PANIMALAR
ENGINEERING COLLEGE

An Autonomous Institution

Approved by AICTE, New Delhi | Affiliated to Anna University, Chennai

CURRICULUM & SYLLABUS
REGULATION 2023

FOR THE STUDENTS ADMITTED DURING 2023-24

B.E - COMPUTER SCIENCE AND ENGINEERING

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PANIMALAR ENGINEERING COLLEGE

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

Bangalore Trunk Road, Varadharajapuram,

Poonamallee, Chennai – 600 123

Department of Computer Science and Engineering

B.E- Computer Science and Engineering

CURRICULUM AND SYLLABUS

REGULATION-2023

(For the Students admitted during 2023-24)

B.E- Computer Science and Engineering

CHOICE BASED CREDIT SYSTEM (CBCS)

I - VIII SEMESTERS CURRICULUM AND SYLLABI (REGULATION 2023)

(For the Students admitted during 2023-24)

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
Theory Cum Practical Courses							
3.	23HS1101	Communicative English and Language Skills	HS	2/0/2	4	3	50/50
4.	23PH1101	Engineering Physics	BS	2/0/2	4	3	50/50
5.	23ES1102	Basics of Electrical and Electronics Engineering	ES	3/0/2	5	4	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		**25**	**20**	

Semester II							
S. No	**COURSE CODE**	**COURSE TITLE**	**Category**	**L/T/P**	**Contact Hours**	**Credit**	**Ext / Int Weightage**
Theory Courses							
1.	23MA1201	Complex Variables and Laplace Transform	BS	3/1/0	4	4	60/40
2.	23ES1201	Python 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.	23HS1201	Communicative and Aptitude Skills	HS	2/0/2	4	3	50/50
5.	23CS1201	Web Application Development	PC	2/0/2	4	3	50/50
Laboratory Courses							
6.	23ES1211	Python Programming Laboratory	ES	0/0/4	4	2	40/60
7.	23ES1212	Technical Skill Practices I	EEC	0/0/2	2	1	40/60
Mandatory Course							
8.	23TA1201	தமிழரும் தொழில் நுட்பமும் / Tamils and Technology	HS	2/0/0	2	1	60/40
9.		Mandatory Course - I	MC	2/0/0	2	0	0/100
			TOTAL		**29**	**20**	

Semester III							
S. No	**COURSE CODE**	**COURSE TITLE**	**Category**	**L/T/P**	**Contact Hours**	**Credit**	**Ext / Int Weightage**
Theory Courses							
1.	23MA1301	Discrete Mathematics	BS	3/1/0	4	4	60/40
2.	23CS1301	Digital Principles and Computer Architecture	PC	3/0/0	3	3	60/40
3.	23CS1302	Data Structures	PC	3/0/0	3	3	60/40
4.	23CS1303	Database Management Systems	PC	3/0/0	3	3	60/40
5.	23IT1301	Object Oriented Programming	PC	3/0/0	3	3	60/40
Laboratory Courses							
6.	23CS1311	Data Structures Laboratory	PC	0/0/4	4	2	40/60
7.	23CS1312	Database Management Systems Laboratory	PC	0/0/4	4	2	40/60
8.	23IT1311.	Object Oriented Programming Laboratory	PC	0/0/4	4	2	40/60
9.	23ES1311	Technical Skill Practices II	EEC	0/0/2	2	1	40/60
Mandatory Course							
10.		Mandatory Course - II	MC	2/0/0	2	0	0/100
			TOTAL		**32**	**23**	

Semester IV							
S. No	**COURSE CODE**	**COURSE TITLE**	**Category**	**L/T/P**	**Contact Hours**	**Credit**	**Ext / Int Weightage**
Theory Courses							
1.	23MA1401	Probability and Statistical Methods	BS	3/1/0	4	4	60/40
2.	23CS1401	Computer Networks	PC	3/0/0	3	3	60/40
3.	23CS1402	Computational Thinking	PC	3/0/0	3	3	60/40
4.	23IT1403	Operating Systems	PC	3/0/0	3	3	60/40
5.	23AD1405	Foundations of Data Science	PC	3/0/0	3	3	60/40
Theory Cum Practical Courses							
6.	23IT1401	Object Oriented Software Engineering	PC	2/0/2	4	3	50/50
Laboratory Courses							
7.	23CS1411	Computer Networks Laboratory	PC	0/0/4	4	2	40/60
8.	23AD1413	Foundations of Data Science Laboratory	PC	0/0/4	4	2	40/60
9.	23ES1411	Technical Skill Practices III	EEC	0/0/2	2	1	40/60
			TOTAL		**30**	**24**	

Semester V							
S. No	**COURSE CODE**	**COURSE TITLE**	**Category**	**L/T/P**	**Contact Hours**	**Credit**	**Ext / Int Weightage**
Theory Courses							
1.	23CS1501	Full Stack Development	PC	3/0/0	3	3	60/40
2.	23CS1502	Theory of Computation	PC	3/0/0	3	3	60/40
3.	23MG1501	Organizational Behaviour and Ethical Practices	HS	3/0/0	3	3	60/40
4.		Professional Elective - I	PE	3/0/0	3	3	60/40
5.		Open Elective - I	OE	3/0/0	3	3	60/40
Theory Cum Practical Courses							
6.	23CS1503	Artificial Intelligence and Machine Learning Techniques	PC	2/0/2	4	3	50/50
Laboratory Courses							
7.	23CS1511	Full Stack Development Laboratory	PC	0/0/4	4	2	40/60
8.	23CS1512	Socially Relevant Mini Project	PC	0/0/4	4	2	40/60
9.	23ES1511	Technical Skill Practices IV	EEC	0/0/2	2	1	40/60
			TOTAL		**29**	**23**	

Semester VI							
S. No	**COURSE CODE**	**COURSE TITLE**	**Category**	**L/T/P**	**Contact Hours**	**Credit**	**Ext / Int Weightage**
Theory Courses							
1.	23CS1601	Mobile Application Development	PC	3/0/0	3	3	60/40
2.	23CS1602	Complier Design	PC	3/0/0	3	3	60/40
3.	23CS1603	Cognitive Computing	PC	3/0/0	3	3	60/40
4.	23CB1402	Introduction to Innovation and Entrepreneurship	EEC	3/0/0	3	3	60/40
5.		Professional Elective - II	PE	3/0/0	3	3	60/40
Theory Cum Practical Courses							
6.	23CS1604	Internet of Things	PC	2/0/2	4	3	50/50
Laboratory Courses							
7.	23CS1611	Mobile Application Development Laboratory	PC	0/0/4	4	2	40/60
8.	23CS1612	Innovation and Entrepreneurship Laboratory	PC	0/0/4	4	2	40/60
9.	23ES1611	Technical Skill Practices V	EEC	0/0/2	2	1	40/60
			TOTAL		**29**	**23**	

Semester VII							
S. No	**COURSE CODE**	**COURSE TITLE**	**Category**	**L/T/P**	**Contact Hours**	**Credit**	**Ext / Int Weightage**
Theory Courses							
1.	23CS1701	Cryptography and Cyber Security	PC	3/0/0	3	3	60/40
2.	23IT1701	Cloud Computing and Big Data Analytics	PC	3/0/0	3	3	60/40
3.		Professional Elective - III	PE	3/0/0	3	3	60/40
4.		Professional Elective - IV	PE	3/0/0	3	3	60/40
5.		Open Elective - II	OE	3/0/0	3	3	60/40
Laboratory Courses							
6.	23CS1711	Cryptography and Cyber Security Laboratory	PC	0/0/4	4	2	40/60
7.	23IT1711	Cloud Computing and Big Data Analytics Laboratory	PC	0/0/4	4	2	40/60
			TOTAL		**23**	**19**	

Semester VIII							
S. No	**COURSE CODE**	**COURSE TITLE**	**Category**	**L/T/P**	**Contact Hours**	**Credit**	**Ext / Int Weightage**
Theory Courses							
1.		Professional Elective - V	PE	3/0/0	3	3	60/40
2.		Professional Elective - VI	PE	3/0/0	3	3	60/40
Laboratory Course							
3.	23CS1811	Project Work	EEC	0/0/20	20	10	40/60
			TOTAL		**26**	**16**	

TOTAL CREDITS : 168

SUMMARY OF CREDITS

S. NO.	SUBJECT AREA	CREDITS AS PER SEMESTER								CREDITS TOTAL	PERCENTAGE (%)
		I	II	III	IV	V	VI	VII	VIII		
1.	Humanities and Social Sciences (HS)	4	4			3				11	6.55
2.	Basic Science (BS)	7	4	4	4					19	11.31
3.	Engineering Sciences (ES)	9	8							17	10.12
4.	Professional Core (PC)		3	18	19	11	14	10		75	44.64
5.	Professional Elective (PE)					3	3	6	6	18	10.71
6.	Open Elective (OE)					3		3		6	3.57
7.	Employment Enhancement Courses (EEC)		1	1	1	3	6		10	22	13.10
8.	Mandatory Courses (MC) (Non Credit)		0	0						-	-
	TOTAL	20	20	23	24	23	23	19	16	168	100.00

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(S):

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,44thEdition,2018.
2. James Stewart, "Calculus: Early Transcendental", Cengage Learning, 9thEdition, 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. Narayanan, S. and Manicavachagom Pillai, T. K., “Calculus" Volume I and II, S. Viswanathan Publishers Pvt.Ltd.Chennai, 2007.
2. Srimantha Pal and 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. Sivaramakrishna Dass, C. Vijayakumari, “Engineering Mathematics”, Pearson
6. Education India, 4th Edition 2019.
7. Sundar Raj. M and Nagarajan. G , “Engineering Mathematics-I”,3rdEdition, 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

Internal Assessment				End Semester Examinations
Assessment I (100 Marks)		Assessment II (100 Marks)		
Individual Assignment / Case Study / Seminar / Mini Project	Written Test	Individual Assignment / Case Study / Seminar / Mini Project	Written Test	Written Examinations
40	60	40	60	100
40%				60 %

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 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 accessfile-Example Program:Transaction processing using random accessfiles–Command line arguments

TOTAL: 45 PERIODS

COURSE OUTCOME(S):

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.

TEXTBOOKS:

1. ReemaThareja,¯ProgramminginC,OxfordUniversityPress,SecondEdition,2016
2. Kernighan,B.WandRitchie,D.M,¯TheCProgramminglanguage,SecondEdition, PearsonEducation,2006

REFERENCE BOOKS:

1. Paul Deitel and Harvey Deitel,¯ CHow to Program, Seventh edition, Pearson Publication, 2015
2. Juneja,B.Land Anita Seth,¯Programming in C, CENGAGE Learning India pvt.Ltd.,2011
3. Pradip Dey, Manas Ghosh, ¯Fundamentals of Computing and Programming in C, First Edition,Oxford UniversityPress,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-HillEducation,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						

Internal Assessment				End Semester Examinations
Assessment I (100 Marks)		Assessment II (100 Marks)		
Individual Assignment / Case Study / Seminar / Mini Project	Written Test	Individual Assignment / Case Study / Seminar / Mini Project	Written Test	Written Examinations
40	60	40	60	100
40%				60 %

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 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

THEORY : 30 PERIODS

TEXT BOOKS:

1. N P Sudharshana and 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 SwanLimited, 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.

WEB REFERENCES:

1. https://learnenglishteens.britishcouncil.org/exams/grammar-and-vocabulary-exams/ word formation
2. https://cdn.s3waas.gov.in/s347d1e990583c9c67424d369f3414728e/uploads/2018/02/2018 0316 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/2018/02/2018 031621.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.

PRACTICAL : 30 PERIODS
TOTAL : 60 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(S):

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

CO1 The students will be able to 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 To gain understanding of basic grammatical structures and use them in right context.

CO6 To 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**

Assessment (40% weightage) (Theory Component)		**Assessment** (60% weightage) (Laboratory Component)		**End Semester Examination**
Individual Assignment / Case Study / Seminar / Mini Project	**Written Test**	**Evaluation of Laboratory Observation, Record**	**Test**	**Written Examination**
40	**60**	**75**	**25**	
100				**100**
50 %				**50 %**

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 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 21ehavior- 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 ofcontinuity – 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.

THEORY: 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.

PRACTICAL : 30 PERIODS
TOTAL : 60 PERIODS

TEXT BOOKS:

1. AjoyGhatak, Optics, 5th Ed., Tata McGraw Hill, 2012
2. Arthur Beiser, ShobhitMahajan and S RaiChoudhury, 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(S):

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 Have 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 Get knowledge on fundamental concepts of quantum theory, nanoscience its applications

CO5 Gain knowledge on the basics of electromagnetic waves and its properties.

CO6 Understand the basics properties of materials, especially elastic and thermal properties of materials.

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						
CO6												

Assessment (40% weightage) (Theory Component)		**Assessment** (60% weightage) (Laboratory Component)		**End Semester Examination**
Individual Assignment / Case Study / Seminar / Mini Project	**Written Test**	**Evaluation of Laboratory Observation, Record**	**Test**	**Written Examination**
40	**60**	**75**	**25**	
100				**100**
50 %				**50 %**

23ES1102	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING	L	T	P	C
		3	0	2	4

COURSE OBJECTIVE:

- To learn the concepts related with Electrical circuits and Wiring.
- To study the concept of electrical machines.
- To understand basics of Semiconductor Devices.
- To understand the basics of Sensors and Actuators
- To develop IOT infrastructure for Real time applications

UNIT I BASIC ELECTRICAL CIRCUITS AND HOUSE WIRING 9

Electrical Quantities – Ohms Law – Kirchhoff's Law – Series and Parallel Connections – Earthing and its Types- basic house wring - tools and components, different types of wiring, safety measures at home and industry. **Case Study** -staircase Wiring and ceiling fan Wiring.

UNIT II ELECTRICAL MACHINES 9

Construction, Working Principle of Dc motors, Brushless dc motor, Permanent magnet DC Motor, stepper motor,Servo Motor(No Problems). -Application of motor in Industrial automation.

UNIT III SEMICONDUCTOR DEVICES AND CIRCUITS 9

PN junction diode -Zener diode – Half wave and Full wave rectifier, - BJT, MOSFET,IGBT-Characteristics- **Case Study**: SMPS in computer and UPS in Residential Application.

UNIT IV SENSORS AND ACTUATORS 9

Sensors: Temperature Sensor- Pressure Sensor-Proximity Sensor, Ultrasonic sensors. Actuators: Actuation using thermal forces, Actuation using shape memory Alloys, Actuation using piezoelectric crystals. **Case Study**: Integrated sensor and actuator systems in automation.

UNIT V EMERGING TECHNOLOGIES 9

Solar PV system- solar and battery powered Electric Vehicle - IOT Concept and itsFunctional blocks- Introduction to Arduino Uno. **Case Study**: Smart and Connected Cities: Smart Lighting- Smart Parking Architecture - Smart Traffic Control.

THEORY :45 PERIODS

TEXT BOOKS:

1. Hughes revised by Mckenzie Smith with John Hilcy and Keith Brown, Electrical and Electronics Technology, 8th Edition, Pearson, 2012.
2. R.J. Smith, R.C. Dorf, Circuits Devices and Systems, 5th Edition, John Wiley and sons, 2001
3. P. S. Dhogal, Basic Electrical Engineering – Vol. I & II, 42nd Reprint, McGraw Hill, 2012.
4. Clarence W. de Silva, "Sensors and Actuators: Engineering System Instrumentation", 2nd Edition, CRC Press, 2015
5. David Hanes, Gonzalo Salgueiro, Patrick Grossetete. Rob Barton and Jerome Henry, "IOT Fundamentals: Networking Technologies, Protocols and Use Cases for Internet of Things, Cisco Press, 2017.

REFERENCE BOOKS:

1. Del Toro, Electrical Engineering Fundamentals Pearson Education, NewDelhi, 2007
2. 2.Smarjit Ghosh,Fundamentals of Electrical and Electronics Engineering, 2nd Edition 2007
3. 3.Olivier Hersent, David Boswarthick, Omar Elloumi, The Internet of Things- Key applications and Protocols‖, Wiley, 2012

WEB REFERENCES:

1. https://electrical-engineering-portal.com/download-center/books-and-guides/electrical-engineering/basic-course
2. https://www.infoq.com/articles/internet-of-things-reference-architecture/

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://onlinecourses.nptel.ac.in/noc22_cs53/preview

LIST OF EXPERIMENTS

1. (i)Study of Electronic components and equipment's – Resistor, colour coding

   (ii)Soldering practice – Components Devices and Circuits-Using general purpose PCB

2. 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

3. Measurement of electrical quantities – voltage, current, power & power factor in RLC circuit.

4. Design of Half wave Rectifier & Full wave Rectifier

5. Simulation of following circuits using suitable software

   (i)Seven segment LED display

   (ii)Stepper Motor control

   (iii)Traffic Light Control

6. 2D & 3D Electrical wiring Model using suitable Software.

SOFTWARE REQUIRED: Keil/Proteus/Fusion 360

PRACTICAL: 30 PERIODS
TOTAL: 75 PERIODS

COURSE OUTCOME(S):

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

CO1 Acquire basic knowledge on Basic Electrical circuits and House Wiring.

CO2 Understand the construction, working principle and applications of DC and AC Machines

CO3 Acquire basic knowledge on semiconductor devices and their applications

CO4 Illustrate the concepts of Sensors and Actuators

CO5 Identify and analyse Various Emerging Technologies.

CO6 Analyse the applications of IOT in real time scenario.

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	1		1					1
CO6	3	2	3	3	3		1					1

Assessment (40% weightage) (Theory Component)		**Assessment** (60% weightage) (Laboratory Component)		**End Semester Examination**
Individual Assignment / Case Study / Seminar / Mini Project	**Written Test**	**Evaluation of Laboratory Observation, Record**	**Test**	**Written Examination**
40	**60**	**75**	**25**	
100				**100**
50 %				**50 %**

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 everycenturion 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 asshown 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 theaverageheight.
8. Given a string ¯a$bcd./fg‖ 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 numbersusing 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 using 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 minimumbalance 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(S):

Upon successful completion of the course, the 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.

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.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							

Internal Assessment		End Semester Examination
Evaluation of Laboratory Observation, Record	Test	Practical
75	25	100
60 %		40%

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 - ClassicalLiterature in Tamil – Secular Nature of Sangam Literature – Distributive Justice inSangam Literature - Management Principles in Thirukural - Tamil Epics and Impact of Buddhism & Jainism in Tamil Land Bakthi Literature Azhwars and N ayanmars - Forms of minor Poetry - Development of Modernliterature in Tamil - Contribution of Bharathiyar and Bharathidhasan.

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

Hero stone to modern sculpture - Bronze icons - Tribes and their handicrafts - Art of temple car making - - Massive Terracotta sculptures, Village deities, Thiruvalluvar Statue at Kanyakumari, Making of musical instruments - Mridhangam, Parai, Veenai, Yazh and Nadhaswaram - Role of Temples in Social and Economic Life of Tamils.

UNIT–III FOLK AND MARTIAL ARTS 3

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

UNIT–IV THINAI CONCEPT OF TAMILS 3

Flora and Fauna of Tamils & Aham and Puram Concept from Tholkappiyam and Sangam Literature - Aram Concept of Tamils - Education and Literacy during Sangam Age - Ancient Cities and Ports of Sangam Age - Export and Import during Sangam Age - Overseas Conquest of Cholas.

UNIT–V CONTRIBUTION OF TAMILS TO INDIAN NATIONAL MOVEMENT AND 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

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

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

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

UNIT – II **மரபு - பாறை ஓவியங்கள் முதல் நவீன ஓவியங்கள் வரை - சிற்பக் கலை** **3**

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

UNIT – III **நாட்டுப்புறக் கலைகள் மற்றும் வீர விளையாட்டுகள்** **3**

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

UNIT –IV **தமிழர்களின் திணைக் கோட்பாடுகள்** **3**

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

UNIT –V **இந்திய தேசிய இயக்கம் மற்றும் இந்திய பண்பாட்டிற்குத் தமிழர்களின் பங்களிப்பு** **3**

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

Total : 15 PERIODS

TEXT-CUM REFERENCE BOOKS:

1. தமிழக வரலாறு - மக்களும் பண்பாடும் - கே.கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணினித் தமிழ் – முனைவர். இல. சுந்தரம். (விகடன் பிரசுரம்).
3. கீழடி - வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
4. பொருநை - ஆற்றங்கரை நாகரிகம். (தொல்லியல் துறை)
5. Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
6. Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: InternationalInstitute of Tamil Studies
7. Historical by: International Institute of Tamil Studies).
8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
9. Keeladi - 'Sangam City C ivilization 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) (Publishedby: The Author)
11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Bookand Educational Services Corporation, Tamil Nadu)
12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book

Internal Assessment				**End Semester Examinations**
Assessment I (100 Marks)		**Assessment II (100 Marks)**		
Individual Assignment / Case Study / Seminar / Mini Project	**Written Test**	**Individual Assignment / Case Study / Seminar / Mini Project**	**Written Test**	**Written Examinations**
40	60	40	60	100
40%				**60 %**

SEMESTER – II

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 -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 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(S):

Upon successful completion of the course, students 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,2018.
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. Jain R.K. and Iyengar S.R.K., Advanced Engineering Mathematics, NarosaPublications, New Delhi, 3rd Edition, 2007.
3. O'Neil, P.V. Advanced Engineering Mathematics, Cengage Learning India Pvt. Ltd, New Delhi, 2007.
4. 4.Sastry, S.S, Engineering Mathematics, Vol.I & II, PHI LearnigPvt. Ltd, 4th Edition, New Delhi, 2014.
5. Wyile, R.C. and Barrett, L.C., Advanced Engineering Mathematics, Tata McGraw Hill Education Pvt Ltd, 6thEdition, New Delhi, 2012.

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**
CO6												

Internal Assessment				**End Semester Examinations**
Assessment I (100 Marks)		**Assessment II (100 Marks)**		
Individual Assignment / Case Study / Seminar / Mini Project	**Written Test**	**Individual Assignment / Case Study / Seminar / Mini Project**	**Written Test**	**Written Examinations**
40	60	40	60	100
40%				**60 %**

23ES1201	PYTHON PROGRAMMING	L	T	P	C
		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 STRUCTURES 9

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.Illustrativeprograms: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 comprehensionsTuples: 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 marksheet,c alendar,file explorer using Tkinter,

TOTAL: 45 PERIODS

COURSE OUTCOME(S):

On 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. Reema Thareja,”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. Martin C. Brown, “Python: The Complete Reference”, 4th Edition, Mc-Graw Hill, 2018

2. Eric Matthes, “Python Crash Course, A Hands - on Project Based Introduction to Programming”, 2nd Edition, No Starch Press, 2019.
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

Internal Assessment				End Semester Examinations
Assessment I (100 Marks)		Assessment II (100 Marks)		
Individual Assignment / Case Study / Seminar / Mini Project	Written Test	Individual Assignment / Case Study / Seminar / Mini Project	Written Test	Written Examinations
40	60	40	60	100
40%				60 %

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(S):

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/

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**

Internal Assessment				**End Semester Examinations**
Assessment I (100 Marks)		**Assessment II (100 Marks)**		
Individual Assignment / Case Study / Seminar / Mini Project	**Written Test**	**Individual Assignment / Case Study / Seminar / Mini Project**	**Written Test**	**Written Examinations**
40	60	40	60	100
40%				**60 %**

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.

THEORY : 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.

PRACTICAL : 30 PERIODS
TOTAL : 60 PERIODS

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.

COURSE OUTCOME(S):

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**

Assessment (40% weightage) (Theory Component)		**Assessment** (60% weightage) (Laboratory Component)		**End Semester Examination**
Individual Assignment / Case Study / Seminar / Mini Project	**Written Test**	**Evaluation of Laboratory Observation, Record**	**Test**	**Written Examination**
40	**60**	**75**	**25**	
100				**100**
50 %				**50 %**

23CS1201	WEB APPLICATION DEVELOPMENT	L	T	P	C
		2	0	2	3

COURSE OBJECTIVE :

- To understand the concepts and architecture of the World Wide Web.
- To understand and practice mark-up languages
- To introduce tools for creating interactive web pages
- To understand and practice web development using wordpress.

UNIT - I WEB ESSENTIALS 4

Clients, Servers and Communication – The Internet – Understanding the difference between internet and intranet- Basic Internet protocols – World Wide Web – HTTP Request Message – HTTP Response Message – Web Clients – Web Servers.

UNIT - II HTML 5.0 6

HTML5 – Tables – Lists – Image – Iframes – HTML5 control elements – Semantic elements –Drag and Drop – Canvas – SVG – Audio – Video controls.

UNIT - III CASCADING STYLE SHEETS 6

CSS3 – Inline, embedded and external style sheets – Rule cascading – Inheritance – Backgrounds – Border Images – Colors – Shadows – Text – Transformations – Transitions –Animations- Media Query.

UNIT - IV WORDPRESS FUNDAMENTALS 7

Introduction to CMS And WordPress, WordPress Installation ,WordPress Admin Creating Users, User Rights & Roles

UNIT - V WORDPRESS DEVELOPMENT 7

Creating Page and Post in Wordpress, WordPress Themes, Plugins , Menus, Widgets, SEO.

TOTAL: 30 PERIODS

TEXT BOOKS:

1. Scobey, Pawan Lingras, "Web Programming and Internet Technologies- An ECommerce Approach", Jones & Bartlett Publishers, 2020
2. Brian Messenlehner, Jason Coleman, Building Web Apps with WordPress: 2019

REFERENCE BOOKS:

1. Andreas Maurer, HTML5 & CSS3: A Step-by-Step guide for beginners to build and design responsive and engaging websites with html5 and css3 , Kindle Edition,2020.
2. Deitel and Deitel and Nieto, Internet and World Wide Web - How to Program,Prentice Hall, 2011.
3. Gopalan N.P. and Akilandeswari J. ¯Web Technology, Prentice Hall of India, 2011.
4. Andreas Maurer, HTML5 & CSS3: A Step-by-Step guide for beginners to build and design responsive and engaging websites with html5 and css3 , Kindle Edition,2020.

WEB REFERENCES:

1. https://www.brainkart.com/article/Web-Essentials_10223/
2. https://developer.mozilla.org/en-US/docs/Web/HTML/Reference
3. https://developer.wordpress.org/reference

LIST OF EXPERIMENTS

1. Create a web page with the following using HTML
   a. To embed a map in a web page
   b. To fix the hot spots in that map
   c. Show all the related information when the hot spots are clicked.

2. Create a Personal blog design using HTML Multimedia elements and CSS elements - (Audio, Video, Iframe, Image, External CSS for Look and Feel)

3. Create your own Resume using HTML 5 Tags.Add Styles to your Resume using CSS 3Properties and add CSS3 Animation to your profile

4. Create a web page with the following.
   1. Cascading style sheets.
   2. Embedded style sheets.
   3. Inline style sheets. Use our college information for the web pages.

5. Create a website for a small business using Wordpress

6. Create a course website using Wordpress

7. **Mini Project** : Suggested Topics(but not limited to)
   - Survey Form
   - Quiz Game
   - Event Website

TOTAL: 30 PERIODS

COURSE OUTCOME(S):

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

CO1 Outline the Internet and basic Internet Protocols
CO2 Develop a basic website using HTML
CO3 Design an attractive webpage using CSS
CO4 Correlate the essential technologies for website development
CO5 Experiment Word press Installation and administration
CO6 Build web sites using wordpress tool

	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	3							2
CO4	2	2	2	2	3							2
CO5	2	2	2	2	3							2
CO6	2	2	2	2	3							2

Assessment (40% weightage) (Theory Component)		**Assessment** (60% weightage) (Laboratory Component)		**End Semester Examination**
Individual Assignment / Case Study / Seminar / Mini Project	**Written Test**	**Evaluation of Laboratory Observation, Record**	**Test**	**Written Examination**
40	**60**	**75**	**25**	
100				**100**
50 %				**50 %**

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)

1. Dice roll simulator
2. Guess the number game
3. Random password generator

TOTAL: 60 PERIODS

COURSE OUTCOME(S):

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 REFERENCES:

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

Internal Assessment		**End Semester Examination**
Evaluation of Laboratory Observation, Record	**Test**	**Practical**
75	**25**	**100**
60 %		**40%**

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(S):
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. Reema Thareja, Programming in C, 2nd edition, OXFORD University Press, New Delhi, 2019.

2. Paul Deitel and Harvey Deitel, C How to Program, Seventh edition, Pearson Publication,2016.

REFERENCES 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/

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) – Graffition Potteries.

UNIT–II DESIGN AND CONSTRUCTION TECHNOLOGY 3

Designing and Structural construction House & Designs in household materials during Sangam Age –Building materials and Herostones 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 ScientificTamil-Tamilcomputing–DigitalizationofTamilBooks- Development of Tamil Software – Tamil Virtual Academy – Tamil Digital Library – Online Tamil Dictionaries –Sorkuvai Project.

TOTAL : 15 PERIODS

24TA1201	தமிழரும் தொழில்நுட்பமும்	L	T	P	C
		1	0	0	1

UNIT – I **நெசவு மற்றும் பானைத் தொழில்நுட்பம்** **3**

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

UNIT – II **வடிவமைப்பு மற்றும் கட்டிடத் தொழில்நுட்பம்** **3**

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

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

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

UNIT –IV **வேளாண்மை மற்றும் நீர்பாசனத் தொழில்நுட்பம்** **3**

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

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

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

Total : 15 PERIODS

TEXT-CUM REFERENCE BOOKS:

1. தமிழக வரலாறு - மக்களும் பண்பாடும் - கே.கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணினித் தமிழ் - முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்).
3. கீழடி - வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
4. பொருநை - ஆற்றங்கரை நாகரிகம். (தொல்லியல் துறை)
5. Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
6. Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: InternationalInstitute of Tamil Studies
7. Historical by: International Institute of Tamil Studies).
8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
9. Keeladi - 'Sangam City C ivilization 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) (Publishedby: The Author)
11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Bookand Educational Services Corporation, Tamil Nadu)
12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book

Internal Assessment				**End Semester Examinations**
Assessment I (100 Marks)		**Assessment II (100 Marks)**		
Individual Assignment / Case Study / Seminar / Mini Project	**Written Test**	**Individual Assignment / Case Study / Seminar / Mini Project**	**Written Test**	**Written Examinations**
40	60	40	60	100
40%				**60 %**

SEMESTER – III

23MA1301	DISCRETE MATHEMATICS	L	T	P	C
		3	1	0	4

COURSE OBJECTIVE:

- To extend student's logical and mathematical maturity and ability to deal with abstraction.
- To introduce most of the basic terminologies used in computer science courses and application of ideas to solve practical problems.
- To understand the basic concepts of combinatorics and graph theory.
- To familiarize the applications of algebraic structures.
- To understand the concepts and significance of lattices and boolean algebra which are widely used in computer science and engineering.

UNIT - I LOGIC AND PROOFS 9+3

Propositional logic – Propositional equivalences - Predicates and quantifiers – Nested quantifiers – Rules of inference - Introduction to proofs – Proof methods and strategy.

UNIT - II COMBINATORICS 9+3

Mathematical induction – Strong induction and well ordering – The pigeonhole principle - Recurrence relations – Solving linear recurrence relations – Generating functions – Inclusion and exclusion principle and its applications.

UNIT - III GRAPHS 9+3

Graphs and graph models – Graph terminology and special types of graphs – Matrix representation of graphs - Shortest path – Dijkstra's algorithms – Graphs isomorphism - Connectivity – Euler and Hamiltonian paths.

UNIT - IV ALGEBRAIC STRUCTURES 9+3

Algebraic systems – Semi groups and monoids - Groups – Subgroups – Homomorphism - Normal subgroup and cosets – Lagrange 's theorem-Definitions and examples of Rings and Fields.

UNIT - V LATTICES AND BOOLEAN ALGEBRA 9+3

Partial ordering – Posets – Lattices as posets – Properties of lattices - Lattices as algebraic systems – Sub lattices – Direct product and homomorphism – Some special lattices – Boolean algebra.

TOTAL : 60 PERIODS

COURSE OUTCOME(S):

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

CO1 Apply concept of Predicate Calculus in computer science like design of computing machines, artificial intelligence, and have the knowledge to test the logic of a program.

CO2 Understand the concepts of the counting principles

CO3 Understand the application of various types of graphs in real life problem.

CO4 Identify isomorphism and analyze structure between graphs

CO5 Apply the concepts and properties of algebraic structures.

CO6 Determining Boolean functions and simplify expression using its properties.

TEXT BOOKS:

1. Rosen, K.H., Discrete Mathematics and its Applications, 7th Edition, Tata McGraw Hill Pub. Co. Ltd., New Delhi, Special Indian Edition, 2011.
2. Tremblay, J.P. and Manohar.R, Discrete Mathematical Structures with Applications to Computer Science, Tata McGraw Hill Pub. Co. Ltd, New Delhi, 30th Reprint, 2011.
3. Veerarajan. T, Discrete Mathematics: with graph theory and combinatorics,McGrawHill Education (India) Pvt. Ltd. 2007.

REFERENCE BOOKS:

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

CO - PO MAPPING

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

Internal Assessment				End Semester Examinations
Assessment I (100 Marks)		Assessment II (100 Marks)		
Individual Assignment / Case Study / Seminar / Mini Project	Written Test	Individual Assignment / Case Study / Seminar / Mini Project	Written Test	Written Examinations
40	60	40	60	100
40%				60 %

23CS1301	DIGITAL PRINCIPLES AND COMPUTER ARCHITECTURE	L	T	P	C
		3	0	0	3

COURSE OBJECTIVE:

- To learn to design digital circuits using simplified Boolean functions
- To design Combinational Logic Circuits
- To gain knowledge on designing Sequential Logic Circuits
- To explore the basic structure and operations of a computer
- To understand Memory and Input-output Systems

UNIT- I BOOLEAN ALGEBRA AND LOGIC GATES 9

Number Systems – Arithmetic Operations – Binary Codes- Boolean Algebra and Logic Gates – Theorems and Properties of Boolean Algebra – Boolean Functions – Canonical and Standard Forms – Simplification of Boolean Functions using Karnaugh Map -- Quine McCluskey Method – Logic Gates – NAND and NOR Implementations.

UNIT- II COMBINATIONAL LOGIC CIRCUITS 9

Combinational Circuits – Analysis and Design Procedures – Binary Adder-Subtractor – Decimal Adder – Binary Multiplier – Magnitude Comparator – Decoders – Encoders – - Multiplexers - Demultiplexers.

UNIT- III SEQUENTIAL LOGIC CIRCUITS 9

Sequential Circuits - Flip-Flops: RS, D, JK, and T - Shift Registers - Counters.

UNIT- IV BASIC STRUCTURE OF A COMPUTER 9

Basic operational concepts, Performance, Operations, Operands of the computer hardware, Instructions representation, Decision making, Logical operations, Addressing modes.

UNIT- V MEMORY , I/O & PARALLEL PROCESSING 9

Memory Hierarchy - Cache Memory – Accessing I/O Devices – Direct Memory Access- Parallel processing challenges – Flynn's Classification – SISD, MIMD, SIMD, SPMD, and Vector Architecture.

TOTAL: 45 PERIODS

COURSE OUTCOME(S):

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

CO1 Relate different number systems and binary codes.
CO2 Explain the basic structure of computers, operations and instructions.
CO3 Build digital circuits using simplified Boolean functions.
CO4 Design and realize simple combinational logic circuits.
CO5 Evaluate the characteristics and working of various Flip-Flops.
CO6 Compare and contrast memory hierarchies, I/O systems and Parallel processing.

TEXTBOOKS:

1. M. Morris R. Mano, Michael D. Ciletti, Digital Design: With an Introduction to the Verilog HDL, VHDL, and System Verilog, 6th Edition, Pearson Education, 2018.
2. David A. Patterson and John L. Hennessy, Computer Organization and Design: The Hardware/Software Interface, Fifth Edition, Morgan Kaufmann / Elsevier, 2014.

REFERENCE BOOKS:

1. John F. Wakerly, Digital Design Principles and Practices, Fifth Edition, Pearson Education, 2018.
2. Charles H. Roth Jr, Larry L. Kinney, Fundamentals of Logic Design, Sixth Edition, CENGAGE Learning, 2013.
3. William Stallings, Computer Organization and Architecture – Designing for Performance, Tenth Edition, Pearson Education, 2016.
4. Govindarajalu, Computer Architecture and Organization, Design Principles and Applications, Second edition, McGraw-Hill Education India Pvt Ltd, 2014.

WEB REFERENCES:

1. https://www.javatpoint.com/digital-electronics
2. https://www.tutorialspoint.com/digital_circuits
3. https://www.tutorialspoint.com/Computer-System-Architecture
4. https://www.geeksforgeeks.org/computer-organization-and-architecture-tutorials/

ONLINECOURSES/RESOURCES:

1. https://nptel.ac.in/courses/117105080
2. https://www.coursera.org/learn/digital-systems

CO - PO MAPPING

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

Internal Assessment				End Semester Examinations
Assessment I (100 Marks)		Assessment II (100 Marks)		
Individual Assignment / Case Study / Seminar / Mini Project	Written Test	Individual Assignment / Case Study / Seminar / Mini Project	Written Test	Written Examinations
40	60	40	60	100
40%				60 %

23CS1302	DATA STRUCTURES	L	T	P	C
		3	0	0	3

COURSE OBJECTIVE:

- To learn Linear Data Structures and their applications in problem solving
- To understand Non Linear Data Structures - Trees and their applications in problem solving
- To understand Non Linear Data Structures - Graph and their implementations.
- To learn to implement Hash and Heap functions
- To understand Internal and External Sort and Searching techniques.

UNIT- I LINEAR DATA STRUCTURES – LIST, STACK AND QUEUE 9

List ADT – Singly Linked List – Doubly Linked List – Circular Linked List – Applications of List: Manipulation on Polynomial – Stack ADT – Implementation of Stack – Applications of Stack: Balancing Symbols – Conversion of Infix to Postfix Expression – Expression Evaluation – Queue ADT – Circular Queue, Double Ended Queue – Applications of Queue.

UNIT- II NON LINEAR DATA STRUCTURES – TREES 9

Trees – Terminology and Properties – Binary Trees – Expression Trees and Threaded Binary Trees – Binary Search Tree – Operations in Binary Search Tree – Tree Traversals – AVL Trees – Operations in AVL Trees.

UNIT- III NON LINEAR DATA STRUCTURES – GRAPH 9

Representation of Graph – Graph Traversal: Breadth First Search (BFS), Depth First Search (DFS) - Bi-connectivity – Euler circuits – Topological Sort – Minimum Spanning Tree : Prim's and Kruskal's Algorithm – Single Source Shortest Path: Dijkstra's Algorithm.

UNIT- IV HASHING TECHNIQUES AND HEAP 9

Hash Functions – Open Hashing – Separate Chaining, Closed Hashing – Linear Probing, Quadratic Probing, Double Hashing, Random Probing, Rehashing, Extendible Hashing. Heaps – Min/Max Heaps – Operation on Heap – Binary Heaps.

UNIT- V SORTING AND SEARCHING TECHNIQUES 9

Sorting: Quick Sort – Shell Sort – Heap Sort – Bucket Sort – Merge Sort- Radix Sort – Analysis of Sorting Algorithms – Searching: Linear Search – Binary Search – Applications.

TOTAL: 45 PERIODS

COURSE OUTCOME(S):

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

CO1 Identify the Linear Data Structures suitable to different problem solutions.

CO2 Understand Data Structures like Stack and Queue.

CO3 Implement different types of Trees and apply them to the problem solutions

CO4 Analyze Graph structures and various operations on graphs and their applicability

CO5 Experiment with Hash tables and Heaps.

CO6 Compare the various Sorting and Searching algorithms.

TEXTBOOKS:

1. Chandan Banerjee and Atanu Das, Data Structures and Algorithms in C and Python, Universities Press,2023.
2. Reema Thareja, "Data Structures Using C", 2nd Edition, OXFORD University Press, NewDelhi, 2016.

REFERENCE BOOKS:

1. Jean-Paul Tremblay and Paul G. Sorenson, "An Introduction to Data Structures with Applications", 2nd Edition, McGraw Hill, 2013.
2. Langsam, Augenstein and Tanenbaum, "Data Structures Using C and C++", 2nd Edition, Pearson Education, 2015.
3. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C++", Pearson Education 4th Edition, 2014.
4. R. Kruse, C. L. Tondo and B. Leung, "Data Structures and Program Design in C", 2nd Edition, Pearson Education, 2006.

WEB REFERENCES:

1. https://www.programiz.com/dsa
2. https://www.w3schools.in/data-structures/tutorials/
3. https://www.javatpoint.com/data-structure-tutorial
4. https://www.geeksforgeeks.org/data-structures/
5. https://en.wikibooks.org/wiki/Data_Structures
6. https://www.simplilearn.com/tutorials/data-structure-tutorial

ONLINECOURSES/RESOURCES:

1. https://www.codechef.com/certification/data-structures-and-algorithms/prepare
2. https://www.coursera.org/learn/data-structures
3. https://nptel.ac.in/courses/106102064
4. https://www.edx.org/learn/data-structures
5. https://www.udemy.com/topic/data-structures/
6. https://www.mygreatlearning.com/academy/learn-for-free/courses/data-structures-in-c

CO - PO MAPPING

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

Internal Assessment				End Semester Examinations
Assessment I (100 Marks)		Assessment II (100 Marks)		
Individual Assignment / Case Study / Seminar / Mini Project	Written Test	Individual Assignment / Case Study / Seminar / Mini Project	Written Test	Written Examinations
40	60	40	60	100
40%				60 %

23CS1303	DATABASE MANAGEMENT SYSTEMS	L	T	P	C
		3	0	0	3

COURSE OBJECTIVE:

- To understand the role of a database management system, relational data model and successfully apply logical database design principles, including E-R diagrams.
- To learn the basic concepts and the applications of database systems.
- To learn SQL and construct queries using SQL.
- To know about Transaction processing and concurrency control.
- To understand Database storage structures and access techniques.

UNIT- I DATABASE FUNDAMENTALS 9

Introduction: Database System Applications, Purpose of Database Systems, View of Data, Components and Structure, Database Users and Administrator, History of Database Systems. Data models: ER model, Entities, Attributes and Entity sets, Relationships and Relationship sets, Additional features of ER Model, Conceptual Design with the ER Model, Enhanced E-R Model- Mapping ER Model to Relational Model.

UNIT- II RELATIONAL DATABASE 9

Relational Data Model - Concept of Relations, Schema-Instance distinction, Keys, Referential integrity and Foreign keys, Relational algebra operators, SQL - Introduction, Data Definition in SQL, Table, Key and Foreign key definitions, Update behaviours. Querying in SQL, Notion of aggregation, Aggregation functions Group by and Having clauses, Embedded SQL, Query Processing.

UNIT- III DATABASE DESIGN 9

Schema Refinement and Normal Forms: Introduction to Schema Refinement, Functional Dependencies, Properties of Decompositions. Normalization: First, Second, Third Normal Forms, Dependency Preservation, Boyce-Codd Normal Form – Multivalued Dependencies – Fourth Normal Form – Join Dependencies – Fifth Normal Form.

UNIT- IV TRANSACTION MANAGEMENT 9

Transaction Concept – State – ACID Properties – Concurrency control - Serializability – Recoverability – Locking based protocols –Timestamp Based Protocol - Deadlock handling.

UNIT- V IMPLEMENTATION TECHNIQUES AND NON-RELATIONAL MODEL 9

Data on External Storage – RAID- File Organizations – Indexing and Hashing -Trees- B+ tree and B- Tree index files. Introduction to NoSQL and MongoDB: Advantages, Architecture, Data Models MongoDB Data types and CRUD Operations-Working of NoSQL Using MONGODB/CASSANDRA.

TOTAL: 45 PERIODS

COURSE OUTCOME(S):

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

CO1 Identify and Recognize the Structure of a Database

CO2 Understand an Entity Relational Model for a database.

CO3 Apply Relational and Non-Relational database concepts to design a database.

CO4 Analyze the importance of normalization and functional dependencies in database design.

CO5 Evaluate the working principles of indexing and hashing.

CO6 Create a database design using both Relational and Non- Relational models

TEXTBOOKS:

1. Data base System Concepts, A. Silberschatz, Henry. F. Korth, S. Sudarshan, McGraw HillIndia Private Limited, 2020.
2. Mongo DB Complete Guide by Manu Sharma, BPB Publications, ISBN: 9789389898866, July 2021.

REFERENCE BOOKS:

1. Data base Management Systems, Raghu Ramakrishnan, Johannes Gehrke, McGraw Hill Education (India) Private Limited, 3rd Edition.
2. Fundamentals of Database System, Ramez Elmasri and Shamkant B. Navathe, Pearson Publications, 7th Edition.
3. C. J. Date, A. Kannan and S. Swamy nathan, An Introduction to Database Systems, Pearson Education, Eighth Edition, 2009.

CO - PO MAPPING

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

Internal Assessment				End Semester Examinations
Assessment I (100 Marks)		Assessment II (100 Marks)		
Individual Assignment / Case Study / Seminar / Mini Project	Written Test	Individual Assignment / Case Study / Seminar / Mini Project	Written Test	Written Examinations
40	60	40	60	100
40%				60 %

23IT1301	OBJECT ORIENTED PROGRAMMING	L	T	P	C
		3	0	0	3

COURSE OBJECTIVE:

- Understanding Object Oriented Programming concepts and basic characteristics of Java
- Knowing the principles of packages, inheritance and interfaces
- Developing java application with threads and handling exceptions
- Understand String, I/O and Collection framework
- Learning generic programming and to build simple Graphical User Interfaces

UNIT - I INTRODUCTION TO OOP AND JAVA FUNDAMENTALS 9

Object Oriented Programming - Abstraction – Objects And Classes - Encapsulation-Inheritance -Polymorphism- characteristics of Java-Java Environment- Java source File-compilation –Fundamental Programming Structures In Java –Data types-variables-operators-control flow- Defining Classes In Java – Constructors, Methods -Access Specifiers - Static Members - Arrays ,Javadoc Comments.

UNIT - II INHERITANCE, PACKAGES AND INTERFACES 9

Inheritance – Types of Inheritance-Super Keyword- Method Overrriding- Dynamic method Dispatch– Abstract classes and methods- Final classes-Object Class – Inner Class - Packages – Defining Packages – Finding Packages And CLASSPATH -Importing Packages - Interfaces – Defining an Interface, Implementing Interface and Extending Interfaces .

UNIT - III MULTITHREADING AND EXCEPTION HANDLING 9

Thread-Thread life cycle, creating threads, synchronizing threads, Inter-thread communication, daemon threads, thread groups - Exceptions - exception hierarchy - throwing and catching exceptions – built-in exceptions, creating own exceptions, Stack Trace Elements.

UNIT - IV STRING, I/O AND COLLECTION FRAMEWORK 9

Strings:String class, String Buffer Class-Input / Output Basics – Streams – Byte streams and Character streams – Reading and Writing Console – Reading and Writing Files-Collection Framework: ArrayList, Set, Map.

UNIT - V GENERIC PROGRAMMING AND EVENT DRIVEN PROGRAMMING 9

Generic Programming – Generic classes – Generic methods – Bounded Types – Restrictions and Limitations-Basics of event handling - event handlers - adapter classes - actions - mouse and key events –AWT - Introduction to Swing – layout management - Swing Components –Windows–Menus– Dialog Boxes.

TOTAL : 45 PERIODS

COURSE OUTCOME(S):

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

CO1 Define clearly all the basic concepts of oops
CO2 Interpret simple JAVA programs by applying classes and objects
CO3 Implement the concepts of Inheritance, interfaces and packages.
CO4 Analyze real time problems with multithreading and exceptional handling concepts
CO5 Evaluate complex programs with the help of collection framework and I/O
CO6 Build applications by incorporating AWT and swing components

TEXT BOOKS:

1. Herbert Schildt, Java The complete reference, 11th Edition, McGraw Hill Education, 2019.
2. Cay S. Horstmann, Gary cornell, Core Java Volume –I Fundamentals, 11th Edition, Prentice Hall, 2018.

REFERENCE BOOKS:

1. Paul Deitel, Harvey Deitel, Java SE 8 for programmers, 3rd Edition, Pearson, 2015.
2. Steven Holzner, Java 2 Black book, Dream tech press, 2011.
3. Timothy Budd, Understanding Object-oriented programming with Java, Updated Edition, Pearson Education, 2000

WEB REFERENCES:

1. https://www.programiz.com/java-programming
2. https://www.w3schools.com/cpp/cpp_oop.asp
3. https://www.geeksforgeeks.org/object-oriented-programming-oops-concept-in-java/
4. https://docs.oracle.com/javase/tutorial/java/concepts
5. https://www.javatpoint.com/java-oops-concepts

ONLINE COURSES / RESOURCES:

1. https://onlinecourses.nptel.ac.in/noc21_cs03/preview
2. https://www.udemy.com/topic/object-oriented-programming/
3. https://www.edx.org/course/object-oriented-programming
4. https://www.coursera.org/specializations/object-oriented-programming
5. https://www.coursera.org/courses?query=java

CO - PO MAPPING

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

Internal Assessment				End Semester Examinations
Assessment I (100 Marks)		Assessment II (100 Marks)		
Individual Assignment / Case Study / Seminar / Mini Project	Written Test	Individual Assignment / Case Study / Seminar / Mini Project	Written Test	Written Examinations
40	60	40	60	100
40%				60 %

23CS1311	DATA STRUCTURES LABORATORY	L	T	P	C
		0	0	4	2

COURSE OBJECTIVE:

- To understand the basic Data Structures and their implementations.
- To gain knowledge in Linear Data Structures – Stack, Queue, Linked List.
- To explore about Non Linear Data Structures - Trees and Graphs
- To solve problems implementing appropriate data structures by understanding the strength and weakness of different Data Structures.
- To implement sorting and searching algorithms using relevant data structures

LIST OF EXPERIMENTS

1. Write a program to implement the Stack that performs the following operations
   a) Push
   b) Pop
   c) Peep
   d) Change
   e) Display
2. Write a program to Implementation the following Stack applications
   a) Balancing Parenthesis
   b) Conversion of Infix to Postfix Expression
   c) Evaluation of Postfix Expression
3. Write a program to implement the following operations on Circular Queue
   a) Insert an Element on to Circular Queue
   b) Delete an Element from Circular Queue
   c) Display the elements of Circular Queue
4. Write a program to implement the following operations on Singly Linked List
   a) Insert a node at the front of the Linked List
   b) Insert a node at the end of the Linked List
   c) Delete a First node of the Linked List
   d) Delete a node at the end of the Linked List.
5. Write a program to implement the following operations on Doubly Linked List
   a) Creation
   b) Insertion
   c) Deletion
6. Write a program to implement the following operations on Circular Linked List
   a) Creation
   b) Insertion
   c) Deletion
7. Write a program to implement the Polynomial arithmetic using Linked List.
8. Write a program for the following operations on Binary Search Tree (BST)
   a) Create a Binary Search Tree
   b) Delete an element in the Binary Search Tree
   c) Traverse the Binary Search Tree in Inorder, Preorder and Post Order
   d) Search the Binary Search Tree for a given element (KEY)
9. Write a program to perform the following operations into an AVL Tree
   a) Insert an element into an AVL tree
   b) Delete an element from an AVL tree
   c) Search for a key element in an AVL tree

10. Write a program to implement the following Graph Traversal Methods
    a) Breadth First Search
    b) Depth First Search
11. Write a program to implement Topological Sorting (Application of a Graph)
12. Write a program to implement Minimum Spanning Tree using the following algorithms
    a) Prim's Algorithm
    b) Kruskal's Algorithm
13. Write a Program to implement Single Source Shortest Path algorithm (Dijkstra's algorithm)
14. Given a File of N employee records with a set K of Keys (4-digit) which uniquely determine the records in file F. Assume that file F is maintained in memory by a Hash Table (HT) of M memory locations with L as the set of memory addresses (2-digit) of locations in HT. Let the keys in K and addresses in L are Integers. Write a Program that uses Hash function H: K – > L as H(K)=K mod m (remainder method) and implement hashing technique to map a given key K to the address space L. Resolve the collision (if any) using linear probing
15. Write a program to implement Max/ Min Heap and its operations
16. Write a program that implements the following sorting
    a) Quick Sort
    b) Merge Sort
    c) Radix Sort
    d) Heap Sort
17. **MINI PROJECT (Suggested Mini Project Titles, but not limited to)**
    a) Dictionary using Binary trees
    b) Phone directory application using Doubly-linked lists
    c) Snake Game
    d) Chess Game
    e) Quiz Game
    f) Sudoku
    g) Traffic Analysis
    h) Memory Matching Game
    i) Crossword Puzzle
    j) Travel Planner (Graphs)
    k) Tic-Tac-Toe Game
    l) User Defined (Student Choice)

TOTAL:60 PERIODS

COURSE OUTCOME(S):

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

CO1 Identify the Abstract Data Type of Linked List and their applications.

CO2 Understand the concept of Linear Data Structures such as Stacks and Queues and its application.

CO3 Construct different types of Tree along with their operations and applications.

CO4 Solve problem involving Graphs and its applicability.

CO5 Evaluate the Heap & Hash Function and concepts of collision and its resolution methods.

CO6 Design efficient algorithms for Sorting and Searching.

WEB REFERENCES:

1. https://www.hackerrank.com/domains/data-structures
2. https://www.geeksforgeeks.org/data-structures/
3. https://www.codechef.com/learn/topic/data-structures-and-algorithms
4. https://www.javatpoint.com/data-structure-tutorial
5. https://www.programiz.com/dsa
6. http://www.java2s.com/example/java/data-structure/

CO - PO MAPPING

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

Internal Assessment		End Semester Examination
Evaluation of Laboratory Observation, Record	Test	Practical
75	25	100
60 %		40%

23CS1312	DATABASE MANAGEMENT SYSTEMS LABORATORY	L	T	P	C
		0	0	4	2

COURSE OBJECTIVE:

- To learn to create and use a database
- To be familiarized with a query language.
- To have hands on experience on DDL Commands.
- To understand of DML Commands and DCL Command
- To learn advanced SQL queries.
- To be exposed to different applications.

LIST OF EXPERIMENTS

1. Introduction SQL-SQL*Plus: DDL,DML,DCL,TCL.SQL clause :SELECT FROM WHERE GROUPBY,HAVING,ORDERBY Using SQLite/MySQL/Oracle.
2. Creation of Views, Synonyms, Sequence, Indexes, Save point
3. Creating relationship between the databases and retrieve records using joins for the below relations:
   Salesman Relation:

salesman_id	name	city	commission
5001	James Hoog	New York	0.15
5002	Nail Knite	Paris	0.13
5005	Pit Alex	London	0.11
5006	Mc Lyon	Paris	0.14
5007	Paul Adam	Rome	0.13
5003	Lauson Hen	San Jose	0.12

   Customer Relation:

customer_id	cust_name	city	grade	salesman_id
3002	Nick Rimando	New York	100	5001
3007	Brad Davis	New York	200	5001
3005	Graham Zusi	London	300	5002
3004	Fabian	Paris	300	5006
3009	Geoff Cameron	Rome	100	5007
3003	Jozy	San Jose	300	5003

4. Write a PL/SQL block to specify constraints by accepting input from the user.
5. Implementation of PL/SQL Procedure (IN, OUT, INOUT) with Exception Handling.
6. Implementation of PL/SQL Function.
7. Implementation of PL/SQL Cursor.

8. Implementation of PL/SQL Trigger, Packages.
9. Implementation of NoSQL basic commands using Cassandra/Mongo DB.
10. Implementation of Data Model in NoSQL.
11. Implementation of Aggregation, Indexes in NoSQL
12. **MINI PROJECT** (Suggested topics, but not limited to)
    Software Requirement : Database Connectivity with Front End Tools (Python/C/C++/JAVA) and Back End Tools (MySQL/SQLite/CASSANDRA/MONGO DB)
    i)Inventory Control System.
    ii)Material Requirement Processing
    iii)Hospital Management System.
    iv) Railway Reservation System.
    v) Personal Information System.
    vi)Timetable Management System.
    vii)Hotel Management System

TOTAL:60 PERIODS

COURSE OUTCOME(S):

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

CO1 Define the relationship between databases.
CO2 Understand various query execution such as relational constraints, joins, set operations, aggregate functions, trigger, views.
CO3 Apply the basic concepts of Database Systems and Applications
CO4 Analyze stored functions, stored procedures, cursor, trigger using PL/SQL block.
CO5 Relate the different models of NoSQL databases.
CO6 Design and implement database applications on their own.

WEB REFERENCES:

1. https://www.w3schools.com/sql/sql_quickref.asp
2. https://www.oracle.com/in/database/technologies/appdev/sql.html
3. https://www.tutorialspoint.com/mongodb/mongodb_database_references.htm

CO - PO MAPPING

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

Internal Assessment		End Semester Examination
Evaluation of Laboratory Observation, Record	Test	Practical
75	25	100
60 %		40%

23IT1311	OBJECT ORIENTED PROGRAMMING LABORATORY	L	T	P	C
		0	0	4	2

COURSE OBJECTIVE:

- Building Software development skills using java programming for real-world applications.
- Understand and apply the concepts of classes, packages, interfaces, array list
- Understand and apply the concepts of inheritance and polymorphism
- Understand Exception handling and file processing.
- Develop applications using generic programming and event handling.

LIST OF EXPERIMENTS

1. Write a java program that prints all real solutions to the quadratic equation $ax^2+bx+c=0$. Read in a, b, c and use the quadratic formula.
2. The Fibonacci sequence is defined by the following rule. The first two values in the sequence are 1 and 1. Every subsequent value is the sum of the two values preceding it. Write a java program that uses both recursive and non-recursive functions.
3. Write a java program for sorting a given list of names in ascending order
4. Write a program that prompts the user for an integer and then prints out all prime numbers up to that integer.
5. Write a Java program to Multiply two given matrices
6. Write a Java program that checks whether a given string is a palindrome or not.
7. Develop a Java application to generate Electricity bill. Create a class with the following members: Consumer no., consumer name, previous month reading, current month reading, type of EB connection(i.e domestic or commercial).
8. Develop a java application to implement currency converter (Dollar to INR, EURO to INR, Yen to INR and vice versa), distance converter (meter to KM, miles to KM and vice versa) , time converter (hours to minutes, seconds and vice versa) using packages.
9. Develop a java application with Employee class with Emp_name, Emp_id, Address, Mail_id, Mobile_no as members. Inherit the classes, Programmer, Assistant Professor, Associate Professor and Professor from employee class. Add Basic Pay (BP) as the member of all the inherited classes with 97% of BP as DA, 10 % of BP as HRA, 12% of BP as PF, 0.1% of BP for staff club fund. Generate pay slips for the employees with their gross and net salary.
10. Design a Java interface for ADT Stack. Implement this interface using array. Provide necessary exception handling in both the implementations.
11. Write a program to perform string operations using Array List. Write functions for the following
    a) Append - add at end
    b) Insert – add at particular index
    c) Search
    d) List all string starts with given letter
12. Write a Java Program to create an abstract class named Shape that contains two integers and an empty method named print Area(). Provide three classes named Rectangle, Triangle and Circle such that each one of the classes extends the class Shape. Each one of the classes contains only the method print Area () that prints the area of the given shape.
13. Write a Java program to implement exception handling.
14. Write a Java program that reads a file name from the user, displays information about whether the file exists, whether the file is readable, or writable, the type of file and the length of the file in bytes.

15. Write a java program that implements a multi-threaded application that has three threads. First thread generates a random integer every 1 second and if the value is even, second thread computes the square of the number and prints. If the value is odd, the third thread will print the value of cube of the number.
16. Write a java program that correct implements of producer consumer program using the concept of inter thread communication
17. Write a program to implement Map.
18. Write a program to implement HashSet Class.
19. Write a java program to find the maximum value from the given type of elements using a generic function.
20. Write a java program that simulates a traffic light. The program lets the user to select one of three lights: Red, Yellow or Green with radio buttons. On selecting a button an appropriate message with "STOP ", "READY" or "GO" should appear above the buttons in selected color.
    Initially, it should not display any message.
21. Design a calculator using event-driven programming paradigm of Java using Scientific manipulations.
22. Develop a mini project for any application using Java concepts.

ADDITIONAL PROGRAMS

23. Design a class to represent a Student details include the Student ID, Name of the Student, Branch, year, location and college. Assign initial values using constructor. Calculate average of marks of 6 subjects and calculate attendance percentage.
24. Develop with suitable hierarchy, classes for Point, Shape, Rectangle, Square, Circle, Ellipse, Triangle, Polygon, etc. Design a simple test application to demonstrate dynamic polymorphism.
25. Write a program that creates three threads. First thread displays "Good Morning" every one second, the second thread displays "Hello" every two seconds and the third thread displays "Welcome" every three seconds.
26. Write a java programs to find factorial of a number. User is allowed to enter a number into the text field whose factorial is to be determined. On pressing the button the value of the text field is firstly converted into integer and then processed to find its factorial. The result will get displayed in another text field.(Hint: use swings).

TOTAL: 60 PERIODS

COURSE OUTCOME(S):

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

- **CO1** Understand to write basic programs in JAVA
- **CO2** Design simple JAVA programs by applying classes and objects
- **CO3** Implement the concepts of Inheritance, interfaces and packages.
- **CO4** Design real time problems with multithreading and exceptional handling concepts.
- **CO5** Evaluate complex programs with the help of collection framework and I/O
- **CO6** Build applications by incorporating AWT and swing components

TEXT BOOKS:

1. Herbert Schildt, Java The Complete Reference, 11th Edition, McGraw Hill Education, 2011.

REFERENCE BOOKS:

1. Paul Deitel, Harvey Deitel, Java SE 8 for programmers, 3rd Edition, Pearson, 2015.
2. Steven Holzner, Java 2 Black book, Dream tech press, 2011.
3. Timothy Budd, Understanding Object-oriented programming with Java, Updated Edition, Pearson Education, 2000

WEB REFERENCES:

1. https://www.programiz.com/java-programming
2. https://www.w3schools.com/cpp/cpp_oop.asp
3. https://www.geeksforgeeks.org/object-oriented-programming-oops-concept-in-java/
4. https://docs.oracle.com/javase/tutorial/java/concepts
5. https://www.javatpoint.com/java- oops-concepts

CO - PO MAPPING

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	3	3	2									
CO2	3		3									
CO3	3	3	3									
CO4	3	3	3	3								
CO5	2	1	3	3								
CO6	3	3			2							

Internal Assessment		End Semester Examination
Evaluation of Laboratory Observation, Record	Test	Practical
75	25	100
60 %		40%

23ES1311	TECHNICAL SKILL PRACTICES II	L	T	P	C
		0	0	2	1

COURSE OBJECTIVE

- To understand the concepts of Arrays, ListADT.
- To learn linear data structures–stacks and queues ADTs.
- To understand and apply Tree data structures.
- To analyze sorting and searching algorithms.
- To understand and apply Graph structures and hashing techniques.

LIST OF TOPICS

1. Arrays
2. ListADT
3. Queue ADT
4. Stack ADT
5. Problems on Postfix and Infix expressions
6. Binary Tree Traversal
7. Binary Search Tree
8. B-Tree
9. Binary Heaps
10. Linear search algorithm and Binary search algorithm
11. Sorting Algorithms
    i. Bubble Sort
    ii. Selection Sort
    iii. Insertion Sort
    iv. Merge Sort
    v. Quick sort
    vi. Radix Sort
    vii. Bucket Sort
    viii. Heap Sort
    ix. Shell Sort
12. Graph Traversal algorithms
    i. BFS
    ii. DFS
    iii. Topological Sorting
13. Shortest Path Algorithm
    i. Dijkstra Algorithm
    ii. Bellman-Ford Algorithm
14. Minimum Spanning tree
    i. Kruskal Algorithm
    ii. Prim's Algorithm
15. All pairs shortest paths using Floyd's Algorithm
16. Hashing using open addressing technique.

TOTAL:30PERIODS

COURSE OUTCOME(S):

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

CO1 Implement arrays and abstract data types for list.

CO2 Solve real world problems using appropriate linear data structures.

CO3 Apply appropriate tree data structures in problem solving.
CO4 Implement various searching and sorting algorithms.
CO5 Implement appropriate Graph representations and solve real-world applications.
CO6 Apply various hashing operations.

SOFTWARE REQUIREMENTS:
Anaconda Python Distribution / TURBO C.

TEXT BOOKS:

1. G. A. Vijayalakshmi Pai," A Textbook of Data Structures and Algorithms, Volume 1", Wiley-ISTE,January 2023.
2. G. A. Vijayalakshmi Pai,"A Textbook of Data Structures and Algorithms, Volume 2: Mastering Nonlinear Data Structures", Wiley-ISTE,2023.
3. Dr.HarshBhasin,"DataStructureswithPython",BPBPublications,Delhi, 2023.
4. John Canning, AlanBroder, RobertLafore,``Data Structures & Algorithms in Python", Addison-Wesley Professional, 2022.
5. Y Daniel Liang,"Introduction To Python Programming And Data Structures",Global Edition 3rd Edition,Pearson Publications, 2022.

REFERENCE BOOKS:

1. Dr.Basant Agarwal,"Hands-On Data Structures and Algorithms with Python",3rdEdition, Packt Publishing, 2022.
2. Narasimha Karumanchi, "Data Structures and Algorithms Made Easy", Career Monk Publications, 2016.
3. Michael H.Gold wasser, Michael T. Goodrich,and Roberto Tamassia," Data Structures and Algorithms in Python",Wiley Publications ,2013.

ONLINE COURSES/RESOURCES:
1. https://www.codechef.com/practice.
2. https://www.javatpoint.com/data-structure-tutorial.
3. https://www.simplilearn.com/tutorials/python-tutorial/data-structures.
4. https://nptel.ac.in/Courses/.

SEMESTER – IV

23MA1401	PROBABILITY AND STATISTICAL METHODS	L	T	P	C
		3	1	0	4

COURSE OBJECTIVE:

- To introduce the basic concepts of probability and random variables.
- To introduce the basic concepts of two dimensional random variables.
- To acquaint the knowledge of testing of hypothesis for small and large samples which plays an important role in real life problems.
- To introduce the basic concepts of classifications of design of experiments which plays very important role in the field of agriculture.
- To introduce the basic concepts of solving algebraic and transcendental equations.

UNIT I RANDOM VARIABLES 9+3

Discrete and continuous random variables – Moments – Moment generating functions – Binomial, Poisson, Geometric, Uniform, Exponential and Normal distributions.

UNIT II TWO - DIMENSIONAL RANDOM VARIABLES 9+3

Joint distributions – Marginal and conditional distributions – Covariance – Correlation and linear regression– Central limit theorem for Independent Identically Distributed random variable(without proof).

UNIT III TESTING OF HYPOTHESIS 9+3

Statistical hypothesis - Large sample test based on Normal distribution for Proportion , single mean and difference of two means - Student'sttest for single mean and difference of two means, F test for Variance. Chi-square tests for independence of attributes and goodness of fit.

UNIT IV DESIGN OF EXPERIMENTS 9+3

One way and Two way classifications - Completely randomized design – Randomized block design – Latin square design.

UNIT V NUMERICAL SOLUTION OF EQUATIONS 9+3

Solution of algebraic and transcendental equations - Fixed point theorem (without proof)- Newton Raphson method - Solution of linear system of equations - Gauss elimination method - Gauss Jordan method - Iterative methods of Gauss Jacobi and Gauss Seidel.

TOTAL : 60 PERIODS

COURSE OUTCOME(S):

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

CO1 Understand the basic concepts of one dimensional random variables and apply in engineering applications.

CO2 Apply standard distributions to solve real world problems.

CO3 Understand the basic concepts of two dimensional random variables and apply in engineering applications.

CO4 Apply the concept of testing of hypothesis for small and large samples in real life problems.

CO5 Apply the basic concepts of classifications of design of experiments in the field of agriculture.

CO6 Understand the basic concepts and techniques of solving algebraic and

transcendental equations.

TEXT BOOKS:

1. Johnson, R.A., Miller, I and Freund J., "Miller and Freund‘s Probability and Statistics for Engineers", Pearson Education, Asia, 8th Edition, 2015.
2. Milton. J. S. and Arnold. J.C., "Introduction to Probability and Statistics", Tata McGraw Hill, 4th Edition, 2007.
3. Grewal, B.S., and Grewal, J.S., "Numerical Methods in Engineering and Science", Khanna Publishers,10thEdition, New Delhi, 2015

REFERENCE BOOKS:

1. Veerarajan T, “Probability, Statistics and Random Processes with Queueing Theory”, McGraw Hill, 1st Edition, 2018.
2. Kandasamy, P., Thilagavathy ,K.,and Gunavathy,S., ‘Numerical Methods’, Chand and Co.,2007
3. Devore. J.L., "Probability and Statistics for Engineering and the Sciences, Cengage Learning, New Delhi, 8th Edition, 2014.
4. Ross, S.M., "Introduction to Probability and Statistics for Engineers and Scientists", 3rd Edition, Elsevier, 2004.
5. Spiegel. M.R., Schiller. J. and Srinivasan, R.A., "Schaum‘s Outline of Theory and Problems of Probability and Statistics", Tata McGraw Hill Edition, 2004.

CO - PO MAPPING

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

Internal Assessment				End Semester Examinations
Assessment I (100 Marks)		Assessment II (100 Marks)		
Individual Assignment / Case Study / Seminar / Mini Project	Written Test	Individual Assignment / Case Study / Seminar / Mini Project	Written Test	Written Examinations
40	60	40	60	100
40%				60 %

23CS1401	COMPUTER NETWORKS	L	T	P	C
		3	0	0	3

COURSE OBJECTIVE:

- To understand protocol layering and physical level communication
- To be familiar with data link layer and media access control layer functions.
- To learn the various routing protocols used in network layer
- To understand the functions and protocols of the Transport layer.
- To realize the application Layer protocols and attacks.

UNIT- I INTRODUCTION AND PHYSICAL LAYER 9

Networks – Network Types – Protocol Layering – TCP/IP Protocol suite – OSI Model – Physical Layer: Performance – Guided transmission media, Wireless transmission – Switching.

UNIT- II DATA-LINK LAYER & MEDIA ACCESS 9

Introduction – Link-Layer Addressing – Data-Link Layer Protocols – HDLC – PPP – Media Access Control – Wired LANs: Ethernet – Wireless LANs: IEEE 802.11, The Link-Layer Protocol for Cable Internet Access, Switched Local Area Networks.

UNIT- III NETWORK LAYER 9

Introduction – Network Layer Protocols: IPV4, ICMP, IPV6 – Unicast Routing Algorithms– Multicasting Basics , Routing for mobile hosts.

UNIT- IV TRANSPORT LAYER 9

Introduction – Transport Layer Protocols – User Datagram Protocol – Transmission Control Protocol –Multiprotocol Label Switching (MPLS).

UNIT- V APPLICATION LAYER 9

WWW and HTTP – FTP – Email -Telnet -SSH – DNS – Application layer attacks.

TOTAL: 45 PERIODS

COURSE OUTCOME(S):

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

CO1 Define the basic layers and its functions in computer networks.
CO2 Understand the basics of how data flows from one node to another.
CO3 Apply routing algorithms to the network.
CO4 Analyze the difference between the TCP and UDP protocols
CO5 Evaluate the performance of a network.
CO6 Compare the principles of the different application layer protocols.

TEXTBOOKS

1. Behrouz A. Forouzan, Data Communications and Networking, Fifth Edition TMH, 2017(Reprint)
2. Larry L. Peterson, Bruce S. Davie, Computer Networks: A Systems Approach, Fifth Edition, Morgan Kaufmann Publishers Inc., 2012.

REFERENCE BOOKS

1. William Stallings, Data and Computer Communications, Tenth Edition, Pearson Education, 2013.
2. Nader F. Mir, Computer and Communication Networks, Second Edition, Prentice Hall, 2014.
3. Ying-Dar Lin, Ren-Hung Hwang and Fred Baker, Computer Networks: An Open Source Approach, McGraw Hill Publisher, 2011.
4. James F. Kurose, Keith W. Ross, Computer Networking, A Top-Down Approach Featuring the Internet, Sixth Edition, Pearson Education, 2013.

WEB REFERENCES

1. https://www.tutorialspoint.com/computer_fundamentals/computer_networking.htm
2. http://www.cs.ccsu.edu/~stan/classes/CS490/Slides/Networks4-Ch4-4.pdf.
3. http://ecourses.vtu.ac.in/nptel/courses/Webcourse-contents/IIT-MADRAS/ComputerNetworks/pdf

CO - PO MAPPING

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

Internal Assessment				End Semester Examinations
Assessment I (100 Marks)		Assessment II (100 Marks)		
Individual Assignment / Case Study / Seminar / Mini Project	Written Test	Individual Assignment / Case Study / Seminar / Mini Project	Written Test	Written Examinations
40	60	40	60	100
40%				60 %

23CS1402	COMPUTATIONAL THINKING	L	T	P	C
		3	0	0	3

COURSE OBJECTIVE:

- To learn to effectively use computers and technology to analyze and solve problems.
- To understand Brute force, divide and conquer, greedy algorithm design techniques
- To learn about Dynamic Programming and iterative improvement algorithm design techniques
- To understand Backtracking and Branch and Bound design technique.
- To impart knowledge on NP Classes, Approximation algorithms.

UNIT- I COMPUTATIONAL THINKING AND ALGORITHMS 9

Fundamentals of Computing – Identification of Computational Problems -Algorithms, building blocks of algorithms (statements, state, control flow, functions), notation (pseudo code, flow chart, programming language-creating oral algorithms for everyday tasks - Asymptotic Notations and its properties -Best case, Worst case and average case analysis-Mathematical analysis for Recursive and Non-recursive algorithms.

UNIT- II ALGORITHM DESIGN TECHNIQUES - I 9

Brute Force : String Matching, Selection sort, **Exhaustive Search** - Travelling Salesman Problem - Knapsack Problem - Assignment problem, **Divide and Conquer Methodology** - Binary Search - Merge sort - Quick sort- Strassen‘s Matrix Multiplication, **Greedy Technique**: Container loading problem – Minimum spanning tree: Prim‘s algorithm and Kruskal‘s Algorithm-Huffman Trees.

UNIT- III ALGORITHM DESIGN TECHNIQUES - II 9

Dynamic programming: - Principle of optimality - Computing a Binomial Coefficient – Floyd‘s algorithm - Multi stage graph - Optimal Binary Search Trees - Knapsack Problem**, Iterative Improvement :** The Maximum-Flow Problem : Ford-Fulkerson algorithm - Stable Marriage algorithm.

UNIT- IV BACKTRACKING AND BRANCH AND BOUND ALGORITHMS 9

Backtracking - n-Queens problem - Hamiltonian Circuit Problem - Subset Sum Problem - Graph Coloring Problem, **Branch and Bound**: Assignment problem - Knapsack Problem - Travelling Salesman Problem.

UNIT- V P,NP-CLASSES AND APPROXIMATION ALGORITHM 9

Tractable and intractable problems : P, NP NP- Complete and NP Hard Problems, **Approximation Algorithms for NP-Hard Problems:** Travelling Salesman problem - Knapsack problem.

TOTAL: 45 PERIODS

COURSE OUTCOME(S):

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

CO1 Define problems in a way that allows computers to effectively address and solve them.

CO2 Classify algorithmic design approaches like divide and conquer, greedy techniques to effectively solve problems.

CO3 Apply algorithmic design methodologies such as dynamic programming, Iterative Improvement for problem-solving.

CO4 Categorize the state space search method as a strategy for solving problems.

CO5 Determine an approximation algorithm to solve problems.

CO6 Construct the classes P, NP,NP-Hard, NP Complete.

TEXTBOOKS:

1. S.Sridhar, Design and Analysis of Algorithms, Second Edition, Oxford Edition, 2023.
2. Anany Levitin, Introduction to the Design and Analysis of Algorithms, Third Edition, Pearson Education, 2018.
3. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest and Clifford Stein, Introduction to Algorithms, 4th Edition, Prentice Hall of India,2022.
4. Alfred V. Aho, John E. Hopcroft and Jeffrey D. Ullman,Data Structures and Algorithms, Reprint Edition, Pearson Education.

REFERENCE BOOKS:

1. Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran, Computer Algorithms/C++ Orient Blackswan, 2nd Edition, 2019.
2. Harsh Bhasin, Algorithms Design and Analysis, Oxford university press, 2015.

CO - PO MAPPING

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

Internal Assessment				End Semester Examinations
Assessment I (100 Marks)		Assessment II (100 Marks)		
Individual Assignment / Case Study / Seminar / Mini Project	Written Test	Individual Assignment / Case Study / Seminar / Mini Project	Written Test	Written Examinations
40	60	40	60	100
40%				60 %

23IT1403	OPERATING SYSTEMS	L	T	P	C
		3	0	0	3

COURSE OBJECTIVE:

- Understand the basic concepts and functions of operating systems.
- Understand concepts of Processes and analyze Scheduling algorithms
- Understand the concept of Deadlocks.
- Analyze various memory management schemes.
- Understand I/O management and File Systems.
- Familiar with the basics of Linux system and Mobile OS like iOS and Android.

UNIT - I OPERATING SYSTEM OVERVIEW 9

Computer System Overview- Instruction Execution, Interrupts, Multiprocessor and Multicore Organization. Operating system overview - objectives and functions, Evolution of Operating System - Operating System Structures – Operating- system Services - System Calls - System Services - Operating system Structure – Building and Booting Operating system - Processes – Process Concept, Process Scheduling, Operations on Processes, Inter-process Communication.

UNIT - II PROCESS MANAGEMENT 9

CPU Scheduling – Scheduling criteria, Scheduling algorithms, Multiple-processor scheduling, Real time scheduling; Process Synchronization - The critical-section problem, Synchronization hardware, Mutex locks, Semaphores, Classic problems of synchronization, Critical regions, Monitors; Deadlock – System model, Deadlock characterization, Methods for handling deadlocks, Deadlock prevention, Deadlock avoidance, Deadlock detection, Recovery from deadlock

UNIT - III STORAGE MANAGEMENT 9

Main Memory – Background, Swapping, Contiguous Memory Allocation, Paging, Segmentation, Segmentation with paging, 32 and 64 bit architecture Examples; Virtual Memory – Background, Demand Paging, Page Replacement, Allocation, Thrashing; Allocating Kernel Memory, OS examples

UNIT - IV FILE SYSTEMS 9

Mass Storage structure – Overview of Mass Storage Structure, Disk Structure, Disk Scheduling and Management, swap space management File-System Interface – File concept, Access methods, Directory Structure, Protection; File System Implementation - File System Structure, File System Operations, Directory implementation, Allocation Methods, Free Space Management, Efficiency and Performance, Recovery;

UNIT - V MODERN OPERATING SYSTEMS 9

Linux System – Design Principles, Kernel Modules, Process Management, Scheduling, Memory Management, Input-Output Management, File System, Inter-process Communication; Mobile OS – iOS and Android – Architecture and SDK Framework, Media Layer, Services Layer, Core OS Layer, File System

TOTAL : 45 PERIODS

COURSE OUTCOME(S)

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

CO1 Understand the basics of Operating System.

CO2 Articulate the concepts of Process, Process scheduling, Process Synchronization, Deadlock.

CO3 Analyze the various memory management schemes.

CO4 Examine various File systems.

CO5 Describe Linux OS.
CO6 Elaborate Mobile OS like Android and iOS.

TEXT BOOKS:

1. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, Operating System Concepts,10th Edition, John Wiley and Sons Inc., 2018.
2. William Stallings, Operating Systems: Internals and Design Principles, 9th Edition by Pearson,2017.

REFERENCE BOOKS:

1. Ramaz Elmasri,A. GilCarrick, David Levine,Operating Systems–A Spiral Approach, Tata McGraw HillEdition, 2010.
2. AchyutS. Godbole, AtulKahate, Operating System, McGraw Hill Education,Third Edition, 2017.PearsonEducation,2016.
3. GaryNutt, Operating Systems,Third Edition,PearsonEducation,2004.
4. Harvey M.Deitel, Paul JDeital, Davis RChoffnes, Operating System,Third Edition, Pearson Education,2004.
5. Daniel P Bovet and Marco Cesati, Understanding the Linux kernel‖,3rdedition, O'Reilly,2005

ONLINE COURSES / RESOURCES:

1. https://nptel.ac.in/courses/106108101
2. https://www.coursera.org/learn/codio-intro-to-operating-systems-2-memory-management?specialization=codio-introduction-operating-systems.

CO - PO MAPPING

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

Internal Assessment				End Semester Examinations
Assessment I (100 Marks)		Assessment II (100 Marks)		
Individual Assignment / Case Study / Seminar / Mini Project	Written Test	Individual Assignment / Case Study / Seminar / Mini Project	Written Test	Written Examinations
40	60	40	60	100
40%				60 %

23AD1405	FOUNDATIONS OF DATA SCIENCE	L	T	P	C
		3	0	0	3

COURSE OBJECTIVE:

- To acquire skills in data preparatory and preprocessing steps.
- To understand the mathematical skills in statistics.
- To learn the tools and packages in Python for data science.
- To gain knowledge to understand classification and Regression Model.
- To acquire knowledge in data interpretation and visualization techniques.

UNIT- I INTRODUCTION 9

Need for data science – benefits and uses – facets of data – data science process – setting the research goal – retrieving data – cleansing, integrating, and transforming data – exploratory data analysis – build the models – presenting and building applications.

UNIT- II DESCRIBING DATA I 9

Frequency distributions – Outliers – relative frequency distributions – cumulative frequency distributions – frequency distributions for nominal data – interpreting distributions – graphs – averages – mode – median – mean – averages for qualitative and ranked data – describing variability – range – variance – standard deviation – degrees of freedom – inter quartile range.

UNIT- III DESCRIBING DATA II 9

Normal distributions – z scores – normal curve problems – finding proportions – finding scores – correlation – scatter plots – correlation coefficient for quantitative data – computational formula for correlation coefficient – regression – regression line – least squares regression line – standard error of estimate – multiple regression equations – regression toward the mean.

UNIT- IV PYTHON FOR DATA HANDLING 9

Basics of Numpy arrays – aggregations – computations on arrays – comparisons, masks, boolean logic – fancy indexing – structured arrays – Data manipulation with Pandas – data indexing and selection – operating on data – missing data — combining datasets – aggregation and grouping.

UNIT- V PYTHON FOR DATA VISUALIZATION 9

Visualization with matplotlib – line plots – scatter plots – visualizing errors – density and contour plots – histograms, binnings and density – three dimensional plotting – geographic data — graph plotting using Plotly.

TOTAL: 45 PERIODS

COURSE OUTCOME(S):

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

- **CO1** Demonstrate the skills of data inspecting and cleansing.
- **CO2** Determine the relationship between data dependencies using statistics.
- **CO3** Construct data using primary tools for data science in Python.
- **CO4** Represent the useful information using mathematical skills.
- **CO5** Apply the knowledge for data describing the Data.
- **CO6** Implement real time application using visualization tools.

TEXTBOOKS:

1. David Cielen, Arno D. B. Meysman, and Mohamed Ali, Introducing Data Science, Manning Publications, 2016.
2. Robert S. Witte and John S. Witte, Statistics, Eleventh Edition, Wiley Publications, 2017.
3. Jake VanderPlas, Python Data Science Handbook, O'Reilly, 2016.

REFERENCE BOOKS:

1. Allen B. Downey, Think Stats: Exploratory Data Analysis in Python, Green Tea Press, 2014.

WEB REFERENCES:

1. https://www.geeksforgeeks.org/data-science-fundamentals
2. https://www.analyticsvidhya.com/blog/2016/02/complete-tutorial-learn-data-science-scratch

ONLINE COURSES/ RESOURCES:

1. https://www.coursera.org/learn/foundations-of-data-science
2. https://nptel.ac.in/courses/106106179

CO - PO MAPPING

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

Internal Assessment				End Semester Examinations
Assessment I (100 Marks)		Assessment II (100 Marks)		
Individual Assignment / Case Study / Seminar / Mini Project	Written Test	Individual Assignment / Case Study / Seminar / Mini Project	Written Test	Written Examinations
40	60	40	60	100
40%				60 %

23IT1401	OBJECT ORIENTED SOFTWARE ENGINEERING	L	T	P	C
		2	0	2	3

COURSE OBJECTIVES:

- Identify and create the key activities in managing a software project and recognize different process model.
- Analyze the requirements for project development, design exploration, and mid-sized project estimation.
- Understand the fundamentals of object modelling.
- Design and differentiate Unified Process from other approaches using UML diagrams.
- Articulate the students to learn different design patterns in Object Oriented solutions for Real- real-world problems.
- Create and implement models of object-oriented software systems with testing and maintenance.

UNIT- I INTRODUCTION TO SOFTWARE ENGINEERING AND SOFTWARE REQUIREMENTS 6

Introduction - Definition-Characteristics of Software Engineers ,Systems Developer, Application Developer -Program and Software Product -SDLC-Process Models: Waterfall Model, RAD Model, Spiral Model, V-mode, Incremental Model, Agile Model, Iterative Model, Big-Bang Model, Prototype Model-Unified Process -Project Management- Tools- Gantt Chart-PERT Chart.

UNIT- II ANALYSIS OF SOFTWARE REQUIREMENTS AND ESTIMATION 6

Software Requirements: Functional and Non-Functional requirements- FURPS - Software Requirement Specification(SRS)- Characteristics for SRS- IEEE Standard Requirements Documents -Requirements Analysis- Data Flow Diagrams(DFD)-Estimation of Software Project- The COCOMO Model-Risk Management - Reliability Models- Jelinski and Moranda Model.**Case study: SRS for Credit card processing system.**

UNIT- III OBJECT ORIENTED SYSTEM ANALYSIS AND UML MODELING 6

An Engineering Perspective- Object Orientation Analysis(OOA)- Design(OOD)- Requirements Elicitation -Unified Modeling Language(UML)- Structure diagrams: Class diagrams - Component diagrams -Package diagram- Behavior diagrams: Activity diagram-Use Case diagram -State Chart diagram - Interaction diagrams: Sequence diagram-Collaboration diagram- Timing diagrams- When to use diagram- Analysis Object Model(Domain Model).**Case study: UML for Credit card processing system**

UNIT- IV OBJECT ORIENTED DESIGN PATTERNS 6

Design Principles - Designing objects with responsibilities- GRASP: -Creator - Information expert - Low Coupling -High Cohesion-Indirection -Polymorphism- Protected Variations- Pure Fabrication-Applying GOF design pattern- Design Patterns in Smalltalk MVC-Creational Design Patterns - Structural Design Patterns-Behavioral Design Patterns.

UNIT- V IMPLEMENTATION, TESTING AND MAINTENANCE 6

Mapping Design (Models) to Code – Testing : STLC-Type of Software Testing-Develop Test Cases and Test Plans- Usability – Deployment – Configuration Management - Software Quality - ISO 9000 Certification - SEICMM - PCMM -Six Sigma – Maintenance - Recent Trends in Object-oriented Software Development.

TOTAL: 30 PERIODS

COURSE OUTCOME(S):

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

CO1 Identify and select a suitable Process Model for the given problem and have a thorough understanding of various Software Life Cycle models.

CO2 Analyze the requirements of the given software project and produce requirement specifications.

CO3 Apply the knowledge of object-oriented modeling concepts and design methods with a clear emphasis on Unified Modelling Language for a moderately realistic object-oriented system.

CO4 Apply various software architectures, including frameworks and design patterns, when developing software projects.

CO5 Evaluate the software project using various Testing techniques.

CO6 Recognize the deployment strategy and Configuration Management strategies of the software project.

TEXTBOOKS:

1. Roger S. Pressman, Software Engineering: A Practitioner‘s Approach , McGraw Hill International Edition, Eighth Edition, 2019
2. Carol Britton and Jill Doake, A Student Guide to Object-Oriented Development.
3. Grady Booch, James Rumbaugh, Ivar Jacobson : The Unified Modeling Language User Guide, Pearson Education,2008.

REFERENCE BOOKS:

1. Grady Booch, Robert A. Maksimchuk, Michael W. Engle, Bobbi J. Young Ph.D., Jim Conallen, Kelli A. Houston: Object-Oriented Analysis and Design with Applications,Addison-Wesley Professional, 2021.
2. Brahma Dathan,Object Oriented Analysis And Design,2nd Edn,Blackswan Private Limited.2021.

WEB REFERENCES :

1. https://www.simplilearn.com/tutorials/software-development-resources/software-engineering-materials
2. https://courses.cs.washington.edu/courses/cse403/01au/lectures
3. https://www.uml-diagrams.org/uml-object-oriented-concepts.html
4. https://www.tutorialspoint.com/object_oriented_analysis_design/ooad_tutorial.pdf
5. https://kvrsoftwares.blogspot.com/2019/04/ooad-3-1-r16-ph.html

ONLINECOURSES/RESOURCES:

1. https://www.coursera.org/courses?query=software%20engineering
2. https://www.udemy.com/courses/development/software-engineering/
3. https://www.udemy.com/course/djeyamala-ooad-uml/
4. https://onlinecourses.nptel.ac.in/noc22_cs99/preview

LIST OF EXPERIMENTS **30 PERIODS**

Prepare the following documents for each experiment and develop the software using software engineering methodology.

1. Problem Analysis and Project Planning -Thorough study of the problem –Identify Project scope, Objectives and Infrastructure.
2. Software Requirement Analysis - Describe the individual Phases/modules of the project and Identify deliverables, Software requirements Specification SRS.

3. Data Modeling - Use work products – data dictionary, use case diagrams and activity diagrams, build and test class diagrams, sequence diagrams and add interface to class diagrams, State Transition Diagram, Component and deployment diagrams.
4. Software Development and Debugging – Implement the design by coding.
5. Software Testing - Prepare test plan, perform validation testing, coverage analysis, memory leaks, develop test case hierarchy, Site check and site monitor.

List of Projects:

1. Credit card processing
2. Book bank
3. Exam Registration
4. Stock maintenance system.
5. Online course reservation system
6. Airline/Railway reservation system
7. Software personnel management system
8. Passport automation system.
9. e-book management system
10. Recruitment system
11. Foreign trading system
12. Conference Management System
13. BPO Management System
14. Library Management System
15. Student Information System

SOFTWARE REQUIRED:

1. Argo UML
2. Java-Net beans
3. Oracle-Database

REFERENCE BOOKS:

1. Gerardus Blokdyk (Ebook) -" UML A Complete Guide ", Publisher, Emereo Publishing, 2020 Edition
2. Sparx Systems - User Guide Series :"Unified Modeling Language(UML)"- Enterprise Architect,2022 .

WEB REFERENCES:

1. https://creately.com/blog/diagrams/uml-diagram-types-examples/
2. https://venngage.com/blog/uml-diagram-examples/
3. https://www.visual-paradigm.com/guide/uml-unified-modeling-language/uml-class-
4. diagram-tutorial/
5. https://sparxsystems.com/resources/user-guides/16.0/model-domains/uml-models.pdf

CO - PO MAPPING

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

Assessment (40% weightage) (Theory Component)		**Assessment** (60% weightage) (Laboratory Component)		**End Semester Examination**
Individual Assignment / Case Study / Seminar / Mini Project	**Written Test**	**Evaluation of Laboratory Observation, Record**	**Test**	**Written Examination**
40	**60**	**75**	**25**	
100				**100**
50 %				**50 %**

23CS1411	COMPUTER NETWORKS LABORATORY	L	T	P	C
		0	0	4	2

COURSE OBJECTIVE:

- To understand and apply a range of network commands to configure, troubleshoot, and manage network devices effectively.
- To explore various flow control algorithms used in networking protocols
- To gain practical skills in programming with TCP and UDP sockets
- To learn to utilize network simulation tools to model and analyze network behavior,
- To apply routing protocols within network simulation tools to design, configure, and evaluate network

LIST OF EXPERIMENTS

1. a) Learn to use commands like tcpdump, netstat, ifconfig, nslookup and traceroute.
   b) Capture ping and traceroute PDUs using a network protocol analyzer and examine.
2. Write a code for implementing Stop and Wait Flow Control Technique.
3. Write a code for implementing Sliding Window Flow Control Technique.
4. Write a code for simulating ARP / RARP protocols.
5. Write a code for simulating of error correction code (like CRC).
6. Write a code using TCP sockets for implementing Echo client and Echo server.
7. Write a code using TCP sockets for implementing Chat Client and Chat Server
8. Write a code using TCP sockets for implementing File Transfer between client and server.
9. Write a HTTP web client program to download a web page using TCP sockets.
10. Simulation of DNS using UDP sockets.
11. Study of Network simulator (NS).
12. Simulation of Congestion Control Algorithms using NS.
13. Simulation of Distance Vector Routing algorithm.
14. Simulation of Link State Routing algorithm.
15. Performance evaluation of Routing protocols using Simulation tool.

TOTAL:60 PERIODS

SOFTWARE REQUIRED : C / PYTHON / JAVA

COURSE OUTCOME(S):

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

CO1 Choose between TCP and UDP.
CO2 Understand the programs using sockets.
CO3 Implement error correction codes.
CO4 Analyze the performance of different protocols.
CO5 Evaluate the performance of various network protocols using simulation tools.
CO6 Construct Analyze various routing algorithms.

WEB REFERENCES:

1. https://www.tutorialspoint.com/computer_fundamentals/computer_networking.htm
2. https://www.coursera.org/learn/illinois-tech-computer-networking
3. https://onlinecourses.nptel.ac.in/noc22_cs19/preview

CO - PO MAPPING

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

Internal Assessment		End Semester Examination
Evaluation of Laboratory Observation, Record	Test	Practical
75	25	100
60 %		40%

23AD1413	FOUNDATIONS OF DATA SCIENCE LABORATORY	L	T	P	C
		0	0	4	2

COURSE OBJECTIVE:

- Understanding the python libraries for data science.
- Understanding the basic Statistical and Probability measures for data science.
- Learning descriptive analytics on the benchmark data sets.
- Applying correlation and regression analytics on standard data sets.
- Presenting and interpreting data using visualization packages in Python.

LIST OF EXPERIMENTS

1. Download, install and explore the features of NumPy, SciPy, Jupyter, Statsmodels and Pandas packages.
2. Create an empty and a full NumPy array.
3. Program to remove rows in Numpy array that contains non-numeric Values.
4. Reading data from text files, Excel and the web and exploring various commands for doing descriptive analytics on the Iris data set.
5. Use the diabetes data set from UCI and Pima Indians Diabetes data set for performing the following:
   a. Univariate analysis: Frequency, Mean, Median, Mode, Variance, Standard Deviation, Skewness and Kurtosis.
   b. Bivariate analysis: Linear and logistic regression modeling
   c. Multiple Regression analysis
   d. Also compare the results of the above analysis for the two data sets
6. Write a Pandas program to create and display a DataFrame from a specified dictionary data which has the index labels.
7. Write a Pandas program to get the first 3 rows of a given DataFrame.
8. Program to find the variance and standard deviation of set of elements.
9. Write a Python program to draw line charts of the financial data of Alphabet Inc. between October 3, 2016 to October 7, 2016.
10. Program to plot a Correlation and scatter plots.
11. Program for Linear Regression and Logistic Regression.
12. Apply and explore various plotting functions on UCI data sets.
    a. Normal curves
    b. Density and contour plots
    c. Correlation and scatter plots
    d. Histograms
    e. Three dimensional plotting
13. Perform Mini Project on Fake News Detection.
14. Build an application to detect colors in the given picture using Basic Data Science.

TOTAL:60 PERIODS

COURSE OUTCOME(S):

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

CO1 Make use of the python libraries for data science

CO2 Execute the basic Statistical and Probability measures for data science.

CO3 Perform descriptive analysis on the benchmark data sets.

CO4 Implement correlation and regression analysis on standard data sets

CO5 Present and interpret data using visualization packages in Python

CO6 Implement data Science concept to develop small application.

REFERENCES:

1. Jake Vander Plas, “Python Data Science Handbook”, O’Reilly, 2016.
2. Allen B. Downey, “Think Stats: Exploratory Data Analysis in Python”, Green Tea Press, 2014.
3. Data Science From Scratch: First Principles with Python, Second Edition by Joel Grus, 2019

CO - PO MAPPING

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

Internal Assessment		End Semester Examination
Evaluation of Laboratory Observation, Record	Test	Practical
75	25	100
60 %		40%

23ES1411	TECHNICAL SKILL PRACTICES III	L	T	P	C
		0	0	2	1

COURSE OBJECTIVE:

- To understanding Java Fundamentals.
- To develop proficiency in flow control statements and Understand the usage of arrays and var-arg types
- To exploring Object-Oriented Programming Concepts through Java Programming
- To develop programs on Exception handling through Java Programming
- To understand the usage of wrapper classes and Utilizing Standard Java Libraries

LIST OF TOPICS

1.Java Tokens- Comments, Identifiers, Keywords, Separators, Data types

2.Scoping and Parameter passing (by value & by reference)

3.Flow Control Statements

4.Arrays and Var-arg types

5.Operators & their Precedence & Associativity

6.Conversions: Narrowing & Widening Conversions

7.Access Modifiers for Class & Class Members

8.Non Access Modifiers for Class & Class Members

9.Packages with Static imports

10.Creating Classes and Instances

11.Method and Types of methods

12.Inheritance

13.Polymorphism(Method Overloading & Overriding) Abstract classes and Interfaces

14.Constructors and Initialization

15.Static data and methods

16.Exception Handling Framework- User defined Exceptions

17.Java Thread Model

TOTAL: 30PERIODS

COURSE OUTCOME(S):

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

- **CO1** Understand the fundamental programming elements of Java and learn to apply basic control structures in Java.
- **CO2** Apply scoping rules and demonstrate an understanding of parameter passing in Java
- **CO3** Analyze and create effective flow control statements in Java
- **CO4** Evaluate the usage of arrays, var-args, and enums in Java, based on program requirements and design considerations.
- **CO5** Develop Java programs to implement object-oriented design principles.
- **CO6** Apply exception handling techniques in Java, including the creation of user-defined exceptions

TEXTBOOKS:

1. Herbert Schildt, “Java The complete reference”, 12th Edition, McGraw Hill Education, 2022.
2. Cay S. Horstmann, Gary Cornell, “Core Java Volume – I Fundamentals”, 11th Edition, Prentice Hall, 2020.

REFERENCES BOOKS:

1. Paul Deitel, Harvey Deitel, “Java SE 8 for programmers”, 3rd Edition, Pearson, 2015.
2. Timothy Budd, “Understanding Object-oriented programming with Java”, Updated Edition,Pearson Education, 2000.

WEB REFERENCES:

1. https://www.javatpoint.com/java-tutorial
2. https://www.tutorialspoint.com/java/index.htm