TamilNadu (Dr.K.K.Pillay) (Published by:The Author)
11. Porunai Civilization (Jointly Published by: Department of Archaeology & TamilNadu Text Book and Educational Services Corporation, Tamil Nadu)
12. Journey of Civilization Indus to Vaigai (R. Balakrishnan) (Published by: RMRL)–Reference Book

SEMESTER – II

23MA1202	COMPLEX VARIABLES AND NUMERICAL METHODS	L	T	P	C
		3	1	0	4

COURSE OBJECTIVE

- To understand the concepts of vectors as it gives the insight into how to trace along the different types of curves
- To introduce the numerical techniques of interpolation in various intervals, numerical techniques of differentiation and integration in engineering disciplines
- To acquaint the knowledge of various techniques and methods of solving ordinary differential equations
- To understand the standard technique of a complex variable theory in particular of analytic functions and its mapping property
- Complex variable techniques have been used in a wide area of engineering.

UNIT - I 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 theorem and Stokes' theorem (excluding proofs) – Simple applications involving cubes, rectangular parallelepiped, sphere and cylinder.

UNIT - II INTERPOLATION AND NUMERICAL DERIVATIVES AND INTEGRALS 9+3

Interpolation with unequal intervals: Lagrange's interpolation – Newton's divided difference interpolation – Interpolation with equal intervals: Newton's forward and backward difference formulae- Numerical integration using Trapezoidal, Simpson's 1/3 rule.

UNIT - III NUMERICAL SOLUTIONS OF ORDINARY DIFFERENTIAL EQUATIONS 9+3

Single step methods : Taylor's series method – Euler's method - Modified Euler's method – Improved Euler's method- Fourth order Runge-Kutta method for solving first order equations - Multi step methods : Adams- Bash forth Predictor Corrector method, Milne's predictor corrector method for solving first order equations.

UNIT - IV ANALYTIC FUNCTIONS 9+3

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

UNIT - V 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).

TOTAL : 60PERIODS

COURSE OUTCOME

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

- CO1** 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.
- CO2** Use interpolation methods to solve problems involving numerical differentiation and integration.
- CO3** Understand the knowledge of various techniques and methods for solving first and second order ordinary differential equations.
- CO4** Understand the concepts of analytic functions, harmonic functions and conformal mapping
- CO5** Use complex integration techniques to solve engineering problems.

TEXT BOOKS

- Grewal B.S.,- "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 44th Edition, 2018.
- B.V. Ramana, " Higher Engineering Mathematics", McGraw Hill Education, India.
- Bali N., Goyal M. and Walkins C., "Advanced Engineering Mathematics", Firewall Media (An imprint of Lakshmi Publications Pvt. Ltd.), New Delhi, 7th Edition, 2009.
- Burden, R.L and Faires, J.D, "Numerical Analysis", 9th Edition, Cengage Learning, 2016.
- Grewal, B.S., and Grewal, J.S., "Numerical Methods in Engineering and Science", Khanna Publishers, 10th Edition, New Delhi, 2015.
- Sastry, S.S., "Introductory Methods of Numerical Analysis", 5th Edition, PHI Learning, 2015.

REFERENCE BOOKS

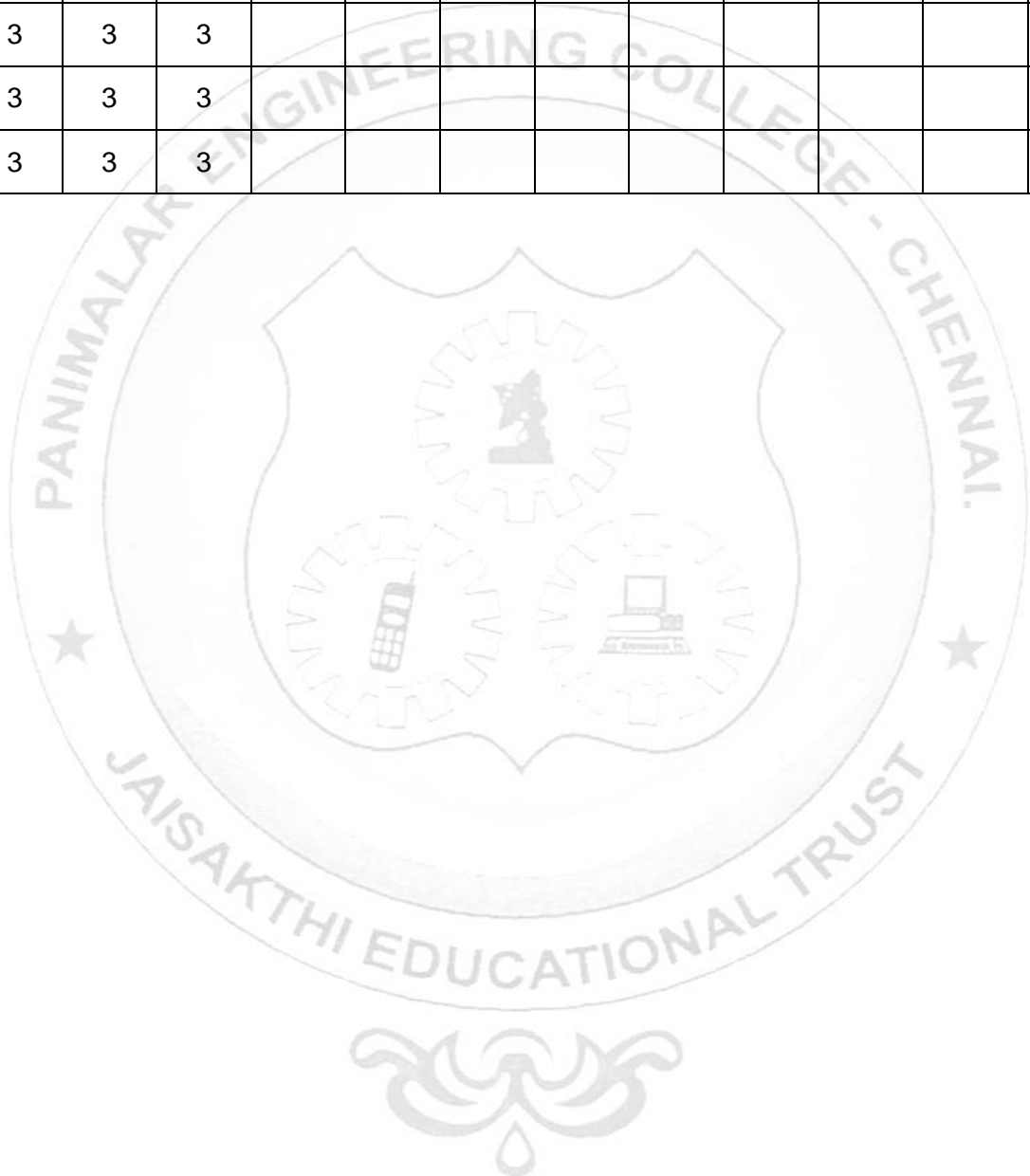
1. Erwin Kreyzig, "Advanced Engineering Mathematics", John Wiley sons, 10th edition, 2015.
2. Jain R.K. and Iyengar S.R.K., "Advanced Engineering Mathematics", Narosa Publications, New Delhi, 3rd Edition, 2007.
3. O'Neil, P.V. "Advanced Engineering Mathematics", Cengage Learning India Pvt. Ltd, New Delhi, 2007.
4. Brian Bradie, "A Friendly Introduction to Numerical Analysis", Pearson Education, Asia, New Delhi, 2007.
5. SankaraRao. K., "Numerical Methods for Scientists and Engineers", Prentice Hall of India Pvt.Ltd, 4th Edition, New Delhi, 2017
6. Kandasamy, P., Thilagavathy ,K., and Gunavathy. S., "Numerical Methods", S. Chand and Co., 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



23ME1201	ENGINEERING MECHANICS	L	T	P	C
		3	0	0	3

COURSE OBJECTIVE

- To understand the concepts of resultant force and moment of a particle and rigid body
- To understand the concepts of equilibrium of particles and rigid bodies in 2D and 3D
- To understand the concepts of centroid, moment of inertia and mass moment of inertia
- To understand the concepts of kinematics of particles and rigid bodies
- To understand the concepts of kinetics of particles and rigid bodies
- To understand the concepts of frictional force

UNIT I **BASICS AND STATICS OF PARTICLES** **9**

Introduction - Units and dimensions – Fundamental laws of Mechanics - Principle of transmissibility - Parallelogram and triangular Law of forces - Vectorial representation of forces - Vector operations of forces - Coplanar Forces - Rectangular components of force - Equilibrium of a particle - Lami's theorem – Forces in space system - Equilibrium of a particle in space – Equivalent systems of forces.

UNIT II **STATICS OF RIGID BODIES AND ANALYSIS OF TRUSSES AND FRAMES** **9**

Moments and Couples – Moment of a force about a point and about an axis – Varignon's theorem – moment of a couple - resolution of a force into a force and a couple - reduction of a system of forces - Single equivalent force - Free body diagram – Types of supports and their reactions – Equilibrium of Rigid bodies in 2D and 3D – Case studies.

Simple trusses - Method of joints, method of sections - joints under special loading conditions - space trusses - Analysis of frames.

UNIT III **PROPERTIES OF SURFACES AND SOLIDS** **9**

Centroid of areas – simple and composite areas - Theorems of Pappus and Guldinus – Centre of mass – simple and composite volumes - Moment of inertia - simple and composite areas - Parallel axis theorem and perpendicular axis theorem - Polar moment of inertia - Radius of gyration – Product of inertia - Principal moment of inertia of plane areas - Mass moment of inertia of simple solids.

UNIT IV **FRICTION AND ITS APPLICATIONS** **9**

Friction -Laws of dry friction - Angle of friction - Coefficient of static and kinetic friction – Sliding friction - Wedges – Ladder Friction - Surface contact friction Sliding and Rolling friction – Friction drives – Friction in screw threads – Bearings and lubrication – Friction clutches – Belt drives – Friction in brakes- Band and Block brakes - case studies.

UNIT V**DYNAMICS OF PARTICLES****9**

Kinematics - Translation and Rotation of Rigid Bodies – Velocity and acceleration -General Plane motion of simple rigid bodies such as cylinder and sphere - Rectilinear Motion and Curvilinear Motion of Particles - Equations of Motions - Projectile Motion.

Kinetics - Newton's Second Law of Motion – D'Alembert's Principle – - Energy - potential energy - kinetic energy - conservation of energy - work done by a force - work energy method.

Concept of conservation of momentum - Impulse-Momentum principle - Impact - Direct central impact, oblique central impact, impact of a moving train on the spring board.

TOTAL :45 PERIODS**COURSE OUTCOME**

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

- CO1** Evaluate the resultant force and moment of 2D and 3D force systems.
- CO2** Apply the concepts of equilibrium of particles and rigid bodies in engineering problems.
- CO3** Evaluate the centroid, moment of inertia and mass moment of inertia of composite areas and volumes.
- CO4** Apply the equations of linear and projectile motions to solve physical problems.
- CO5** Apply the concepts of equilibrium of rigid bodies in engineering problems.

TEXT BOOKS

1. Beer F.P and Johnston Jr. E.R, "Vector Mechanics for Engineers (In SI Units): Statics and Dynamics", 8thEdition, Tata McGraw-Hill Publishing Company, New Delhi, 2004.
2. Rajasekaran S and Sankarasubramanian G, "Engineering Mechanics Statics and Dynamics", 3rd Edition, Vikas Publishing House Pvt. Ltd., 2005.
3. Balasubramaniam T.V and Murugan R, "Engineering Mechanics", 1st Edition, Vijay Nicole Imprints, 2015.

REFERENCE BOOKS

1. Irving H. Shames and Krishna Mohana Rao G., "Engineering Mechanics - Statics and Dynamics", 4thEdition, Pearson Education, 2006.
2. Hibbeler R.C and Ashok Gupta, "Engineering Mechanics: Statics and Dynamics", 11thEdition, Pearson Education, 2010.
3. Meriam J.L and Kraige L.G, "Engineering Mechanics - Statics - Volume 1, Dynamics Volume 2", 3rdEdition, John Wiley & Sons,1993.
4. Bhavikatti S.S and Rajashekarappa, K.G, "Engineering Mechanics", New Age International (P) Limited Publishers, 2005.
5. Vela Murali, "Engineering Mechanics", Oxford University Press, 2010.

WEB REFERENCES

1. <http://www.iitg.ac.in/rkbc/me101/me101.htm>
2. <https://ocw.mit.edu/courses/civil-and-environmental-engineering/1-050-engineering-mechanics-i-fall-2007/index.htm>
3. <http://hyperphysics.phy-astr.gsu.edu/hbase/hframe.html>

ONLINE COURSES / RESOURCES

1. <https://nptel.ac.in/courses/112/106/112106286/>
2. <https://nptel.ac.in/courses/122/104/122104015/>
3. <https://www.coursera.org/learn/engineering-mechanics-statics>
4. <https://www.edx.org/course/engineering-mechanics-2>

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

23ES1203	BASIC ELECTRICAL ENGINEERING	L	T	P	C
		3	0	0	3

COURSE OBJECTIVE

- To learn the concepts related with Electrical circuits and Wiring.
- To understand basics of Semiconductor Devices and Instrumentation
- To Study the working principles of Special machines.
- To study the concept of DC and AC Drives.
- To understand the concepts of Solar PV system and Hybrid Electric Vehicle.

UNIT - I 9 BASIC CIRCUITS AND WIRING

Electrical quantities, Ohms Law, Kirchoff's Laws -Series and Parallel Connections - Single phase and three phase system, Earthing and its types- Basic house wiring and its types – safety measures at home and industry.

UNIT II 9 SEMICONDUCTOR DEVICES AND MEASURING INSTRUMENTS

PN junction diode, -Zener diode – Half wave and Full wave rectifier, - Bipolar Junction transistors. Classification of instruments – Operating Principles of indicating Instruments – Moving iron, Moving coil and wattmeter

UNIT III 9 DC DRIVES

Construction and working Principles of DC Motors, Starters, Armature and Field control, Speed control using controlled rectifiers and DC choppers.

UNIT IV 9 AC DRIVES AND SPECIAL MACHINES

AC Drives: Construction and working Principles of Three phase Induction motor and synchronous Motor, voltage / frequency control. Special Machines: Construction and working of Brushless dc motor, Permanent magnet DC Motor, stepper motor

UNIT V 9 SOLAR PV SYSTEM AND ELECTRIC VEHICLE

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 Vehicles.

TOTAL :45 PERIODS

COURSE OUTCOME

On successful completion of the course student will be able to:

- CO1** Acquire basic knowledge on Basic Electrical circuits and House Wiring.
- CO2** Acquire basic knowledge on semiconductor devices and Measuring Instruments
- CO3** Explain the working principle and applications of DC and AC Drives.

CO4 Explain the working principle of Special Electrical Machines

CO5 Illustrate the concepts related in the Solar PV system and Hybrid Electric Vehicles.

TEXT BOOKS

1. A.K. Sawhney, Puneet Sawhney 'A Course in Electrical & Electronic Measurements & 49 Instrumentation', Dhanpat Rai and Co, New Delhi, 2015.
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. Vedam Subrahmaniam, "Electric Drives (Concepts and Applications)", Tata McGraw-Hill, 2010
5. Nagrath .I.J. & Kothari .D.P, "Electrical Machines", Tata McGraw-Hill, 2006

REFERENCE BOOKS

1. Pillai.S.K "A First Course on Electric Drives", Wiley Eastern Limited, 2012.
2. Singh. M.D., K.B.Khanchandani, "Power Electronics", Tata McGraw Hill, 2012.
3. Kothari DP and I.J Nagrath, "Basic Electrical Engineering", Fourth Edition, McGraw Hill Education, 2019.
4. MehrdadEhsani, YiminGao, Sebastian E. Gay, Ali Emadi, 'Modern Electric, Hybrid Electric and Fuel Cell Vehicles: Fundamentals, Theory and Design', CRC Press, 2004.

WEB REFERENCES:

1. <https://electrical-engineering-portal.com/download-center/books-and-guides/electrical-engineering/basic-course>
2. <https://afdc.energy.gov/vehicles/how-do-all-electric-cars-work>

ONLINE COURSES / RESOURCES:

1. <https://archive.nptel.ac.in/courses/117/106/117106108/>
2. <https://archive.nptel.ac.in/courses/108/105/108105155/>
3. <https://archive.nptel.ac.in/courses/108/104/108104140/>
4. https://onlinecourses.nptel.ac.in/noc22_ee53/preview

CO-PO MAPPING

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

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

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.htm> .
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

REFERENCES

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

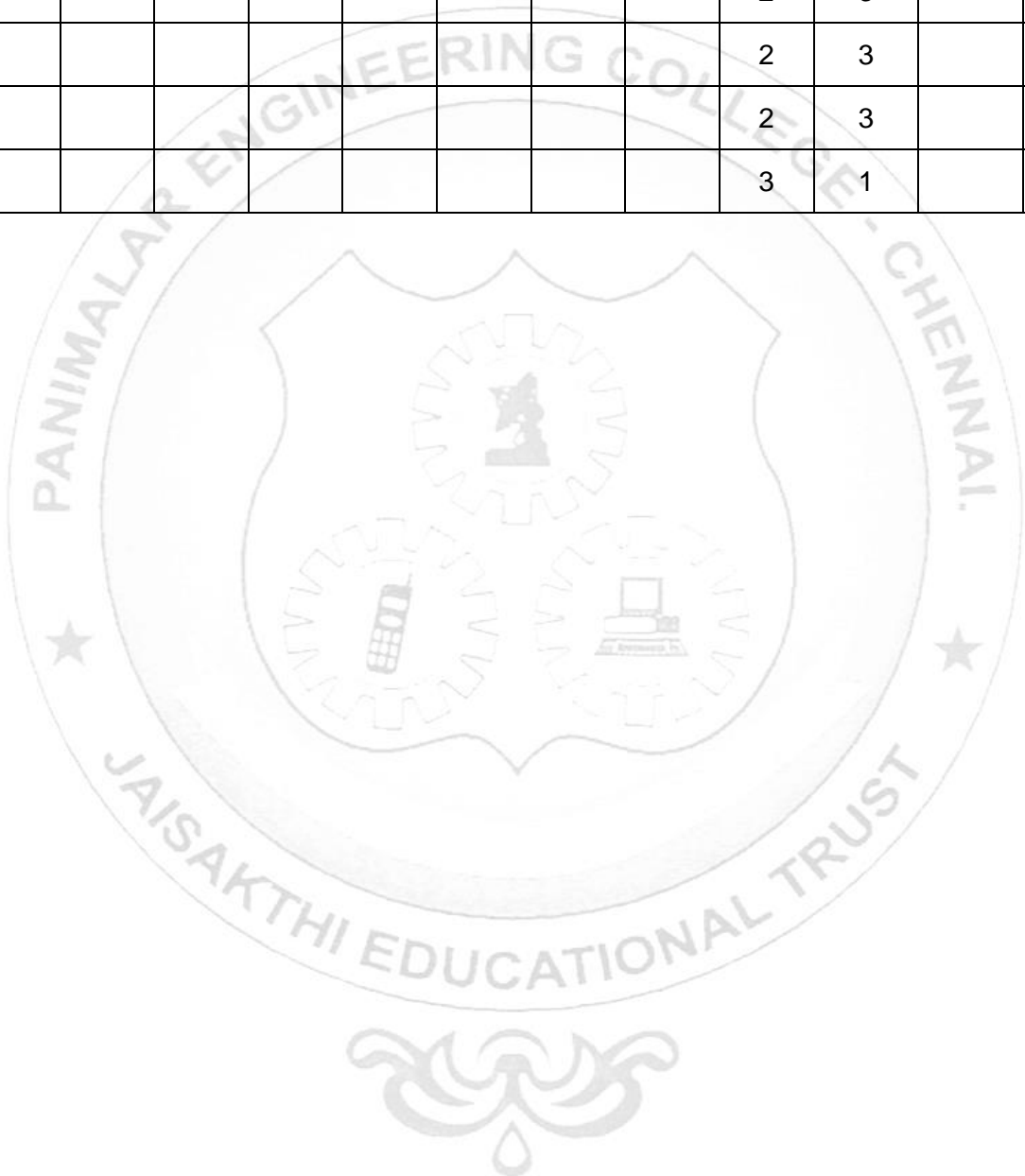
COURSE OUTCOME

Upon successful completion of the course, students 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	1		3



23EE1203	FUNDAMENTALS OF PYTHON PROGRAMMING	L	T	P	C
		2	0	0	2

COURSE OBJECTIVE

- To know the basic programming constructs
- To use control structures in python
- To use python collections – Lists, Tuples and Dictionary
- To define Python functions and use Strings
- To learn about strings and its manipulations in Python.

UNIT - I INTRODUCTION TO PYTHON PROGRAMMING 6

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.

UNIT II CONTROL STRUCTURES 6

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.

UNIT III COLLECTIONS 6

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.

UNIT IV FUNCTIONS 6

Functions: Types, parameters, arguments: positional arguments, keyword arguments, parameters with default values, functions with arbitrary arguments, Scope of variables: Local and global scope, Recursion functions.

UNIT V STRINGS 6

Strings: Formatting, Comparison, Slicing, Splitting, Stripping, Negative indices, String functions, Regular expression: Matching the patterns, Search and replace

TOTAL :30 PERIODS

COURSE OUTCOME

On successful completion of the course student will be able to:

- CO1** Understand the basic python programming constructs
- CO2** Develop and execute simple Python programs
- CO3** Write simple Python programs using conditionals and loops for solving problems.

CO4 Represent compound data using Python lists, tuples, dictionaries etc.

CO5 Develop programs using functions.

CO6 Develop programs using string functions.

TEXT BOOKS

1. Paul Deitel and Harvey Deitel, "Python for Programmers", Pearson Education, 1st Edition, 2021.
2. Reema Thareja, "Problem Solving and Programming with Python", 2nd edition, Oxford University Press, New Delhi, 2019.

REFERENCE BOOKS

1. Martin C. Brown, "Python: The Complete Reference", 4th Edition, Mc-Graw Hill, 2018
3. Eric Matthes, "Python Crash Course, A Hands - on Project Based Introduction to Programming", 2nd Edition, No Starch Press, 2019.

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/>

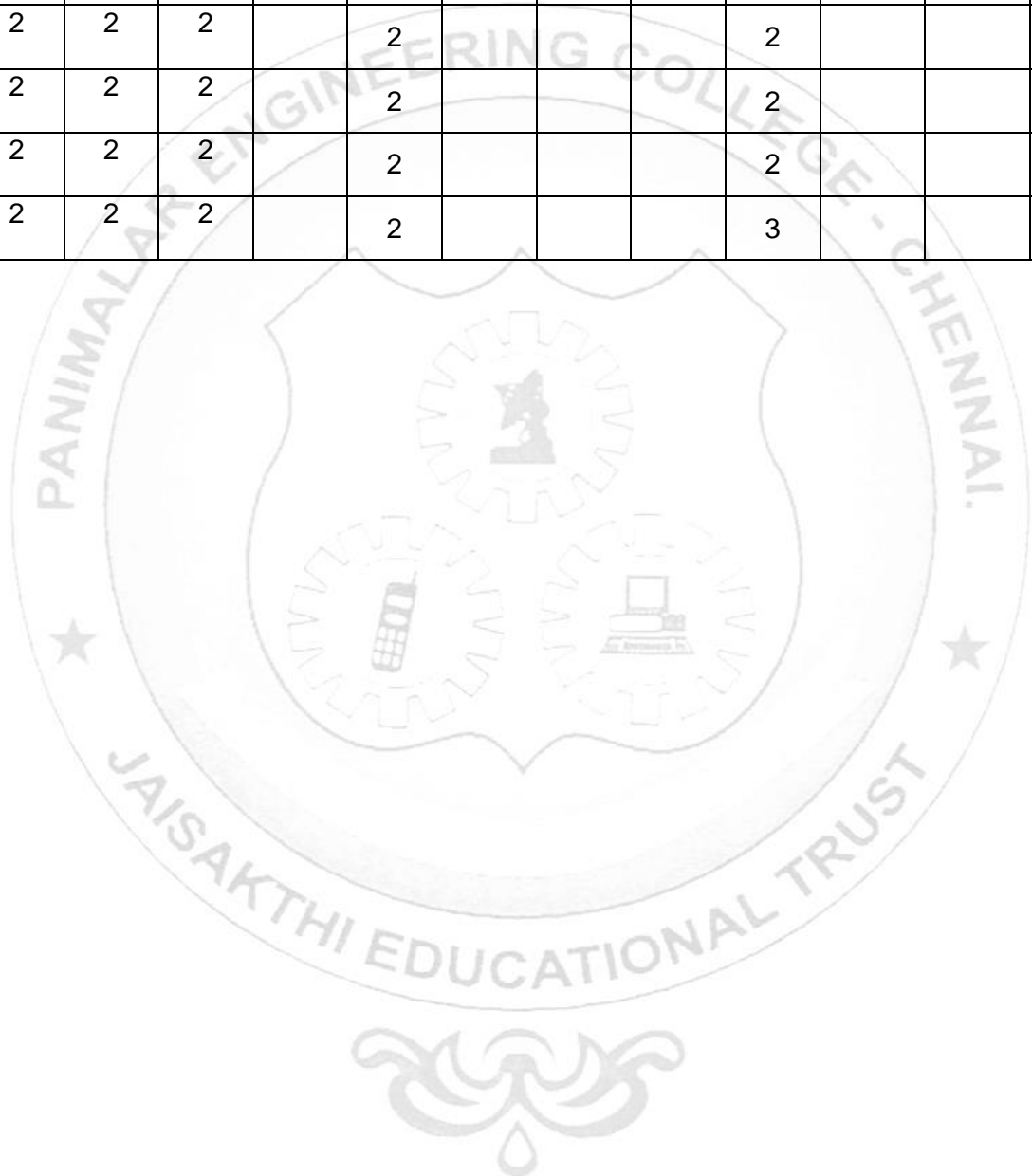
LIST OF EXERCISES

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. Write a python program to find and replace all occurrences of one word with another.

TOTAL :30 PERIODS

CO-PO MAPPING

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



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

COURSE OBJECTIVES

- 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

OUTCOMES:

On 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.

REFERENCES

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

23ES1213	PRODUCT DEVELOPMENT LABOATORY	L	T	P	C
		0	0	4	2

COURSE OBJECTIVE

- Drawing pipe line plan; laying and connecting various pipe fittings used in common household plumbing work;
- Sawing, Planning and making joints in wood materials used in common household wood work
- Welding various joints in steel plates using arc welding work;
- Machining various simple processes like turning, drilling, tapping in parts
- Assembling simple mechanical assembly of common household equipments
- Studying sheet metal and foundry operations
- Understanding basics of electrical engineering like wiring, measuring current
- Understanding basics of electronics

GROUP – A CIVIL & ELECTRICAL ENGINEERING

CIVIL ENGINEERING PRACTICES 15

PLUMBING WORK:

- Connecting various basic pipe fittings like valves, taps, coupling, unions, reducers, elbows and other components which are commonly used in household.
- Preparing plumbing line sketches.
- Laying pipe connection to the suction side and delivery side of a pump
- Connecting pipes of different materials: Metal, plastic and flexible pipes used in household appliances.

WOOD WORK:

- Introduction to Tools and Equipments
- Simple Planning and sawing practice
- Making Half Lap, Dovetail, Mortise and Tenon joints

WOOD WORK STUDY:

- Studying joints in door panels and wooden furniture
- Studying common industrial trusses using models.

ELECTRICAL ENGINEERING PRACTICES 15

- Residential house wiring using switches, fuse, indicator, lamp and energy meter.
- Fluorescent lamp wiring.
- Stair case wiring
- Measurement of electrical quantities – voltage, current, power & power factor in RLC circuit.
- Measurement of energy using single phase energy meter.
- Soldering practice – Components Devices and Circuits – Using general purpose PCB.

GROUP – B MECHANICAL AND ELECTRONICS

MECHANICAL ENGINEERING PRACTICES

15

SHEET METAL WORK:

- a) Demonstrating basic sheet metal operations
- b) Making simple sheet metal objects like trays, funnels etc.

BASIC MACHINING WORK:

- c) Introduction to Lathe, Dilling machine, Tools and Equipments
- d) Simple Turning and facing
- e) Step turning
- f) Simple Drilling and Tapping of flat plate using drilling machine

FOUNDRY WORK:

- g) Introduction to tools, equipments and basic operations used in Foundry

WELDING WORK:

- h) Introduction to Arc welding and Gas welding Tools and Equipments
- i) Welding of Butt Joints, Lap Joints, and Tee Joints using arc welding.

GROUP – B MECHANICAL AND ELECTRONICS

ELECTRONICS ENGINEERING PRACTICES

15

- a) Study of Electronic components and equipments – Resistor colour coding
- b) Measurement of AC signal parameter (peak-peak, rms period, frequency) using CRO.
- c) Design of Half wave and Full wave Rectifier.
- d) 2D & 3D Electrical wiring Model using suitable Software.

TOTAL : 60 PERIODS

COURSE OUTCOME

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

- CO1** Connecting various basic pipe fittings like valves, taps, coupling, unions, reducers, elbows and other components which are commonly used in household.
- CO2** Introduction to Lathe machine, Tools and Equipments with machining experiments
- CO3** Carry out basic home electrical works and measure the electrical quantities.
- CO4** Analyse the basic electronic circuits and to solder simple components on PCB and test simple electronic circuits.
- CO5** Design and Construct 2D and 3D Electrical wiring model using suitable software.

TEXT BOOKS

1. Jeyapoovan T., Saravanapandian M. & Pranitha S., "Engineering Practices Lab Manual", Vikas Puplicing House Pvt.Ltd, (2006)
2. Kannaiah P. & Narayana K.L., "Manual on Workshop Practice", Scitech Publications, (1999).
3. Jeyachandran K., Natarajan S. & Balasubramanian S., "A Primer on Engineering Practices Laboratory", Anuradha Publications, (2007).

REFERENCE BOOKS

1. K.C. John, "Mechanical workshop practice", Second edition, PHI learning Pvt Ltd, New Delhi
2. Bawa H.S., "Workshop Practice", Tata McGraw – Hill Publishing Company Limited, (2007)

WEB REFERENCES

1. <https://nptel.ac.in/courses/112/107/112107090/>
2. <https://nptel.ac.in/courses/112/107/112107084/>

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

23ES1214	ELECTRICAL ENGINEERING LABORATORY	L	T	P	C
		0	0	4	2

COURSE OBJECTIVE

- To understand the characteristics of semiconductor devices.
- To determine the characteristics of DC and AC machines
- To enable the students to be familiar with the speed control of DC Motors.

LIST OF EXPERIMENTS

1. Load test on DC Shunt and Series motor.
2. Load test on compound Motor
3. Speed control of DC shunt motor.
4. V curves and inverted V curves of synchronous Motor
5. Load test on three phase squirrel cage Induction motor.
6. Study of DC & AC Starters
7. Characteristics of Semiconductor diode and Zener diode
8. Characteristics of a NPN Transistor under common emitter, common collector and common base configurations
9. Simulation on motoring operation of DC motor
10. Simulation of Speed control of Dc motors using controlled rectifiers
11. Simulation of Speed control of Dc motors using DC choppers

TOTAL : 60 PERIODS

COURSE OUTCOME

On successful completion of the course student will be able to:

- CO1** Infer the characteristics of BJT.
CO2 Compute performance characteristics of DC and AC Machines with various loads.
CO3 Analyze the speed characteristic of DC and AC Machines.
CO4 Analyze the characteristics of DC motor using Simulation software.
CO5 Simulate the Speed control of DC motors using controlled rectifiers and DC choppers

CO-PO MAPPING

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

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 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. 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

23TA1201	தமிழரும் தொழில் நுட்பமும்	L	T	P	C
		1	0	0	1

UNIT-I நெசவு மற்றும் பானைத் தொழில் நுட்பம் 3

சங்ககாலத்தில் நெசவுத் தொழில் - பானைத் தொழில் நுட்பம் - கருப்பு சிவப்பு பாண்டங்கள் - பாண்டங்களில் கீறல் குறியீடுகள்.

UNIT-II வடிவமைப்பு மற்றும் கட்டிடத் தொழில் நுட்பம் 3

சங்ககாலத்தில் வடிவமைப்பு மற்றும் கட்டுமானங்கள் & சங்ககாலத்தில் வீட்டுப்பொருட்களில் வடிவமைப்பு - சங்ககாலத்தில் கட்டுமானப் பொருட்களும் நடுகல்லும் - சிலப்பதிகாரத்தில் மேடை அமைப்புபற்றிய விவரங்கள் - மாமல்ல புரச் சிற்பங்களும், கோவில்களும் - சோழர் காலத்துப் பெருங்கோயில்கள் மற்றும் பிற வழிபாட்டுத்தலங்கள் - நாயக்கர் காலக்கோயில்கள் - மாதிரி கட்டமைப்புகள் பற்றி அறிதல், மதுரை மீனாட்சி அம்மன் ஆலயம் மற்றும் திருமலைநாயக்கர்மஹால் - செட்டிநாடு வீடுகள் - பிரிட்டிஷ் காலத்தில் சென்னையில் இந்தோ-சாரோசோனிக் கட்டிடக்கலை.

UNIT-III உற்பத்திதொழில்நுட்பம் 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 தொழில் நுட்பம் 3

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

அறிவியல் தமிழின் வளர்ச்சி - கணினித்தமிழ் - தமிழ் நூல்களை மின்பதிப்பு செய்தல் - தமிழ் மென் பொருட்கள் உருவாக்கம் - தமிழ் இணையக் கல்விக் கழகம் - தமிழ் மின்நூலகம் - 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. பொருளை - ஆற்றங்கரை நாகரிகம். (தொல்லியல் துறை)
5. HeritageoftheTamils(Dr.S.V.Subatamanian,Dr.K.D.Thirunavukkarasu)(PublishedSo cialLifeofTamils(Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL- (inprint)
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12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Publishedby: RMRL)-Reference Book

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, rainwater harvesting, water shed 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, acid rain, 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 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 Hours: 30 PERIODS**COURSE OUTCOMES**

On 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. 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. ErachBharucha "Textbook of Environmental Studies for Undergraduate Courses" Orient BlackswanPvt. Ltd. (2013).

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

