VISION

We, at the Department of Mathematics, Anna University, Chennai, shall strive constantly to

- Achieve excellence in the field of Computer Science and Information Technology with strong Mathematical foundation by providing high quality teaching, research and training in Computer Science and all related Engineering fields to our students where they can significantly contribute to our society in all aspects
- Contribute to the quality Personnel Development in Computer Science / Information Technology through our effective Masters Programmes

MISSION

- To provide determined computer science background to the students to hone their skills with best-in-class emerging technologies across the globe.
- To imbibe a spirit of innovations in computers, information technologies and mathematical sciences.
- To popularize and to project the proper perspective of Computer Science with essential Mathematical modelling by undertaking sponsored research and provide consultancy services in educational and industrial relevant areas.

Attested
1. PROGRAMME EDUCATIONAL OBJECTIVES (PEOs):
   1. To make the students have sufficient knowledge and understanding in the field of computer science
   2. To ensure the students have sufficient understanding in the fundamental and core concepts of computer science and information technology, which serve as the basics of computer science
   3. To ensure the students are aware of the cutting edge technologies currently being used in industries and provide them a platform to learn the same
   4. To ensure the students work on multiple academic projects pertaining to different domains, to have strong knowledge in the respective domain
   5. To ensure this academic programme provides them learning to take leadership positions in the industry and also initiate businesses offering innovative solutions

2. PROGRAMME OUTCOMES (POs):
   After going through the five years of study, our information Technology Post-Graduates will exhibit:
   
   i. **PO1**: An ability to independently carry out research/investigation and development work to solve practical problems
   ii. **PO2**: An ability to write and present a substantial technical report/document
   iii. **PO3**: Students should be able to demonstrate a degree of mastery over the area as per the specialization of the program. The mastery should be at a level higher than the requirements in the appropriate bachelor programme
   iv. **PO4**: An ability to work in a multi-disciplinary team
   v. **PO5**: An ability to enhance life-long learning and continuous professional development
3. **PEO / PO MAPPING:**

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Director
Centre for Academic Courses
Anna University, Chennai-600 025
4. MAPPING OF COURSE OUTCOME AND PROGRAMME OUTCOME

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# M.Sc. INFORMATION TECHNOLOGY (FIVE YEARS INTEGRATED)

## REGULATION 2023

### CHOICE-BASED CREDIT SYSTEM

### CURRICULA AND SYLLABI

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OBJECTIVES:
- To build lexical competency and accuracy that will help learners to use language effectively
- To learn various reading strategies that will enable learners to comprehend the different modes of reading materials of varied levels of complexity
- To comprehend the linguistic aspects of various rhetorical structures and functions of Technical English and use them effectively in writing
- To improve the communicative competence of learners
- To help learners use language effectively in academic/work contexts
- To use language efficiently in expressing their opinions via various media
- To build lexical competency and accuracy that will help learners to use language effectively

UNIT I    BASICS OF COMMUNICATION  9+6
Listening – Listening to a Telephone conversation & Writing message, gap filling; Reading – Telephone message, bio-note; Writing – Message, Self-introduction / Personal profile; Grammar – Simple present tense, Present continuous tense, Asking questions (wh-questions); Vocabulary – One word substitution, Synonyms, Abbreviations & Acronyms

LAB ACTIVITY: Introducing oneself – Self introduction; Telephone conversation, Relaying telephone message – Role play

UNIT II    NARRATION  9+6
Listening – Listening to a Travel podcast / Watching a travel documentary; Reading – Reading an excerpt from a travelogue, Newspaper Report; Writing – Narrative writing – event, personal experience; Grammar – Subject – verb, Simple past, Past continuous Tenses; Vocabulary – Antonyms, Word formation (Prefix & Suffix)

LAB ACTIVITY: Narrating one’s personal experience in front of a group – formal and informal context – first day in college / vacation / first achievement / failure etc.,

UNIT III    DESCRIPTION  9+6
Listening – Listening to a conversation, Listening to an advertisement; Reading – Reading a tourist brochure & planning an itinerary, Reading a descriptive article / excerpts from literature; Writing – Writing definitions, Paragraph writing (Descriptive); Grammar – Future tenses, Perfect tenses, Preposition; Vocabulary – Adjectives, Adverbs

LAB ACTIVITY: Making conversation – formal & informal – Turn taking & Turn giving – Small talk

UNIT IV    CLASSIFICATION  9+6
Listening – Listening to announcements & filling a table; Reading – Reading an article, Reading social media posts and classifying (channel conversion – text to table); Writing – Note making, Note taking & Summarising, Writing a classification paragraph; Grammar – Discourse markers – Connectives, Transition words; Vocabulary – Conjunctions, Contextual vocabulary

LAB ACTIVITY: Making short presentations – Different clubs and their activities in the college / Campus Facilities – About your native place and its major attractions
UNIT V  ARTICULATION / EXPRESSION / DISCUSSION  9+6

Listening – Listening to a debate, Discussion; Reading – Reading formal letters, Letters to Editor, Opinion articles / Blogs; Writing – Letter writing, Email writing (To Editor, Complaint letter, Enquiry letter); Grammar – Question tags, Indirect questions, Yes / No questions; Vocabulary – Compound words, Phrasal verbs

LAB ACTIVITY: Taking part in a group discussion on general topics – Debating on topics of interest and relevance

TOTAL: (45+30) = 75 PERIODS

OUTCOMES:
CO 1 : Use grammar and vocabulary suitable for general context.
CO 2 : Comprehend the nuances of spoken and written communication.
CO 3 : Communicate effectively in formal and informal contexts.
CO 4 : Read different types of texts and comprehend their denotative and connotative meanings.
CO 5 : Write different types of texts using appropriate formats.

REFERENCES:
6. www.uefap.com

CO – PO Mapping:

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OBJECTIVES:
- To develop the use of matrix algebra techniques that is needed by engineers for practical applications
- To familiarize the student with functions of several variables. This is needed in many branches of engineering
- To solving integrals by using Beta and Gamma functions and their applications
- To acquaint the student with mathematical tools needed in evaluating multiple integrals and their applications
- To acquaint the students with the concepts of vector calculus which naturally arises in many engineering problems

UNIT I MATRICES 12
Eigen values and Eigen vectors – Properties of Eigen values - Linear dependence and independence of Eigen vectors - Cayley-Hamilton theorem (excluding proof), Reduction to Diagonal form – Similarity transformation, Quadratic form – Reduction of Quadratic form to canonical form, Nature of a Quadratic form

UNIT II DIFFERENTIAL CALCULUS 12
Functions of several variables, limit, continuity, partial derivatives, differentiability, total differential, Errors and approximations - Taylor’s formula for two variables - extreme values and saddle points, constrained maxima and minima: Lagrange multipliers with single constraint

UNIT III INTEGRAL CALCULUS 12
Improper integrals of the first and second kind and their convergence – Differentiation under integrals - Evaluation of integrals involving a parameter by Leibnitz rule – Beta and Gamma functions – Properties – Evaluation of integrals using Beta and Gamma functions – Error functions

UNIT IV MULTIPLE INTEGRALS 12
Double integrals – Change of order of integration – Double integrals in polar coordinates – Area enclosed by plane curves – Triple integrals – Volume of Solids – Change of variables in double and triple integrals

UNIT V VECTOR CALCULUS 12
Gradient of a scalar field, directional derivative, divergence of a vector field, curl of a vector field. Line integrals of scalar and vector fields – Surface integrals of scalar and vector fields - Verification of Green’s, Stoke’s and Gauss divergence theorems (without proof)

TOTAL: 60 PERIODS
OUTCOMES:
CO 1: The students will be able to Use the matrix algebra methods for solving practical problems.
CO 2: The students will be able to use differential calculus ideas on several variable functions.
CO 3: The students will be able to apply different methods of integration in solving practical problems by using Beta and gamma functions.
CO 4: The students will be able to apply multiple integral ideas in solving areas, volumes and other practical problems.
CO 5: The students will be able to calculate grad, div and curl and use Gauss, Stokes and Greens theorems to simplify calculations of integrals.

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OBJECTIVES:
- To introduce and teach the concepts of properties of matter and thermal physics
- To make the students understand the aspects of acoustics and ultrasonics
- To equip the students with the aspects of quantum principles
- The basic aspects of semiconductor physics and devices are introduced
- The students will be introduced to the concepts of photonics and fiber-optics principles

UNIT I  PROPERTIES OF MATTER AND THERMAL PHYSICS  9

UNIT II  ACOUSTICS AND ULTRASONICS  9

UNIT III  QUANTUM PHYSICS  9
Black body radiation – Planck’s theory (derivation) – Compton effect theory and experimental verification – matter waves – Schrödinger wave equation in one dimension: time independent and time dependent equations – particle in a infinitely deep square well potential – finitewell potential – tunnelling through barrier – applications.

UNIT IV  SEMICONDUCTOR PHYSICS  9
Energy bands in solids – intrinsic and extrinsic semiconductors - distribution of quantum states in the energy band (qualitative) – Fermi-Dirac statistics – carrier concentration in an intrinsic semiconductor – carrier concentration in n-type semiconductor – variation with temperature and impurity

UNIT V  PHOTONICS AND FIBREOPTICS  9
Spontaneous and stimulated emission - population inversion, CO₂ laser, semiconductor lasers - homojunction and heterojunction lasers - industrial applications. Principle and propagation of light in optical fibres – numerical aperture and acceptance angle - types of optical fibres (material, refractive index, mode) – attenuation, dispersion, bending

TOTAL: 45 PERIODS
OUTCOMES:
CO 1 : Understand the concepts of properties of matter and thermal physics.
CO 2 : Apply the concepts of acoustics and ultrasonic.
CO 3 : Appreciate the importance of quantum physics.
CO 4 : Understand the importance of semiconductor physics.
CO 5 : Make use of photonic and fiber-optic devices.

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OBJECTIVES:
- To inculcate sound understanding about batteries and their applications
- To introduce the basic concepts of polymer and its application in the field of electronics
- To impart knowledge on composites and its electrical and electronics applications
- To familiarize the student on dielectric, insulators, semi-conductors, magnetic and nano materials
- To teach about the fabrications of integrated circuits and printed circuit boards

UNIT I  BATTERIES
Primary and Secondary – Requirements – Commercial batteries – Dry Cell, Lead acid, metal hydride, Li-ion. Fuels cells – Classification - Hydrogen - oxygen fuel cell. UPS - Components and types of UPS. Batteries used in UPS

UNIT II  POLYMER IN ELECTRONICS

UNIT III  COMPOSITES
Introduction to composites – Characteristics, Matrix materials – Types – Polymer matrix, metal matrix, ceramic matrix, carbon and graphite matrix material. Reinforcement – fiber, particulates, flakes and whiskers, Classification of composites – Particulates, fibrous and laminated composites – Hybrid composites – Application of composites in electrical and electronic component

UNIT IV  SPECIALITY MATERIALS

UNIT V  FABRICATION OF INTEGRATED CIRCUITS
Introduction – Fabrication – MOS – NMOS, PMOS, CMOS, Ga-As Technologies, Printed circuit boards-Fabrication (Single layer only) – Lamination, printing (photo and screen printing) and mechanical operation

TOTAL: 45 PERIODS

OUTCOMES:
CO 1 : Conversant in the theories involved in batteries and its applications.
CO 2 : Familiar in basic concepts in polymer and its application in the field of electronics.
CO 3 : Exposed to composites and their constituents.
CO 4 : Possess in-depth knowledge about speciality materials.
CO 5 : Conversant in the theories involved in batteries and its applications.
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XC3151 DIGITAL SYSTEMS

OBJECTIVES:
- To introduce the basic concept of digital and binary systems
- To give fundamentals of Boolean algebra and logic gates
- To give students the concept of digital logic design
- To give students the basic tools for the design and implementation of digital modules and subsystems
- To reinforce theory and techniques taught in the classroom through project assignments

UNIT I NUMBER SYSTEMS AND BINARY CODES
Introduction to Digital Systems - Binary Numbers — Number Systems and Conversions — Complements – Signed Binary Numbers - Binary Arithmetic – Binary Codes – BCD and other Weighted Codes, Excess-3, Gray Code – Binary Logic

UNIT II BOOLEAN ALGEBRA AND LOGIC GATES
UNIT III  GATE-LEVEL MINIMIZATION  9
Karnaugh Map Method – Two and Three Variable Map - Four Variable Map – Five Variable Map – Product-of-Sums Simplification –Don’t Care Conditions – NAND and NOR Implementations - Other Two-Level Implementations – Quine McCluskey Method – Exclusive OR function

UNIT IV  COMBINATIONAL LOGIC  9

UNIT V  SEQUENTIAL LOGIC  9

LAB PRACTICES:
1. Study of basic logic gates and realization of logic gates using universal gates.
2. Multiplexer and demultiplexer.
3. Half and full adder / subtractor.
4. Encoder and decoder.
5. Binary decade counter.
6. BCD to seven segment decoder.

OUTCOMES:
CO 1 : Apply knowledge of math, science and engineering.
CO 2 : Describe design constraints of digital systems.
CO 3 : Design digital circuitry, analyze and interpret data.
CO 4 : Combinational logic design implementation.
CO 5 : Sequential logic design implementation.

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OBJECTIVES:

- To analyze and develop C Programs using basic programming constructs.
- To solve searching and sorting problem using arrays and strings.
- To apply code reusability with functions and memory management using pointers.
- To compare and develop applications in C using structures and unions.
- To understand the basics of preprocessor directives and file operations.

UNIT I  BASIC OF C PROGRAMMING  6+12

Architecture of Computer – Program design: Algorithm - Pseudocode and flow chart – Introduction to programming paradigms -- Structure of C program - C programming: Data Types - Constants - Keywords - Operators: Precedence and Associativity - Expressions - Input/Output statements, Assignment statements - Decision making statements - Switch statement.

PRACTICALS:

- Designing algorithms for programs
- Designing flowchart for programs
- Programs using integer type, arithmetic operators and basic input/output.
- Programs using other data types and operators.
- Programs using decision making statements and switch

UNIT II  LOOP CONTROL STATEMENTS AND ARRAYS  6+12

Iteration statements: For, while, Do-while statements, nested loops - Introduction to Arrays: Declaration, Initialization - One dimensional array - Two dimensional arrays – Searching and sorting in Arrays – Strings – string handling functions - array of strings

PRACTICALS:

- Programs using for, while, do-while loops and nested loops.
- Programs using arrays and operations on arrays.
- Programs implementing searching and sorting using arrays
- Programs implementing string operations on arrays

UNIT III  FUNCTIONS AND POINTERS  6+12

Modular programming - Function prototype, function definition, function call, Built-in functions – Recursion – Recursive functions - Pointers - Pointer increment, Pointer arithmetic - Parameter passing: Pass by value, Pass by reference, pointer and arrays, dynamic memory allocation with malloc/calloc

PRACTICALS:

- Programs using functions
- Programs using recursion.
- Programs using pointers and arrays, address arithmetic
- Programs using Dynamic Memory Allocation

UNIT IV  STRUCTURES AND UNION  6+12

Storage class, Structure and union, Features of structures, Declaration and initialization of structures, array of structures, Pointer to structure, structure and functions, typedef , bit fields , enumerated data types, Union.

PRACTICALS:

- Programs using structures and array of structures
- Programs using pointers to structures, self-referential structures
- Programs using union
- Programs using enumerated data types

UNIT V  MACROS AND FILE PROCESSING  6+12

PRACTICALS:
- Programs using file read operation
- Programs using file write operation
- Programs using file seek operation
- Programs using macros

TOTAL : (30+60) 90 PERIODS

OUTCOMES:
CO 1 : Write simple C programs using basic constructs.
CO 2 : Design searching and sorting algorithms using arrays and strings.
CO 3 : Implement modular applications using Functions and pointers.
CO 4 : Develop and execute applications using structures and Unions.
CO 5 : Solve real world problem using files.

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Attested

26
INTRODUCTION: BIS specifications, Drawing tools, lines, lettering, scaling and dimensioning. Projection – types.

FIRST ANGLE PROJECTION: Introduction- Projection of points, lines, planes, and solids – parallel, perpendicular and inclined to planes.

ISOMETRIC PROJECTION: Introduction to objects of symmetry with either or any one of the axes and objects of revolution.

INTERACTIVE GRAPHICS: Parametric modeling – 1D, 2D and 3D geometry – transformations - display – points, lines, planes using software.

CURVES: Parametric curves generation methods - displaying - evaluating control points on curves.

SURFACES: Parametric surface generation methods - displaying - evaluating control points on surfaces – Iso, sub and super parametric surfaces for FEA.

SOLIDS: Generation of part models using Computer Aided Geometric Modeling software. (Autodesk Fusion 360, CATIA)

GENERATIVE DESIGN: Important of AI, ML, Solid free form fabrication – Types and applications.

LABORATORY COMPONENT: Engineering Graphics using CAD
1. Introduction to CAD Software.
4. Conversion of isometric to orthographic projection and vice versa.
5. Lateral Surface Development.
7. Perspective projection of simple solids.

Geometric Modeling using a graphical programming language (MATLAB, Auto-LISP)
8. Modeling and displaying a point and line using orthographic projection and performing simple geometric transformation.
11. Modeling and displaying of parametrically represented NURBS curve.
Application of CAD through Programming
15. 1D, 2D transformations – scaling, rotation, mirroring, moving, copying
16. Image enhancement – Coloring, shading, shadowing, contrast, filling lights, brightness, hue saturation, tint, temperature variation
17. Noise reduction techniques, edge detection techniques, counting similar geometry in a cluster
18. Applications of Digital Image Processing techniques
19. Generative design approach – Implementation of AI, ML – Applications
20. CAD smart application development

TOTAL : 60 PERIODS

OUTCOMES:
CO 1: Draw free hand sketching of basic geometrical shapes and multiple views of objects.
CO 2: Draw orthographic projections of lines and planes
CO 3: Draw orthographic projections of solids
CO 4: Draw development of the surfaces of objects
CO 5: Draw isometric and perspective views of simple solids.

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TOTAL: 60 PERIODS
OBJECTIVES:
- To actively listen and collect relevant data from various forms of oral content like presentations, lectures and videos
- To use language effectively in a formal presentation and discussions
- To comprehend various reading materials relevant to technical context and understand the main and supporting ideas of the reading materials
- To explore definitions, essay and report writing techniques and practice them in order to develop associated skills
- To write effective job applications along with detailed CV for internship or placements

UNIT I
CAUSE AND EFFECT
9+6
Listening – To an interview (survivors tale) & framing a set of instructions/ Dos & Don’ts; Reading – Excerpts of Literature (short stories), Journal articles on Global warming/Silent Spring; Writing - Instructions; Official letter / email (Request for internship / Industrial visit); Grammar – If conditionals, Imperatives; Vocabulary – Cause & effect expressions; Idiom

LAB ACTIVITY: Asking questions and answering - Conducting an interview (of an achiever / survivor) – Role play

UNIT II
COMPARE AND CONTRAST
9+6
Listening – To product reviews & gap fill exercises, To short talks (TED Talks) for specific information; Reading – A graphical content (table / chart / graph) & making inferences; Writing – Compare and Contrast Essay; Grammar – Degrees of Comparison; Mixed Tenses; Vocabulary – Order of Adjectives; Transition words

LAB ACTIVITY: Speaking about specifications of a product (Eg. Home appliances) – Persuasive Talk – Role play activity

UNIT III
PROBLEM AND SOLUTION
9+6
Listening – To group discussion (case study); Reading – Visual content (Pictures on social issues / natural disasters) for comprehension; Editorial; Writing Picture description; Problem & Solution Essay; Grammar – Modal verbs; Relative pronoun; Vocabulary – Negative prefixes; Signal words for problem & solution

LAB ACTIVITY: Discussions on Case Study to find solution for problems in professional context

UNIT IV
REPORTING
9+6
Listening – To an oral news report; Reading – A newspaper report on a survey findings – Writing – A survey report; Making recommendations; Grammar – Active and passive voice; Direct and Indirect speech; Vocabulary – Reporting verbs; Numerical adjectives

LAB ACTIVITY: Describing a visual content (Pictures/Table/Chart) using appropriate descriptive language and making appropriate inferences

UNIT V
9+6
Listening – To a job interview, Telephone interview; Reading - Job advertisement and company profile and make inferences; Writing – Job application (cover letter and CV) Grammar – Prepositional phrases; Vocabulary – Fixed expressions, Collocations

LAB ACTIVITY: Making presentation with a visual component (ppt) (job interview / project / Innovative product presentation)

TOTAL: (45+30) = 75 PERIODS
OUTCOMES:

CO 1: Listen effectively to various oral forms of conversation, lectures, discussion and understand the main gist of the content.

CO 2: Communicate effectively in formal and informal context.

CO 3: Read and comprehend technical texts effortlessly.

CO 4: Write reports and job application for internship or placement.

CO 5: Participate effectively in formal group discussions and make formal presentations.

REFERENCES:

6. www.uefap.com

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EE3151 BASICS OF ELECTRICAL AND ELECTRONICS ENGINEERING

UNIT I ELECTRICAL CIRCUITS


UNIT II ELECTRICAL MACHINES

UNIT III  ANALOG AND DIGITAL ELECTRONICS  

UNIT IV  SENSORS AND TRANSDUCERS  
Solenoids, electro-pneumatic systems, proximity sensors, limit switches, piezoelectric, hall effect, photo sensors, Strain gauge, LVDT, differential pressure transducer, optical and digital transducers, Smart sensors, Thermal Imagers.

UNIT V  MEASUREMENTS AND INSTRUMENTATION  

LIST OF EXPERIMENTS:

ELECTRICAL
1. Verification of ohms and Kirchhoff’s Laws.
2. Load test on DC Shunt Motor.
3. Load test on Single Phase Transformer.
4. Load test on 3 Phase Induction Motor.

ELECTRONICS
1. Half wave and full wave Rectifiers.
2. Application of Zener diode as shunt regulator.
3. Inverting and non-inverting amplifier using operational amplifier.

COURSE OUTCOMES
Upon successful completion of the course, students should be able to:
CO 1: Compute and demonstrate the electric circuit parameters for simple problems.
CO 2: Explain the working principles and characteristics of electrical machines, electronic devices and measuring instruments.
CO 3: Identify general applications of electrical machines, electronic devices and measuring instruments.
CO 4: Analyze and demonstrate the basic electrical and electronic circuits and characteristics of electrical machines.
CO 5: Explain the types and operating principles of sensors and transducers.

Mapping of COs with POs and PSOs

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TEXT BOOKS:

REFERENCES:

MA3253 ORDINARY DIFFERENTIAL EQUATIONS AND TRANSFORM TECHNIQUES

OBJECTIVES:
- To acquaint the students with Differential Equations which are significantly used in engineering problems
- To make the students appreciate the purpose of using transforms to create a new domain in which it is easier to handle the problem that is being investigated
- To develop the analytic solutions for partial differential equations used in engineering by Fourier series
- To acquaint the student with Fourier transform techniques used in wide variety of situations in which the functions used are not periodic
- To develop Z-transform techniques which will perform the same task for discrete time systems as Laplace Transform, a valuable aid in analysis of continuous time systems

UNIT I ORDINARY DIFFERENTIAL EQUATIONS OF HIGHER ORDER
12
Homogeneous linear ODEs of second order, linearity principle, general solution - Particular integral: Operator method, Solution by variation of parameters, Method of undetermined coefficients - Homogenous equations of Euler–Cauchy equations and Legendre’s equations –Simultaneous system of first order linear differential equations

UNIT II LAPLACE TRANSFORMS
12
Laplace Transforms: Laplace Transform of standard functions, First shifting theorem, Second shifting theorem, Unit step function, Dirac delta function, Laplace transforms of functions when they are multiplied and divided by ‘t’, Laplace transforms of derivatives and integrals of function, Evaluation of integrals by Laplace transforms, Laplace transform of periodic functions, Inverse Laplace transform by different methods, convolution theorem (without proof). Applications: solving Initial value problems by Laplace Transform method
UNIT III  
FOURIER SERIES  
12

Dirichlet’s conditions – General Fourier series – Odd and even functions – Half-range Sine and Cosine series – Complex form of Fourier series – Parseval’s identity – Harmonic Analysis

UNIT IV  
FOURIER TRANSFORMS  
12

Integral representation, Fourier sine and cosine integrals. Fourier sine and cosine transforms, inverse sine and cosine transform. Fourier transform and inverse Fourier transform, basic properties. The Fourier transform of derivatives. Convolution theorem (without proof)

UNIT V  
Z – TRANSFORM AND DIFFERENCE EQUATIONS  
12

Z-transform – Elementary properties – Inverse Z-transform – Convolution theorem – Initial and final value theorems – Formation of difference equation – Solution of difference equation using Z – transform

TOTAL: 60 PERIODS

OUTCOMES:
CO 1: The students will be able to solve higher order ordinary differential equations which arise in engineering applications.
CO 2: The students will be able to apply Laplace transform methods for solving linear differential equations.
CO 3: The students will be able to compute Fourier series of functions arise in engineering applications.
CO 4: The students will be able to compute Fourier transforms of functions arise in engineering applications.
CO 5: The students will be able to understand Z-transforms.

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OBJECTIVES:
- To get introduced to Python and its environment
- To develop Python programs with conditionals and loops
- To define Python functions and use function calls
- To use Python data structures - lists, tuples, dictionaries
- To do input/output with files in Python

UNIT I PROGRAMMING BASICS 6+12
Introduction to Python Specification - Data Representation: Simple statements: Variables and Identifiers – Object Types - Operators - Expressions and its evaluation

Practicals:
- Develop Python programs using simple Input/Output operations
- Develop Python programs using operators and expressions
- Executing simple programs using Python interactive mode

UNIT II CONTROL STATEMENTS AND FUNCTIONS 6+12

Practicals:
- Write Python programs using simple and nested selective control statements
- Develop Python programs using simple and nested repetitive control statements
- Write Python programs to generate series and patterns using repetitive control statements
- Develop Python programs using simple functions and recursion
- Write Python programs using lambda functions

UNIT III STRING, LIST, TUPLES 6+12

Practicals:
- Write Python programs for operating on Strings
- Design Python programs using Lists, Nested Lists and Lists comprehensions
- Develop Python programs using Tuples, Nested Tuples, Tuple comprehensions, and Sets

UNIT IV SETS & DICTIONARIES, FUNCTIONAL PROGRAMMING 6+12

Practicals:
- Write Python programs creating sets and performing set operations

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• Develop Python programs using Dictionary, Nested Dictionary and comprehensions
• Write Python programs by applying functional programming concepts
• Create, import, and use user-defined modules
• Organize python code using Packages

UNIT V EXCEPTIONS AND FILE HANDLING 6+12

Practicals:
• Design Python programs to handle errors and exceptions
• Write Python programs with multiple handlers for exceptions
• Write Python programs to read, create, and update text files

OUTCOMES:
CO 1 : Understand algorithmic solutions to simple computational problems.
CO 2 : Create Python programs using conditional statements to solve computational problems.
CO 3 : Apply Python data structures for a given problem.
CO 4 : Design modular Python programs using modules and packages.
CO 5 : Create Python programs to manipulate different file types and handle exceptions.

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TOTAL: (30+60) 90 PERIODS
OBJECTIVES:
- To understand the concepts of array and linked list structures
- To know the concepts of stack and queue data structure
- To learn about non-linear tree data structures
- To familiarize the concept of graph and graph-related algorithms
- To know the concepts of sorting and hashing techniques

UNIT I ARRAYS AND LINKED LIST

UNIT II STACK AND QUEUE

UNIT III TREES
Tree – Terminologies – Binary Tree – Binary Tree Variants - Sequential and Linked representation - Tree Traversals – Expression Trees -Threaded Binary Tree – Binary Search Tree – Heap Tree

UNIT IV ADVANCED TREES AND GRAPH

UNIT V HASHING AND SORTING

OUTCOMES:
CO 1 : Solving real-time applications using a list data structure.
CO 2 : Know about the importance of stack and queue data structure in a wide range of applications.
CO 3 : Implement the tree data structures.
CO 4 : Apply graph data structures for a real-world problem.
CO 5 : Use appropriate sort of algorithms for the task at hand.

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XC3252 COMPUTER ARCHITECTURE

OBJECTIVES:
- To understand the structure, function and characteristics of computer systems
- To understand the design of the various functional units and components of computers
- To identify the elements of modern instructions sets and their impact on processor design
- To explain the function of each element of a memory hierarchy
- To identify and compare different methods for computer I/O

UNIT I STRUCTURE OF COMPUTERS

UNIT II ARITHMETIC AND LOGIC UNIT
Binary Addition and Subtraction – Binary Multiplication and Division – Booth Algorithm – Fixed Point Representations – Floating Point Representation – Floating Point Arithmetic Operations – Arithmetic Pipelining

UNIT III CONTROL UNIT
Hardwired and Micro programmed Control – Control Memory – Address Sequencing – Micro instruction Sequencing - Macro instruction Execution - Program Control

UNIT IV MEMORY ORGANIZATION
Memory Operations – Memory Hierarchy – Main Memory – Associative Memory - Auxiliary memory –Virtual Memory – Cache Memory – Memory Array – Secondary Storage – Memory Management Hardware

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UNIT V INPUT OUTPUT ORGANIZATION AND ADVANCED ARCHITECTURE


TOTAL: 45 PERIODS

OUTCOMES:
CO 1: Understand the basic structure of computer.
CO 2: Perform computer arithmetic operations.
CO 3: Understand the control unit operations.
CO 4: Understand the concept of cache mapping techniques.
CO 5: Understand the concept of I/O organization.

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LIST OF EXPERIMENTS
1. Operation on Array
2. Matrix Manipulation using dynamic memory allocation
3. Linear Search and Binary Search
4. Linked List, Doubly Linked List
5. Circular Linked List
6. Polynomial Addition using Linked List
7. Implementation of Stack using Arrays and Linked List
8. Checking well-formed parenthesis
9. Infix to postfix and prefix conversion
10. Evaluation of Expression
11. Implementation of Queue using Arrays and Linked List
12. Double Ended Queue and Priority Queue
13. Bubble, Insertion, Selection, and Shell sort
14. Binary Search Tree
15. Graph Traversals

TOTAL: 60 PERIODS

OUTCOMES:
CO 1: Implementation of arrays and linked lists
CO 2: Implementation of stack and queue data structure in a wide range of applications.
CO 3: Implement the tree data structures.
CO 4: Apply graph data structures for a real-world problem.
CO 5: Use of appropriate sorting algorithms for the task at hand.

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OBJECTIVES:
- To introduce the effective mathematical tools for the solutions of partial differential equations that model physical processes
- To familiarize the students in the field of partial differential equations and to solve boundary value problems associated with engineering applications
- To develop an understanding of the standard techniques of complex variable theory in particular analytic function
- To familiarize complex mappings and its mapping property
- To familiarize the students with complex integration techniques and contour integration techniques which can be used in real integrals

UNIT I  PARTIAL DIFFERENTIAL EQUATIONS  12
Formation – Solutions of first order equations – Standard types and Equations reducible to standard types – Lagrange’s Linear equation – Solution of linear equations of higher order with constant coefficients – Linear non-homogeneous partial differential equations

UNIT II  APPLICATIONS FOURIER SERIES TO PARTIAL DIFFERENTIAL EQUATION  12
Classification of partial differential equations- Method of separation of variables – Solutions of one-dimensional wave equation and one-dimensional heat equation – Steady state solution of two-dimensional heat equation

UNIT III  DIFFERENTIATION OF COMPLEX FUNCTIONS  12
Limit, Continuity and Differentiation of Complex functions - Analytic functions – Necessary and sufficient conditions for analyticity: Cauchy-Riemann equations (without proof)- Properties – Harmonic conjugates – Construction of analytic function – elementary analytic functions (exponential, trigonometric, logarithm) and their properties

UNIT IV  CONFORMAL MAPPING  12
Introduction to Complex mapping - Conformal mapping – Condition for conformality – Standard mappings: a+z, az, az+b, - Bilinear transformations

UNIT V  INTEGRATION OF COMPLEX FUNCTIONS  12
Line integral - Cauchy’s integral theorem – Cauchy’s integral formula – Taylor’s and Laurent’s series – Singularities – Residues – Cauchy’s Residue theorem – Application of residue theorem for evaluation of real integrals – Use of circular contour and semicircular contours (except poles on real lines)

TOTAL : 60 PERIODS

OUTCOMES:
CO 1 : The students will be able to solve partial differential equations which arise in application problems.
CO 2 : The students will be able to obtain the solutions of the partial differential equations using Fourier series.
CO 3 : The students will be able to understand complex functions and differentiation complex functions.
CO 4 : The students will be able to understand their conformal mapping and its application problems.
CO 5 : Evaluate real and complex integrals using the Cauchy’s integral formula and residue theorem.
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XT3351 OBJECT-ORIENTED PROGRAMMING USING C++

OBJECTIVES:
- To get a clear understanding of object-oriented concepts
- To give an introduction about objects and classes
- To understand the concept of inheritance and polymorphism
- To have knowledge about templates and exception handling
- To have insights into I/O operations and manipulators

UNIT I OOP AND C++ FUNDAMENTALS
Object-oriented paradigm - Elements of object-oriented programming – Characteristics of OOP - C++ operators – data types - Pointers - References - Enumeration – Functions – Function prototype – Default arguments — Inline functions
UNIT II    OBJECTS AND CLASSES
Specifying a Classes – Defining Member Functions – Static data member and member function - Array of objects – Object as a function argument - Returning Objects – Friend function - pointers to object - This pointer – Constructor and destructor

UNIT III   INHERITANCE AND POLYMORPHISM
Derived class - Single Inheritance - Multiple Inheritance - Hierarchical Inheritance - Hybrid Inheritance – Virtual base class - Constructors in Derived class – Nesting of classes - Polymorphism – Compile and Run time polymorphism – Function overloading - Operator Overloading – Virtual Functions

UNIT IV    TEMPLATES AND EXCEPTION HANDLING
Exception handling mechanism – Rethrowing an Exception – Specifying Exceptions – Templates – Class Template – Function Template – Member function template – Non-Type Template arguments –Namespaces

UNIT V    INPUT/OUTPUT STREAMS
Input / Output operations – I/O stream classes – Unformatted and formatted I/O operations – Manipulators – Overloading the insertion and extraction operators - File input/output – Command line arguments

LIST OF EXPERIMENTS
1. Create a complex number class with all possible operators
2. Static members, Friend functions
3. Operator overloading, overloading of assignment operator
4. Type conversions such as integer to complex, double to complex, and complex to double
5. Constructor, Destructor, Copy constructor
6. Virtual functions
7. Matrix class with operator overloading
8. Single, Multiple, and Hybrid Inheritance
9. Polymorphism
10. Exception Handling
11. Input/Output file handling

TOTAL : (45+30) 75 PERIODS

OUTCOMES:
CO 1 : Describe the procedural and object-oriented paradigm with concepts of streams, classes, functions, data, and objects.
CO 2 : Understand dynamic memory management techniques using pointers, constructors, and destructors.
CO 3 : Describe the concept of function overloading, operator overloading, virtual functions, and polymorphism.
CO 4 : Classify inheritance with the understanding of early and late binding, usage of exception handling, generic programming.
CO 5 : Demonstrate the use of I/O stream classes, file handling, and command line arguments.

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XT3352 DATABASE MANAGEMENT SYSTEMS

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OBJECTIVES:
- To comprehend the fundamental concepts of Database Management Systems
- To model the data and map it using Entity Relationship Model and Enhanced Entity Relationship Model
- To comprehend Fundamental knowledge about Data Storage
- To understand the need for Normalization and Normalize Relations
- To comprehend to work with SQL Queries and need of concurrency control in transactions.

UNIT I INTRODUCTION TO DBMS AND CONCEPTUAL DATA MODELING

UNIT II RELATIONAL DATA MODELS AND SQL

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UNIT III DATA STORAGE

UNIT IV NORMALIZATION

UNIT V TRANSACTION MANAGEMENT
Introduction to Transactions– Desirable Properties of Transaction Characterizing Schedules based on Recoverability – Characterizing Schedules based on Serializability – Concurrency Control Techniques -Deadlock – Database Recovery Techniques

OUTCOMES:
CO 1 : Distinguish unary, binary, and ternary relationships and give a common example of each.
CO 2 : Compare and contrast the object-oriented model with the E-R and EER models.
CO 3 : Understand the various concepts of the data storage.
CO 4 : Use normalization to decompose our relation with anomalies into well-structured relations.
CO 5 : Understand about the concept of transactions with concurrency control and deadlock.

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OBJECTIVES:
- To provide a clear understanding of the concepts that underlies operating systems
- Fundamental concepts and algorithms that will be covered are based on those used in existing commercial operating systems
- To present these topics in a general setting that is not tied to one particular operating system
- To understand the concept of file and directory structures
- Throughout the course, practical aspects that pertain to the most popular operating systems such as Unix/Linux and Windows, and some instructional operating systems will be studied as well

UNIT I  INTRODUCTION TO OPERATING SYSTEMS AND PROCESSES  9

UNIT II  PROCESS MANAGEMENT  9
Process Synchronization – Critical-Section Problem – Synchronization Hardware - Semaphores – Classic Problems of Synchronization — Monitors - CPU Scheduling – Scheduling algorithms – Multiple Processor Scheduling

UNIT III  DEADLOCKS AND MEMORY MANAGEMENT  9

UNIT IV  STORAGE MANAGEMENT  9

UNIT V  CASE STUDY: LINUX AND WINDOWS OPERATING SYSTEMS  9

LIST OF EXPERIMENTS
1. Basic LINUX commands
2. Filters – grep, sed, awk
3. Process management - Fork, Exec commands, Wait
4. Inter-Process Communication
5. Semaphores
6. CPU Scheduling algorithms
7. Deadlocks
8. Page replacement Algorithms

TOTAL: (45+30) 75 PERIODS
OUTCOMES:
CO 1:  Gain extensive knowledge on principles and modules of operating systems.
CO 2:  Compare performance of processor scheduling algorithms and produce algorithmic solutions to process synchronization problems.
CO 3:  Understand process management, concurrent processes, memory management and deadlocks.
CO 4:  Understand the concept of file and directory structures with storage management.
CO 5:  Use modern operating system calls such as Linux process and synchronization libraries.

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XC3352  MICROPROCESSOR AND APPLICATIONS  L  T  P  C
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OBJECTIVES:
- To know about the architecture and related aspects of 8085
- To know about the architecture and related aspects of 16-bit processor 8086
- Learn to write simple programs for both 8086 and 8085 processors
- To develop an in-depth understanding of interfacing techniques
- To understand about different interfacing IC’s available
UNIT I  INTRODUCTION AND INTEL 8085 9
Architecture – Instruction format - addressing modes – Simple Program - Basic timing Diagram - Input/ Output – Interrupt system – based system design

UNIT II  16 – BIT PROCESSORS (INTEL8086) 9
Intel 8086: Architecture – addressing modes and Instruction format interfacing of memory map; I/O device – odd and even addressed blanks – storing/retrieval of 16 bit data at an odd address – Simple Programs

UNIT III  INTRODUCTION TO MICRO CONTROLLERS 9

UNIT IV  INTERFACING BASICS 9
On controlling/monitoring continuous varying (analog) non-electrical signal using microprocessor/microcontrollers need for interfacing ICs – thumb wheel switch as input devices -single LED, seven segment LED as output devices – interfacing these using both memory mapped I/O and peripheral mapped I/O – D/A, A/D ICs and their signals – sample and hold IC and its usage

UNIT V  INTERFACING IC’S 9
(i) 8255-Programmable Peripheral Interface along with8085
(ii) 8254 – Programmable Interval Timer along with Intel8086
(iii) Need for the following ICs:
(a) 8251 – USART; (b) 8257 – Direct Memory Access Controller;
(c) 8259 – Programmable Interrupt Controller; (d) 8279 – Keyboard / Display Interface.
(iv) 8085 and 8051 based industrial automations

LIST OF EXPERIMENTS
Assembly Language Programming of 8085 and 8086
1. Programs for 8 / 16 bit Arithmetic, Sorting, Searching and String operations
2. Programs for Digital clock, Interfacing ADC and DAC
3. Interfacing and programming 8279, 8259, and 8253
4. Serial Communication between two microprocessors kits using 8251
5. Interfacing Stepper Motor, Speed control of DC Motor
6. Parallel communication between two microprocessors kits using Mode 1 and Mode 2 of 8255
7. Macro assembler Programming for 8086

TOTAL : (45+30) 75 PERIODS

OUTCOMES:
CO 1 : Learn the internal organization of some popular microprocessors/microcontrollers.
CO 2 : Learn hardware and software interaction and integration.
CO 3 : Learn the design of microprocessors-based systems.
CO 4 : Learn the design of microcontrollers-based systems.
CO 5 : Design the processor with appropriate interface selection.

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**OBJECTIVES:**
- To understand the concepts of signals and systems used communication signal analysis
- To design simple systems for generating and demodulating frequency modulated signals
- To understand basics of information theory and channel coding
- To understand analog to digital conversion techniques and coding techniques
- To understand the digital modulation and transmission techniques

**UNIT I**
INTRODUCTION TO SPECTRUM ANALYSIS

**UNIT II**
ANALOG MODULATION TECHNIQUES
UNIT III INFORMATION THEORY AND CODING TECHNIQUES 9
Information – Entropy – information rate – Entropy Coding Techniques – Source coding – Shannon Fano Coding – Huffman Coding – channel capacity theorem, Introduction to error control coding – Block codes, burst error correction

UNIT IV DIGITAL TRANSMISSION OF ANALOG SIGNALS 9

UNIT V DIGITAL MODULATION AND TRANSMISSION 9
Shift Keying Techniques – Binary ASK, Binary FSK, Binary PSK, QPSK – Modulation and Demodulation Principles – Comparison in terms of Bandwidth and Bit Error Rate

TOTAL : 45 PERIODS

OUTCOMES:
CO 1 : Understand fundamentals techniques used to analyse the spectrum of modulated signals and properties of LTI systems.
CO 2 : Understand the analog modulation demodulation principles.
CO 3 : Understand the information, source coding and channel coding principles.
CO 4 : Understand the principles of analog to digital conversion and transmission techniques of voice signals.
CO 5 : Understand the digital modulation demodulation principles.

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Attested

Director
Centre for Academic Courses
Anna University, Chennai 600 025
LIST OF EXPERIMENTS
3. Set Operations – Creating Views – Creating Sequence – Indexing
4. Aggregate Functions – Analytic Functions – Nested Queries
5. Creating Triggers and Stored Procedures
6. Accessing and Updating a Relational Database using Java
7. Case Studies – Applications – Payroll, Inventory, Grade Processing, Tax Calculation, Electricity Bill

TOTAL : 60 PERIODS

OUTCOMES:
CO 1 : Implementation of DDL commands
CO 2 : Explore various join operations
CO 3 : Implementation of set operations and aggregate functions
CO 4 : Creation of triggers and stored procedures
CO 5 : Create a database for real world applications

CO – PO Mapping:

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OBJECTIVES:
- To introduce Mathematical Logic, Inference Theory and proof methods
- To provide fundamental principles of combinatorial counting techniques
- To introduce the algebraic structures and their properties
- To introduce graph models, their representation, connectivity and traversability
- To provide exposure to trees and demonstrate their utility

UNIT I LOGIC AND PROOFS
12

UNIT II COMBINATORICS
12

UNIT III ALGEBRAIC STRUCTURES
12
Groups – Subgroups – Homomorphism of groups – Normal Subgroup and Coset – Lagrange’s Theorem – Definitions and Examples of Rings and Fields

UNIT IV GRAPHS
12
Graphs and Graph Models – Graph Terminology and Special Types of Graphs – Matrix Representation of Graphs and Graph Isomorphism – Planar Graphs - Connectivity – Euler and Hamiltonian graphs

UNIT V TREES
12

TOTAL : 60 PERIODS

OUTCOMES:
CO 1 : Understand the validity of the logical arguments, mathematical proofs and correctness of the algorithm.
CO 2 : Apply combinatorial counting techniques in solving combinatorial related problems.
CO 3 : Understand the significance of algebraic structural ideas used in coding theory and Cryptography.
CO 4 : Use graph models and their connectivity, traversability in solving real world problems.
CO 5 : Apply trees and their utilities.

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XC3401

LINEAR ALGEBRA

OBJECTIVES:
- To acquire the thorough knowledge in vector space, sub spaces, basis and dimensions
- To impart the basic idea of linear transformations, their representation by matrices, geometry of linear operators and change of basis
- To build a base in the analysis of a single linear transformation on a finite dimensional vector space; the analysis of characteristics, values and diagonalizable transformations
- To set a base in the study of finite dimensional inner product spaces in detail, orthogonality, orthogonal projections and the diagonalization
- To follow the required vector space in real time applications such as networks, linear programming, statistics and probability

UNIT I VECTOR SPACES

Vector spaces and subspaces — Linear combinations and Linear system of equations, Span, Linear independence and dependence - Null space, Column space, and Row space – Basis and dimension of a vector space

UNIT II LINEAR TRANSFORMATION

Introduction to linear transformations – General Linear Transformations – Rank and nullity - Kernel and range – Matrices of general linear transformation- Geometry linear operators- Change of basis

UNIT III INNER PRODUCT SPACES

UNIT IV  EIGEN VALUES AND EIGEN VECTORS  

UNIT V  APPLICATIONS  

TOTAL : 45 PERIODS

OUTCOMES:
CO 1 :  The student can set up the base in the basic concepts of vector spaces and dimensions.
CO 2 :  Able to study completely about linear transformations and matrices.
CO 3 :  Will be familiarized with the techniques of diagonalization by inner product spaces.
CO 4 :  Made the objectives clear to get the Eigen values and Eigen vectors required for diagonalization.
CO 5 :  Be ready to apply the linear algebra concepts of solving real time problems in various fields.

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OBJECTIVES:
- To assist the student in understanding the basic theory of software engineering
- To apply these basic theoretical principles to a group software development project
- To understand the importance of analysis and design
- To stress the need for testing before deployment
- To familiarize the functions of a software project manager

UNIT I  INTRODUCTION TO SOFTWARE ENGINEERING  9

UNIT II  REQUIREMENTS ANALYSIS AND SPECIFICATION  9
Requirements Engineering – Requirements Elicitation – Use Case Development – Requirements Negotiation – Requirements Modelling

UNIT III  ANALYSIS AND DESIGN  9

UNIT IV  SOFTWARE QUALITY AND TESTING  9

UNIT V  SOFTWARE PROJECT MANAGEMENT  9

LIST OF EXPERIMENTS
1. Feasibility Study
2. Requirements Engineering
3. Requirements Analysis
4. Software Design using UML
5. Software Implementation
6. Software Testing
A mini project comprising of the above-mentioned phases of software development

TOTAL: (45+30) 75 PERIODS

OUTCOMES:
CO 1: Understand the importance of software engineering as a discipline.
CO 2: Able to elicit requirements and model them using appropriate methods.
CO 3: Identify and apply appropriate software architectures and patterns to carry out high level design of a system.
CO 4: Carry out testing and ensure quality of the software.
CO 5: Understand the role of software project management in software engineering.
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XC3452

OBJECTIVES:
- To familiarize the Object-Oriented Programming (OOP) concepts, such as abstraction, encapsulation, instances, initializations, polymorphism, overloading, inheritance and generic programming
- To learn the OOP specific programming languages such as C++ and Java
- To write programs to solve problems using the OOP language constructs rather than structural programming
- To understand and know the importance of OOP in real-world problems
- To familiarize students to create UI applications
- To expose the usage of streams to store and retrieve data

UNIT I
INTRODUCTION TO OBJECT ORIENTED PROGRAMMING AND JAVA

Introduction to OOP – Thinking Object Oriented - Object Oriented Design. Introduction to Java – JVM - Classes and methods – Varieties of Classes – Messages, Instances and Initialization - Constructors and Destructors – Object and Class in java.lang.class - Namespaces – Scope – Method Overloading – Arrays – Type Casting - Constant Objects and Member Functions – Composition - this Pointer – Static Instances
UNIT II  INHERITANCE AND EXCEPTION HANDLING IN JAVA

Package Access - Java API Packages – Inheritance - Sub Classes and Subclass Types – Replacement and Refinement – Implications of Inheritance - Exception Handling- Java Exception Hierarchy - Declaring New Exception Types – Assertions - Garbage Collection and Method finalize – String Class - Converting between Types - Inheritance – an Intuitive Description of Inheritance Subclass, Subtype, and Substitutability – Forms of Inheritance,” is-a” and “has-a” rule – Multiple Inheritance

UNIT III  POLYMORPHISM IN JAVA


UNIT IV  FILES AND STREAMS IN JAVA

Files and Streams – Formatted Output - Object Concurrency - Serialization - Generic Collections - Generic Classes and Methods - Visibility and Dependency – Reflection and Introspection – Java Utility Packages and Bit Manipulation – Java Collections

UNIT V  GUI, MULTIMEDIA AND DATABASE IN JAVA


TOTAL : 45 PERIODS

OUTCOMES:
CO 1 :  Understand the fundamentals of object-oriented programming in Java.
CO 2 :  Understand the appropriate roles of subtyping and inheritance, and use them effectively.
CO 3 :  Implement polymorphic code and handle run time errors using exception handling
CO 4 :  Implement concurrent applications using threads. Identify the generic classes and methods to implement an application. Use streams to store and retrieve data from database / files.
CO 5 :  Create user-interface applications using GUI components and to understand the event handling principles.

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XT3451 COMPUTER NETWORKS L T P C 3 0 2 4

OBJECTIVES:
- To understand the division of network functionality into layers
- To understand the TCP/IP protocol suite
- To understand the flow of data between the nodes and building blocks of networks
- To Learn flow control and congestion control algorithms
- To understand the network addressing techniques

UNIT I FUNDAMENTALS 9

UNIT II MAC LAYER 9

UNIT III NETWORK LAYER 9

UNIT IV TRANSPORT LAYER 9
Process – To – Process Delivery: UDP, TCP, SCTP – Congestion Control and QOS

UNIT V APPLICATION LAYER 9
Layer 7 Protocols – DHCP, DNS, TELNET, E-mail, FEP, WWW and Http, SNMP – Network Security
LIST OF EXPERIMENTS
1. Familiarize with the layered approach of the protocol stack
2. Familiarize with packet capturing tools in Java and Wireshark
3. Familiarize with IP addressing and subnetting concepts
4. Analyze the existing routing protocols and implement any one of them
5. Implement client server programs using sockets which has multiple clients
6. Implement a simple firewall system

TOTAL: (45+30) 75 PERIODS

OUTCOMES:
CO 1: Identify the components required to build different types of networks.
CO 2: Trace the flow of information from one node to another node in the network.
CO 3: Identify the classes of Network address.
CO 4: Choose functionalities at each layer for different applications.
CO 5: Evaluate the protocols in network layer from QOS perspective.

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COURSE OBJECTIVES:

- To introduce the basic concepts of environment, ecosystems and biodiversity and emphasize on the biodiversity of India and its conservation.
- To impart knowledge on the causes, effects and control or prevention measures of environmental pollution and natural disasters.
- To facilitate the understanding of global and Indian scenario of renewable and nonrenewable resources, causes of their degradation and measures to preserve them.
- To familiarize the concept of sustainable development goals and appreciate the interdependence of economic and social aspects of sustainability, recognize and analyze climate changes, concept of carbon credit and the challenges of environmental management.
- To inculcate and embrace sustainability practices and develop a broader understanding on green materials, energy cycles and analyze the role of sustainable urbanization.

UNIT I  ENVIRONMENT AND BIODIVERSITY  6

UNIT II  ENVIRONMENTAL POLLUTION  6

UNIT III  RENEWABLE SOURCES OF ENERGY  6
Energy management and conservation, New Energy Sources: Need of new sources. Different types new energy sources. Applications of- Hydrogen energy, Ocean energy resources, Tidal energy conversion. Concept, origin and power plants of geothermal energy.

UNIT IV  SUSTAINABILITY AND MANAGEMENT  6
Development, GDP, Sustainability concept, needs and challenges economic, social and aspects of sustainability-from unsustainability to sustainability-millennium development goals, and protocols. Sustainable Development Goals-targets, indicators and intervention areas Climate change- Global, Regional and local environmental issues and possible solutions-case studies. Concept of Carbon Credit, Carbon Footprint. Environmental management in industry - A case study.

UNIT V  SUSTAINABILITY PRACTICES  6

TOTAL: 30 PERIODS

COURSE OUTCOMES:

CO1: To recognize and understand the functions of environment, ecosystems and biodiversity and their conservation.

CO2: To identify the causes, effects of environmental pollution and natural disasters and contribute to the preventive measures in the society.
**CO3:** To identify and apply the understanding of renewable and non-renewable resources and contribute to the sustainable measures to preserve them for future generations.

**CO4:** To recognize the different goals of sustainable development and apply them for suitable technological advancement and societal development.

**CO5:** To demonstrate the knowledge of sustainability practices and identify green materials, energy cycles and the role of sustainable urbanization.

**TEXTBOOKS:**

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LIST OF EXPERIMENTS
1. To create runtime polymorphism using abstract class, interface
2. To create callback feature using interface
3. To create a program for interface inheritance
4. To implement a user defined package
5. To implement a user defined checked exception and unchecked exceptions
6. To create inter-thread communication using shared memory, pipe stream
7. To implement socket connections (UDP, TCP)

TOTAL: 60 PERIODS

OUTCOMES:
CO 1: Implement fundamentals of object-oriented programming in Java.
CO 2: Implement callback feature using interface and interface inheritance.
CO 3: Implement user defined package, user defined check exceptions.
CO 4: Create inter-thread communications.
CO 5: Implement socket connections.

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OBJECTIVES:

- To introduce the idea of one dimensional and two dimensional random variables and the associated properties of their distribution functions
- To impart knowledge of certain special distribution with examples relating to real time situations
- To enable them to estimate the value of the parameters involved in the specific distribution from a possible continuum of alternatives
- To give an idea of testing the statistical hypothesis claimed based on a set of data points using standard sampling distributions
- To establish relationship that make it possible to predict one or more variable in terms of others using correlation and regression analysis

UNIT I PROBABILITY DISTRIBUTIONS


UNIT II SPECIAL DISTRIBUTIONS

Discrete Uniform Distribution - Bernoulli Distribution - Binomial Distribution - Poisson Distribution - Uniform Distribution -Gamma, Exponential and Chi Square Distributions – Normal Distribution

UNIT III ESTIMATION THEORY


UNIT IV HYPOTHESIS TESTING

Sampling Distributions- Central Limit Theorem -Testing a Statistical Hypothesis - Tests Concerning Means, Differences Between Means, Variances, Analysis of r x c Table - Goodness of Fit

UNIT V REGRESSION AND CORRELATION

Linear Regression - Method of Least Squares - Normal Regression Analysis - Normal correlation Analysis - Multiple Linear Regression

OUTCOMES:

CO 1: It enables the students to understand the nature and properties of density functions and hence determine the moments and moment generating functions of any random variable.

CO 2: It helps the students to choose appropriate distribution for the real time problems and hence interpret the analysis mathematically.

CO 3: It make the students to obtain the value of the point estimators using the method of moments and method of maximum likelihood.

CO 4: It imparts the knowledge of various test statistics used in hypothesis testing for mean and variances of large and small samples.

CO 5: It equips the students to determine the regression line using the method of least square and also to calculate the partial and multiple correlation coefficient for the given set of data points.
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XT3501

OBJECT ORIENTED ANALYSIS AND DESIGN

OBJECTIVES:
- To learn the concept of Object Oriented Software Development Process
- To get acquainted with UML Diagrams
- To understand Object Oriented Analysis Processes
- To learn the common patterns in OO design and implement them
- To work out on the alternative development processes

UNIT I
INTRODUCTION TO OBJECT ORIENTED SYSTEMS

UNIT II
STATIC AND DYNAMIC MODELLING IN UML

UNIT III
OBJECT ORIENTED ANALYSIS
UNIT IV  OBJECT ORIENTED DESIGN – I

UNIT V  OBJECT ORIENTED DESIGN – II
View Layer: Designing Interface Objects – Purpose of View Layer Interface – Prototyping the User Interface – Case Studies: Inventory Control System; Library Management System; Hospital Management System; Online Examination System; Online Railway Reservation System

LIST OF EXPERIMENTS
1. Introduction to UML
2. Stock maintenance
3. Passport automation system
4. Book bank
5. Software personnel management system
6. E-ticketing
7. BPO Management System
8. Conference Management System

TOTAL: (45+30) 75 PERIODS

OUTCOMES:
CO1: Master the fundamental principles of Object Oriented programming.
CO2: Master key principles in Object Oriented analysis, design, and development.
CO3: Familiarize with the application of the Unified Modeling Language (UML) towards analysis and design.
CO4: Master common patterns in Object Oriented design and implement them.
CO5: Familiarize with alternative development processes.

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### XT3551 DATA WAREHOUSING AND MINING

**OBJECTIVES:**

- To create a clean, consistent repository of data within a data warehouse for large corporations
- To know the functionalities of data mining and preprocessing techniques
- To perform classification and prediction using various algorithms
- To familiarize the concepts of clustering and frequent itemset mining
- To expose outlier concepts and understand the applications of data mining and its trends

**UNIT I DATA WAREHOUSING & ONLINE ANALYTICAL PROCESSING**

Overview: Data Warehousing Architecture – Data Warehousing Components – Building a Data Warehouse - Data Warehousing schemas – Data Extraction, Cleanup, and Transformation Tools – Metadata - Multidimensional data model - Online Analytical Processing (OLAP) – Need for OLAP - Operations –OLAP Guidelines–Categories of OLAP tools– Patten and Models

**UNIT II KDD & DATA PREPROCESSING**


**UNIT III CLASSIFICATION AND PREDICTION**

Classification: Basic Concepts - Decision Tree Induction - Bayes Classification Methods - Rule-Based Classification - Model Evaluation and Selection - Techniques to Improve Classification Accuracy

**UNIT IV CLUSTERING AND FREQUENT ITEMSET MINING**

UNIT V  OUTLIER DETECTION, APPLICATIONS, AND TRENDS

Outlier Detection: Outliers and Outlier Analysis - Statistical Approaches - Proximity-Based Approach: Distance-based Outlier Detection – Clustering-Based Approaches - Classification-Based Approaches. Mining Complex Data Types - Other Methodologies of Data Mining - Data Mining Applications

LIST OF EXPERIMENTS
1. Creation of a data warehouse
2. Exploration of any two data mining tools
3. Exploration of Python packages for data mining task
4. Exercises related to Exploratory Data Analysis
5. Implementation of the Apriori Algorithm
6. Implementation of FP-Growth Algorithm
7. Implementation of Decision Tree
8. Implementation of Naïve Bayes
9. Implementation of K-means
10. Implementation of Hierarchical and DBSCAN clustering

TOTAL: (45+30) 75 PERIODS

OUTCOMES:
CO 1: Understand the need for a data warehouse and design an OLAP data model for real-time application.
CO 2: Preprocess the real-time data set.
CO 3: Perform mining by applying classification algorithms in the real-time dataset.
CO 4: Perform mining of frequent patterns and make decisions by performing clustering analysis.
CO 5: Able to detect anomalies in the real-time applications.

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OBJECTIVES:
- To understand the basics of web and HTML
- To understand the concepts of style sheets and XML
- To learn JavaScript to create interactive web pages
- To learn server-side programming using servlets and JSP
- To learn the PHP scripting

UNIT I  WEBSITE BASICS AND HTML

UNIT II  STYLE SHEETS AND XML
Style Sheets: CSS-Introduction to Cascading Style Sheets - Features - Core Syntax - Style Sheets and HTML - Style Rule Cascading and Inheritance - Text Properties - Box Model - Normal Flow Box Layout - Beyond the Normal Flow - CSS3.0. Basics of AJAX: Introduction to XML and its Application; Syntax Rules for creating XML document; XML Elements; XML Attributes; XML Tree; XML Namespace; XML schema languages: Document Type Definition (DTD); XML Schema Definition (XSD); XSD Simple Types; XSD Attributes; XSD Complex Types; XML Style Sheets (XSLT)

UNIT III  CLIENT-SIDE SCRIPTING WITH JAVASCRIPT
Structure of JavaScript Program; Variables and Data Types; Statements: Expression, Keyword, Block; Operators; Flow Controls, Looping, Functions; Popup Boxes: Alert, Confirm, Prompt; Objects and properties; Constructors; Arrays; Built-in Objects: Window, String, Number, Boolean, Date, Math, RegExp, Form, DOM; User Defined Objects; Event Handling and Form Validation, Error Handling, Handling Cookies, jQuery Syntax; jQuery Selectors, Events and Effects; Introduction to JSON

UNIT IV  SERVER-SIDE SCRIPTING WITH SERVLETS AND JSP

UNIT V  SERVER-SIDE SCRIPTING USING PHP
PHP Syntax, Variables, Data Types, Strings, Constants, Operators, Control structure, Functions, Array, Creating Class and Objects, PHP Forms, Accessing Form Elements, Form Validation, Events, Cookies, and Sessions, Working with PHP and MySQL, Connecting to Database, Creating, Selecting, Deleting, Updating Records in a table, Inserting Multiple Data, Introduction to CodeIgniter, Laravel, WordPress.

TOTAL: 45 PERIODS
OUTCOMES:
CO 1: Design simple web pages using markup languages like HTML and XHTML.
CO 2: Formatting the document using CSS and data using XML.
CO 3: Create dynamic web pages using DHTML and JavaScript that are easy to navigate.
CO 4: Program server-side web pages using Servlets and JSP that must process requests from client-side web pages.
CO 5: Design web pages using PHP with MySQL.

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XC3551 THEORY OF COMPUTATION
OBJECTIVES:
- To introduce finite state automata as language acceptor of regular sets
- To introduce context free grammars and context free languages and their normal forms
- To explain pushdown automata as the language acceptor of context-free language
- To demonstrate Turing machine as a mathematical model of language acceptor of recursively enumerable language and computer of computing number theoretic functions
- To explain the Chomsky hierarchy among the formal languages
UNIT I REGULAR SETS AND FINITE STATE AUTOMATA 12
Finite state automata - Deterministic and non-deterministic model – Languages accepted by Finite State Automata - Regular Expression - Pumping Lemma for regular set

UNIT II CONTEXT FREE LANGUAGE 12
Grammar - Context Free Grammars - Derivation trees - Simplification of context - Free grammar (only Construction and no proof of equivalence of grammars) - Chomsky normal Form - Greibach Normal Form

UNIT III PUSH DOWN AUTOMATA AND PROPERTIES OF CONTEXT FREE LANGUAGES 12
Pushdown automata - Push down automata and Context free languages - Pumping lemma for context free languages

UNIT IV TURING MACHINE AND UNDECIDABILITY 12
Turing Machine model - Computational languages and functions - Modifications of Turing machines (only description, no proof for theorems on equivalence of the modification) - Problems - Properties of recursive and recursively enumerable languages - Universal Turing Machine and the undecidable problem

UNIT V THE CHOMSKY HIERARCHY 12
Linear Regression - Method of Least Squares - Normal Regression Analysis - Normal correlation Analysis - Multiple Linear Regression

TOTAL: 60 PERIODS

OUTCOMES:
CO 1: Design finite state automata to accept regular sets.
CO 2: Form context free grammar to generate context free language and able to obtain its normal form.
CO 3: Design pushdown automata to accept a context free language.
CO 4: Design Turing machine to accept recursive enumerable language, to compute number theoretic functions and able to understand the limitation of Turing computing model.
CO 5: Understand overall set theoretical relationship of formal languages.

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XT3561 WEB TECHNOLOGY LABORATORY

LIST OF EXPERIMENTS
1. Design of static web pages in HTML
2. Creating and embedding a style sheet in an HTML document
3. Write an XML document to store information and display it in the browser
4. Creating dynamic web pages using JavaScript
5. Client-side validation of pages using JavaScript event handling mechanism
6. Dynamic creation of Node using DOM methods
7. Develop servlet with JDBC access
8. Manage session in JSP using cookies
9. Programming in PHP – Arrays, functions, Form handling
10. Cookies, Session Tracking, Database access with PHP and MySQL

TOTAL : 60 PERIODS

OUTCOMES:
CO 1 : Design simple web pages using markup languages like HTML and XHTML.
CO 2 : Formatting the document using CSS and data using XML.
CO 3 : Create dynamic web pages using DHTML and JavaScript that are easy to navigate.
CO 4 : Program server-side web pages using Servlets and JSP that must process requests from client-side web pages.
CO 5 : Design web pages using PHP with MySQL.

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OBJECTIVES:
- To introduce Linear Programming and their methods
- To provide Integer Programming Algorithms
- To give exposure to Non-Linear programming with applications
- To explain the significance of Decision and Game Theory
- To provide Dynamic Programming with applications

UNIT I  LINEAR PROGRAMMING  12
Introduction of OR - Formulation of linear programming models - assumptions of linear programming problems - Graphical solution – Solutions to LPP using simplex algorithm – Two phase method – Big M method - Transportation and Assignment problems

UNIT II  INTEGER PROGRAMMING  12
Introduction – Cutting plane Algorithm – Branch and Bound Algorithm – Zero-one Programming- Goal programming

UNIT III  NON-LINEAR PROGRAMMING  12
Lagrange multipliers – Equality constraints – Inequality constraints – Kuhn-Tucker conditions – Quadratic programming - Replacement models - Inventory Problems

UNIT IV  DECISION AND GAME THEORY  12
Decision making under certainty – Decision making under risk – Decision making under uncertainty – Decision tree analysis - Game Theory – Two person zero sum games, pure and mixed strategies – Theory of dominance - Graphical Solution – Solving by LP

UNIT V  DYNAMIC PROGRAMMING  12

OUTCOMES:
CO 1: Develop the skills to consider real-world problems and determine whether or not linear programming is an appropriate modeling framework.
CO 2: Understand of the role of algorithmic thinking in the solution of operations research problems.
CO 3: Able to build and solve Transportation Models and Assignment Models.
CO 4: Understand Operations Research models and apply them to real-life problems.
CO 5: Interpret the solutions and infer solutions to the real-world problems.

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XT3601 SOFTWARE PROJECT MANAGEMENT L T P C 3 0 0 3

OBJECTIVES:
- To develop an awareness of the need for project planning and management
- To explain the procedures needed to monitor and control
- To understand about the process improvements and report on quality
- To learn about the product metrics
- To understand about the quality metrics and management metrics

UNIT I OVERVIEW OF SOFTWARE PROJECT MANAGEMENT AND FRAMEWORK 9
Conventional software management - Evolution of software economics - Improving software economics - Conventional Vs Modern software project management. Lifecycle phases – Artifacts of the process - Model based software architectures - Workflows of the process - Checkpoints of the process

UNIT II SOFTWARE MANAGEMENT DISCIPLINES 9
Iterative process planning - Organization and Responsibilities - Process automation - Process control and process instrumentation - Tailoring the process. Project planning - Scheduling - Tracking and Control - Time and Cost overruns - Project organization - Staffing - Group working - Team dynamics

UNIT III MANAGED AND OPTIMIZED PROCESSES
Quality management and ISO 9000 quality assurance method - Configuration management - Quality reviews - Software standards - Tracking of defects - Process improvements - SCI/CMM models - Other process models - Data gathering and analysis Principles of data gathering - Data gathering process - Software measures - Data analysis - Managing software quality - Defect prevention

UNIT IV PRODUCT METRICS

UNIT V QUALITY METRICS AND MANAGEMENT METRICS

TOTAL : 45 PERIODS

OUTCOMES:
CO 1 : Develop project that matches the organizational needs to the most effective software development model.
CO 2 : Managing people and do effective communications among people and do effective planning to meet changes in software developmental stages.
CO 3 : Select and employ mechanisms for tracking the software projects and maintaining quality.
CO 4 : Develop the skills to apply the metrics for software product.
CO 5 : Develop the software project to apply quality and management metrics.

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OBJECTIVES:
- To introduce students to the basic concepts and techniques of Machine Learning.
- To have a thorough understanding of the Supervised and Unsupervised learning techniques.
- To study the various probability based learning techniques
- To understand graphical models of machine learning algorithms
- To work on real life case studies and process data sets to extract knowledge

UNIT I FOUNDATIONS AND LINEAR MODELS 9+6


UNIT II MODEL SELECTION AND BEYOND LINEARITY 9+6


UNIT III TREE BASED METHODS AND SVM 9+6


UNIT IV DEEP LEARNING 9+6


UNIT V UNSUPERVISED LEARNING AND CASE STUDIES 9+6
Unsupervised learning: Challenge of unsupervised learning – Principal component analysis – Missing values and matrix completion – Clustering methods: Partitional clustering – Hireachical
Practicals: 1) Unsupervised learning: PCA – Clustering. 2) Suitable Application Problems from Kaggle

TOTAL : (45+30) 75 PERIODS

OUTCOMES:
CO 1 : set up a well-defined learning problem for a given task
CO 2 : select and define a representation for data to be used as input to a machine learning algorithm
CO 3 : compare different algorithms according to the properties of their inputs and outputs
CO 4 : compare different algorithms in terms of similarities and differences in the computational methods used
CO 5 : develop and describe algorithms to solve a learning problem in terms of the inputs, outputs and computational methods used.

REFERENCES:
1. James, G., Witten, D., Hastie, T., Tibshirani, R., & Taylor, J., “An Introduction to Statistical Learning with applications in Python” (1st ed.). Springer. 2023
5. Shai Shalev-Shwartz and Shai Ben-David, “Understanding Machine Learning”, Cambridg University Press. 2017

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OBJECTIVES:
- To introduce asymptotic notations and growth of functions for understanding of running time of algorithms
- To explain the design of sorting algorithms with correctness and complexity
- To provide details of design, correctness and the complexity of fundamental Graph Algorithms
- To introduce string matching algorithms with correctness and complexity
- To explain classification of problems based on the computational complexity

UNIT I ANALYZING ALGORITHMS
Algorithms – Analyzing algorithms – Designing algorithms – Growth of functions Recurrences

UNIT II SORTING
Insertion sort – Quick sort – Divide and Conquer – Merge sort – Heap sort – Lower bounds for sorting

UNIT III GRAPH ALGORITHMS

UNIT IV STRING MATCHING
The naïve string matching algorithm – String matching with finite automata – The Knuth-Morris-Pratt algorithm

UNIT V NP COMPLETENESS

TOTAL: 60 PERIODS

OUTCOMES:
CO 1: Describe the complexity of algorithm with appropriate asymptotic notations.
CO 2: Use efficient sorting algorithms with comparison as the basic operation for solving sorting problems.
CO 3: Use the fundamental graph algorithms in solving optimization problems.
CO 4: Use efficient string matching algorithms in string matching problems.
CO 5: Able to recognize the complexity class of the given computational problems.

REFERENCES:
XC3652

CLOUD COMPUTING

L T P C
3 0 0 3

OBJECTIVES:
- To introduce the working structure of distributed computing
- To understand the process of virtualization
- To understand virtualization management with respect to storage and networks
- To familiarize the cloud platform architecture
- To have an overview on cloud storage providers

UNIT I  BASICS OF DISTRIBUTED COMPUTING
Introduction to Distributed computing – Models of distributed computation - Message Ordering and Group Communication; Termination Detection Reasoning with Knowledge; Distributed Mutual Exclusion - Deadlock Detection- Global Predicate Detection; Distributed Shared Memory

UNIT II  VIRTUALIZATION

UNIT III  VIRTUALIZATION MANAGEMENT
Management Virtualization – Hardware Maximization – Architecture - Virtual Workloads - Implementation levels of virtualization – virtualization structure – virtualization of CPU, Memory and I/O devices – virtual clusters and Resource Management – Virtualization for data centre automation

UNIT IV  CLOUD PLATFORM ARCHITECTURE
UNIT V CLOUD STORAGE AND SECURITY

Overview of cloud storage - Cloud storage providers - Cloud Software Environments - Eucalyptus, Open Nebula, Open Stack, Nimbus - Cloud Infrastructure security: network, host and application level – aspects of data security, provider data and its security, Identity and access management architecture, IAM practices in the cloud - Key privacy issues in the cloud – Cloud Security and Trust Management

OUTCOMES:
CO 1: Understand the basics of distributed computing.
CO 2: Gain knowledge on virtualization.
CO 3: Understand and apply storage and network virtualization.
CO 4: Develop new cloud platform architectures.
CO 5: Work with cloud storage providers using real time scenarios.

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OBJECTIVES:
- This course provides a sound and rigorous treatment of the basic principles for a proper understanding of the subject matter and for confidence in applying these principles to practical problem solving.
- This course provides a solid undergraduate foundation in Time series Analysis and provides an indication of the relevance and importance of the theory in solving real world problems.
- To enable the students to use the concepts of multivariate normal distribution and principle components analysis.
- To provide information about Estimation theory and regression lines.
- To enable the students to use the concepts of design of experiments and factorial design.

UNIT I  NONPARAMETRIC TESTS  12

UNIT II  DESIGN OF EXPERIMENTS  12
Analysis of Variance - One-way and two-way Classifications - Completely Randomized Design - Randomized Block Design - Latin Square Design – $2^2$ Factorial Design – Taguchi’s Robust Design

UNIT III  STATISTICAL QUALITY CONTROL  12
Control charts for measurements ($\bar{X}$ and R charts) – Control charts for attributes (p, c and np charts) Tolerance limits — Acceptance sampling

UNIT IV  TIME SERIES  12
Components of Time Series – Analysis of Time series – Measurement of Trend – Measurement of Seasonal Fluctuations

UNIT V  MULTIVARIATE ANALYSIS  12
Random vectors and Matrices - Mean Vector and Covariance Matrices - Partitioning of Covariance Matrices - Combination of Random Variables for Mean Vector and Covariance Matrix - Multivariate, Normal Density and its Properties - Principal Components: Population principal components - Principal components from standardized variables

TOTAL : 60 PERIODS

OUTCOMES:
CO 1: The ability to use the appropriate and relevant, fundamental and applied mathematical and statistics knowledge and methodologies in solving practical problems.
CO 2: The ability to bring together and flexibly apply knowledge to characterise, analyse and solve a wide range of problems.
CO 3: An understanding of the balance between the complexity/accuracy of the mathematical/statistical models used and the timeliness of the delivery of the solution.
CO 4: Critical thinking based on empirical evidence and the scientific approach to knowledge development.
CO 5: The students can independently participate in the processes of analysis, planning, formulating strategies of development, decision-making, governing and management, and independent making of tactical and strategic decisions related to the statistics.
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XT3801 ADVANCED NETWORKS

OBJECTIVES:
- To learn about the principles and practices of advanced computer networking concepts
- To understand the importance of Quality of Service in IP networks
- To explore the need for IPv6 and manage the MPLS technology in networks
- To learn about SDN architecture and OpenFlow for network virtualization
- To gain an in-depth knowledge of Network Virtualization Functions

UNIT I INTRODUCTION TO NETWORKS
UNIT II   QUALITY OF SERVICE  

UNIT III  _IPV6 and MPLS  

UNIT IV   SOFTWARE DEFINED NETWORKING  

UNIT V   NETWORK FUNCTION VIRTUALIZATION  
NFV Concepts and Architecture – Virtualization and Data Plane I/O – Service Locations and Chaining – Functionality – Management – Use Cases of SDNs: Data Centers, Overlays, Big Data

TOTAL : 45 PERIODS

OUTCOMES:
CO 1 : Explain the advancements in Ethernet Technologies.
CO 2 : Configure and manage different concepts of QoS polices in IP networks.
CO 3 : Configure and manage the Ipv6 addressing based network and Design a MPLS based network and able to provide QoS, TE services.
CO 4 : Implement the SDN concepts and manage SDN controller.
CO 5 : Explain network function virtualization techniques and apply the emerging technologies for various case studies.

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OBJECTIVES:
- To know about the basic functions of management and organization environment
- To understand the growth of industries and different forms of business organizations
- To understand the group and organizational behavior
- To study globalization and workforce diversity in management
- To study the introduction of Human Resource Management

UNIT I PRINCIPLES OF MANAGEMENT
Meaning, Definition and Significance of Management, Basic Functions of Management – Planning, Organizing, Staffing, Directing and Controlling. Organizational Environment – Social, Economic, Technological and Political. Corporate Social Responsibility

UNIT II INDUSTRIAL AND BUSINESS ORGANIZATION
Growth of Industries (Small, Medium, and Large Scale Industries). Forms of Business Organizations. Resource Management – Internal and External Sources

UNIT III GROUP AND ORGANIZATIONAL BEHAVIOUR
Group dynamics, Group formation and development, group structure, and group cohesiveness. Informal organization – Sociometry – Interaction analysis, Significance of OB, Impact of culture on an organization. Role of leadership and leadership styles. Personality and Motivational Theories. Attitudes, Values, and Perceptions at Work

UNIT IV GLOBALISATION

UNIT V HUMAN RESOURCE MANAGEMENT
Objectives and Functions, Selection and Placement, Training and Development – Conflict management – Stress management - Human resource management in a global environment - Human resource information system (HRIS) - Case discussion

TOTAL: 45 PERIODS

OUTCOMES:
CO 1: Have knowledge of basic functions of management.
CO 2: Have knowledge on small, medium and large scale industries growth.
CO 3: Have knowledge on group dynamics and leadership role.
CO 4: Acquire the information about the globalization and cross-cultural management.
CO 5: Acquire the knowledge on Human Resource Management.

REFERENCES:
XC3851 ARTIFICIAL INTELLIGENCE L T P C
3 0 0 3

OBJECTIVES:
- To know about the basics of Artificial Intelligence
- To learn about the different search strategies in AI
- To learn about Knowledge representation techniques
- To learn about intelligent computing algorithms
- To learn to represent knowledge in solving AI problems

UNIT I BASICS OF ARTIFICIAL INTELLIGENCE 9

UNIT II SEARCHING STRATEGIES 9

UNIT III KNOWLEDGE REPRESENTATION 9
Types of Knowledge – Role of Knowledge – Semantic Nets – Frames – Propositional Logic – Predicate Logic – Semantic Web – Computational Knowledge Discovery – Ontology – Communication of Knowledge – Common Sense

UNIT IV INTELLIGENT COMPUTING 9

UNIT V INTELLIGENT AGENTS 9

TOTAL : 45 PERIODS
OUTCOMES:
CO 1: Understand the different AI systems.
CO 2: Use appropriate search algorithms for any AI problem.
CO 3: Represent a problem using first order and predicate logic.
CO 4: Provide the appropriate agent strategy to solve a given problem.
CO 5: Design software agents to solve a problem.

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XT3852 CYBER SECURITY L T P C
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OBJECTIVES:
- To learn about cyber security, types of attacks, and fighting against them
- To learn about ML-based techniques for signature and anomaly detection
- To understand the intrusion detection and prevention system
- To have in-depth knowledge of Reconnaissance attacks and their detection method
- To have the knowledge about detection strategy of botnets and insider attacks

UNIT I INTRODUCTION TO CYBER SECURITY
UNIT II ML FOR SIGNATURE & ANOMALY DETECTION

UNIT III INTRUSION DETECTION AND PREVENTION

UNIT IV RECONNAISSANCE

UNIT V BOTNETS AND INSIDER THREATS
Botnet topologies, botnet detection using NetFlow analysis - Botnet detection using DNS analysis. Introduction to insider threats, Insider threat profiles - masquerader detection strategies - Using honey tokens for insider threat

OUTCOMES:
CO 1: Categorize the types of attacks and know the procedure to overcome them.
CO 2: Apply Machine Learning techniques for signature and anomaly-based detections.
CO 3: Apply intrusion techniques to detect and prevent the system from attacks.
CO 4: Solve the issues related to detecting of Reconnaissance attacks.
CO 5: Have in-depth knowledge about botnets and insider attacks.

REFERENCES:

TOTAL: 45 PERIODS
XC3861  STATISTICAL PROGRAMMING LABORATORY USING R AND PYTHON

List of Experiments:
1. Implementation of the following problems using Statistical Packages:
   - Classification and tabulation of data and Graphical and diagrammatic presentation of data.
2. Perform calculations that measure the central tendency and dispersion of data and Implementation of measures of Skewness, moments, and kurtosis.
3. Determination of point and interval estimates.
5. Solving the problems based on Time series analysis and forecasting and implementing statistical quality control charts.

TOTAL : 60 PERIODS

OUTCOMES:
CO 1 : Implementation of statistical packages.
CO 2 : Implementation of skewness, kurtosis and moments.
CO 3 : Implementation of intervals.
CO 4 : Implementation of regression functions.
CO 5 : Implementation of time series analysis.

CO – PO Mapping:
OBJECTIVES:
- To provide the mathematical foundations of numerical techniques for solving Eigenvalue problems and linear system of equations.
- To apply the techniques of interpolation for equal and unequal intervals for the given data.
- To understand and apply the techniques of numerical integration and differentiation for solving ODE in applying day-to-day life.
- To be familiar with solving initial value problems and ODE for given initial and boundary conditions.
- To demonstrate the utility of Numerical techniques for solving Partial Differential Equations in Heat and Fluid problems.

UNIT I   SOLUTION OF EQUATIONS AND EIGEN VALUE PROBLEMS
- Iterative method and Newton-Raphson method for Algebraic and Transcendental Equations.
- Solutions of linear system by Gaussian, Gauss-Jordan, Jacobi and Gauss-Seidel methods.
- Inverse of a matrix by Gauss-Jordan method.
- Eigen value of a matrix by Power methods.

UNIT II   INTERPOLATION
- Newton’s divided difference formula, and Lagrange’s formula.
- Newton’s forward and backward difference formulae, Natural Cubic Spline.

UNIT III   NUMERICAL DIFFERENTIATION AND INTEGRATION
- Numerical differentiation with interpolating polynomials.
- Numerical integration by Trapezoidal and Simpson’s 1/3rd rule.
- Double integrals using Trapezoidal and Simpson’s rules.

UNIT IV   INITIAL VALUE PROBLEMS FOR ORDINARY DIFFERENTIAL EQUATIONS
- Single Step Methods-Taylor Series Euler and Modified Euler, methods for first order differential equations.
- Runge-Kutta method of order four for first and second order differential equations.
- Multistep Methods – Milne and Adam’s Bash for the predictor and corrector methods for first-order differential equations.

UNIT V   BOUNDARY VALUE PROBLEMS FOR ORDINARY AND PARTIAL DIFFERENTIAL EQUATIONS
- Finite difference solution for the second order ordinary differential equations.
- Finite difference solution for one-dimensional heat equation (explicit scheme), one-dimensional wave equation.
- Finite difference solution for two-dimensional Laplace and Poisson equations.

OUTCOMES:
- CO 1: Demonstrate the understanding of common numerical methods and how they are used to obtain approximate solutions to the algebraic and transcendental equations.
- CO 2: Apply numerical methods to obtain approximate solutions to mathematical problems using interpolation.
- CO 3: Derive numerical methods for various mathematical operations and tasks, such as interpolation, differentiation, integration, the solution of linear and nonlinear equations, and the solution of differential equations.
- CO 4: Analyse and evaluate the accuracy of common numerical methods in solving ODE of first and second-order equations.
- CO 5: Understand various numerical techniques for solving PDE, for given conditions in Heat and fluid flow problems.
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OBJECTIVES:
- To have an introductory knowledge about IoT architecture
- To understand the communication technologies used in IoT
- To have a broad understanding of architectures, protocols and IoT levels
- To understand the importance of security in IoT
- To analyze applications of IoT in real time scenario

UNIT I
IoT ARCHITECTURE
Functional Requirements - IoT Enabling Technologies – IPv6 - Basic Architecture – Components of IoT: Embedded Computation Units, Microcontrollers, System on Chip (SoCs) - Sensors – Actuators – Communication Interfaces

UNIT II
RF COMMUNICATION TECHNOLOGIES INIoT
UNIT III  APPLICATION LAYER PROTOCOLS IN IoT


UNIT IV  SECURITY IN IoT


UNIT V  PROTOTYPING & APPLICATIONS OF IOT


TOTAL : 45 PERIODS

OUTCOMES:
CO 1 : Have an introduction to IoT architecture.
CO 2 : Understand the communication technologies used in IoT.
CO 3 : Have a broad understanding of architectures, protocols and IoT levels.
CO 4 : Understand the importance of security in IoT.
CO 5 : Analyze applications of IOT in real time scenario.

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OBJECTIVES:
- To learn the fundamentals of data modeling and design in advanced databases
- To study the working principles of distributed databases
- To have an introductory knowledge about the query processing in Object-based databases and its usage
- To understand the basics of Spatial and temporal Databases and their applications
- To learn emerging databases such as XML, Data warehouse and NoSQL

UNIT I DISTRIBUTED DATABASES
Distributed Systems – Introduction – Distributed Databases Vs Conventional Databases - Architecture; Distributed Database Concepts - Distributed Data Storage – Distributed Transactions – Commit Protocols – Concurrency Control – Distributed Query Processing

UNIT II NoSQL DATABASES

UNIT III ADVANCED DATABASE SYSTEMS

UNIT IV XML AND DATA WAREHOUSE

UNIT V INFORMATION RETRIEVAL AND WEB SEARCH

LAB EXERCISES:
1. Create a distributed database using horizontal and vertical fragmentation in any DBMS.
2. Creation of distributed queries using the fragmented data created.
3. Create a document based database using MongoDB and manipulate the data.
4. Create a data warehouse and perform OLAP operations of Data Cube Pivoting, Rollup display, Drill-down display in an unstructured data environment.
5. Create a database to store multimedia elements and perform data retrieval operations.
6. Create a temporal database and explore the usage of temporal queries in it.
8. Given an XML document, traverse the document using DOM and SAX parser.
9. Design a web crawler to extract the information from the websites containing product reviews and classify the reviews as either positive or negative.
10. Create an information retrieval system which processes the corpus of documents and create TF/IDF for the keywords extracted from the documents. Create an inverted index to enable an efficient retrieval process.

TOTAL : (45+30)75 PERIODS
OUTCOMES:
CO 1 : Design a distributed database system and execute distributed queries.
CO 2 : Use NoSQL database systems and manipulate the data associated with it.
CO 3 : Have knowledge on advanced database system concepts.
CO 4 : Design a data warehouse system and apply OLAP operations.
CO 5 : Design XML database systems and validating with XML schema and Have knowledge on information retrieval concepts and apply it in web databases.

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XC3951 MULTIMEDIA TECHNOLOGIES L T P C
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OBJECTIVES:
- To learn about the building blocks of multimedia
- To get exposure in various compression algorithms
- To get familiar with multimedia applications in recent trends
- To study about how to create various content in augmented reality
- To study about interfaces used in virtual reality systems

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Progress through Knowledge

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Centre for Academic Courses
Anna University, Chennai-600 025
UNIT I MULTIMEDIA BASICS

UNIT II AUTHORING TOOLS & DATA COMPRESSION

UNIT III MULTIMEDIA APPLICATIONS
Multimedia Databases – Content Based Information Retrieval, Multimedia Communications - Multimedia Information Sharing and Retrieval – Applications – Social Media Sharing, Online Social Networking - Virtual Reality - Multimedia for Portable Devices, Collaborative Multimedia Applications

UNIT IV AUGMENTED REALITY CONTENT
Augmented Reality – Relationship between augmented reality and other technologies – Augmented reality concepts – major hardware components for augmented reality systems – major software components for augmented reality systems - Contents of augmented reality - creating visual content – creating audio content – Interaction in Augmented Reality – Mobile Augmented Reality – Augmented Reality Applications

UNIT V VIRTUAL REALITY KEY ELEMENTS & SYSTEMS

TOTAL: 45 PERIODS

OUTCOMES:
CO 1 : Understand working basic elements of multimedia.
CO 2 : Use and apply authoring tools for web and e-learning.
CO 3 : Implement various multimedia applications.
CO 4 : Develop contents for augmented reality applications.
CO 5 : Apply monitoring techniques in virtual reality systems.

REFERENCES:


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**XT3961**

**INTERNET OF THINGS LABORATORY**

**L T P C**

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**LIST OF EXPERIMENTS**

Working with Arduino – configuring basic sensors – getting data from sensors – processing the data

– Working with Raspberry Pi – Activating lights/actuators/motors based on the sensor data

Suggested list of applications:

1. Automatic Street Lighting system.
2. Smart Water Monitoring system.
3. Automatic Smart Parking system.
4. Multi Room Music Player using IoT.
5. Smart Home Monitoring system.

**TOTAL: 60 PERIODS**

**OUTCOMES:**

CO 1 : Hands on with Arduino board.
CO 2 : Hands on with Raspberry Pi.
CO 3 : Configuration of basic sensors.
CO 4 : Processing of sensor data.
CO 5 : Develop IoT application for real world scenarios.

**CO-PO Mapping:**

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OBJECTIVES:
- To gain knowledge of MANET and routing mechanisms
- To gain knowledge of the 802.11 Wireless LAN (Wi-Fi) and Bluetooth standards
- To gain knowledge of routing mechanisms and the three classes of approaches: proactive, on-demand and hybrid
- To gain knowledge about wireless sensor nodes
- To gain knowledge about energy management and security mechanism in ad-hoc sensor network

UNIT I  INTRODUCTION TO MANET AND ROUTING  
Introduction to MANET – Applications of MANETS – Challenges – Routing – Unicast – Proactive – reactive – Position-based and QoS routing – Multicasting and Geocasting

UNIT II  ADHOC MAC LAYERS  
MAC LAYER – IEEE 802.11 (for wireless LANs) – IEEE 802.15 – Bluetooth technology – Wireless Mesh Networks

UNIT III  ADHOC TRANSPORT LAYERS  
Cognitive Radio and Networks – TCP over ADHOC Networks – Applications of sensor networks – Necessity for mesh networks – Heterogeneous mesh networks – Vehicular mesh networks

UNIT IV  SENSOR NETWORKS  

UNIT V  ENERGY MANAGEMENT AND SECURITY  
Need for Energy management – Classification of Energy management schemes – Battery management and Transmission power management schemes – Network layer and Data link layer solutions - System power management schemes - Security in Ad hoc and sensor networks – Integrating MANETS WLAN and Cellular networks

TOTAL: 45 PERIODS

OUTCOMES
CO 1: Understand the principles of mobile Adhoc networks (MANETs) and what distinguishes them from infrastructure-based networks.
CO 2: Understand the 802.11 Wireless LAN (WiFi) and Bluetooth standards.
CO 3: Understand how routing protocols function and their implications on data transmission delay and bandwidth consumption.
CO 4: Have an understanding of the principles and characteristics of wireless sensor networks (WSNs).
CO 5: Understand the energy management of sensor nodes and ensure security on it.

REFERENCES:
OBJECTIVES:

- Introduce big data analytics concepts, its life cycle, challenges, application areas, tools and platforms
- To study classification and clustering techniques for analyzing big data
- To introduce analytical theory and methods and recommendation system
- To study in detail about Hadoop and data management for big data
- To know about graphical analysis for big data using case studies

UNIT I  INTRODUCTION TO BIG DATA ANALYTICS

UNIT II  ADVANCED ANALYTICAL THEORY AND METHODS

UNIT III  ASSOCIATION AND RECOMMENDATION SYSTEM

UNIT IV  HADOOP AND NoSQL DATA MANAGEMENT FOR BIG DATA

UNIT V  GRAPH ANALYTICS AND CASE STUDY

OUTCOMES:

CO 1: Work with big data tools and its analysis techniques.
CO 2: Design efficient algorithms forming the data from large volumes.
CO 3: Design an efficient recommendation system.
CO 4: Learn NoSQL databases and management.
CO 5: Design the tools for visualization.
REFERENCES:

XC3072 BIO-INSPIRED COMPUTING

OBJECTIVES:
- To learn bio-inspired theorem and algorithms
- To understand random walk and simulated annealing
- To learn genetic algorithm and differential evolution
- To learn swarm optimization and ant colony for feature selection
- To understand bio-inspired application in image processing

UNIT I INTRODUCTION

UNIT II RANDOM WALK AND ANEALING

UNIT III GENETIC ALGORITHMS AND DIFFERENTIAL EVOLUTION
Introduction to genetic algorithms and - role of genetic operators - choice of parameters - GA variants - schema theorem - convergence analysis - introduction to differential evolution - variants - choice of parameters - convergence analysis – implementation

UNIT IV SWARM OPTIMIZATION AND FIREFLY ALGORITHM
Swarm intelligence - PSO algorithm - accelerated PSO - implementation - convergence analysis - binary PSO - The Firefly algorithm - algorithm analysis - implementation - variants - Ant colony optimization toward feature selection

Attested

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UNIT V  APPLICATION IN IMAGE PROCESSING


TOTAL : 45 PERIODS

OUTCOMES:
CO 1 : Implement and apply bio-inspired algorithms.
CO 2 : Understand the random walk and simulated annealing strategies.
CO 3 : Implement and apply evolutionary algorithms.
CO 4 : Recognize and apply swarm intelligence and ant colony for feature selection.
CO 5 : Apply bio-inspired techniques in image processing.

REFERENCES:

XT3072  BLOCKCHAIN TECHNOLOGIES

OBJECTIVES:
- To understand Blockchain’s fundamental components, and examine decentralization using blockchain
- To explain how cryptocurrency works, from when a transaction is created to when it is considered part of the Blockchain
- To explain the components of Ethereum and the programming languages for Ethereum
- To study the basics of Hyperledger and Web3
- To know about alternative Blockchains and Blockchain projects in different domains

UNIT I  INTRODUCTION TO BLOCKCHAIN

History of Blockchain – Types of Blockchain – Consensus – Decentralization using Blockchain – Blockchain and Full Ecosystem Decentralization – Platforms for Decentralization

UNIT II  INTRODUCTION TO CRYPTOCURRENCY

UNIT III  ETHEREUM

The Ethereum Network – Components of Ethereum Ecosystem – Ethereum Programming Languages: Runtime Byte Code, Blocks and Blockchain, Fee Schedule – Supporting Protocols – Solidity Language

UNIT IV  WEB3 AND HYPERLEDGER


UNIT V  ALTERNATIVE BLOCKCHAINS AND NEXT EMERGING TRENDS


TOTAL: 45 PERIODS

OUTCOMES:
CO 1: Understand the technology components of Blockchain and how it works behind the scenes.
CO 2: Identify different approaches to developing decentralized applications.
CO 3: Understand Bitcoin and its limitations by comparing it with other alternative coins.
CO 4: Devise a solution using the Ethereum model.
CO 5: Understand and use Hyperledger and its development framework.

REFERENCES:

XC3073  COMPUTATIONAL FINANCE

OBJECTIVES:
- To get introduced to the basics of computational finance
- To familiarize with the mathematical preliminaries
- To understand portfolio theory
- To get an overview of basic options theory
- To understand capital asset pricing and risk budgeting

TOTAL: 45 PERIODS
UNIT I INTRODUCTION TO COMPUTATIONAL FINANCE
Law of one price – Risk neutral pricing – Arbitrage and Hedging – Financial Products and capital markets – Futures, Forwards and options – Options pricing problem and three types of solutions

UNIT II MATHEMATICAL PRELIMINARIES
Conditional expectation – Sigma Algebra – Filtrations, Time series analysis - Covariance stationary – autocorrelations - MA(1) and AR(1) models, Stochastic Calculus - Random walk – Brownian motion – Martingales – Ito’s Lemma

UNIT III PORTFOLIO THEORY
Introduction - Portfolio theory with matrix algebra - Review of constrained optimization methods, Markowitz algorithm, Markowitz Algorithm using the solver and matrix algebra – Portfolio choice and linear pricing – Statistical analysis of efficient portfolios

UNIT IV BASIC OPTIONS THEORY

UNIT V THE CAPITAL ASSET PRICING (CAP) AND RISK BUDGETING
Mean variance portfolio theory – Asset returns – Variance as a risk measure - The one and two fund theorems, The capital market line – CAP as a pricing formula – Systematic and unsystematic risk – Euler’s theorem – Asset contributions to volatility – beta as a measure of portfolio risk , Limitations of mathematical models in finance

TOTAL : 45 PERIODS

OUTCOMES:
CO 1 : Introduce to the basics of computational finance
CO 2 : Familiarize with the mathematical preliminaries
CO 3 : Understand portfolio theory
CO 4 : Get an overview of basic options theory
CO 5 : Understand capital asset pricing and risk budgeting

REFERENCES:

XT3073 COMPUTER GRAPHICS

OBJECTIVES:
• To know the mathematical basis of computer graphics
• To train the students to acquire knowledge in Computer Graphics modeling, animation, and rendering
• To create graphical applications
• To acquire knowledge about tools and technologies related to graphics
• To create visually realistic animations

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UNIT I  INTRODUCTION TO COMPUTER GRAPHICS  9
Primitives – Line Drawing Algorithms DDA and Bresenham – Windows and Viewports – Clipping
Algorithms for Lines, Regular Polygons, Circles and Arcs – Parametric Form for a Curve – Visibility
Algorithms – Review of Vectors – Representations of Key Geometric Objects – Lines And Planes

UNIT II  MODELING AND TRANSFORMATION OF OBJECTS  9
Introduction to Transformations – Two Dimensional Transformations – 3D Affine Transformations –
Homogeneous Coordinates – Matrix Representation – Drawing 3D Scenes Interactively –
Introduction to Solid Modeling with Polygonal Meshes – Mesh Approximations to Smooth Objects –
Particle Systems and Physically Based Systems

UNIT III  VIEWING AND VISUAL REALISM  9
Three-Dimensional Viewing – Hidden Surface Removal – Illumination Models-Depth Cueing –
Perspective Projections of 3D Objects – Introduction to Shading Models – Flat Shading and Smooth
Shading – Adding Texture to Faces – Morphing – To Add Shadows of Objects – OPENGL Shading
Language – Manipulating Pixmaps – Manipulating Symbolically Defined Regions – Aliasing and Anti
Aliasing Techniques – Creating More Shades and Colours

UNIT IV  SURFACE DESIGN  9
Describing Curves using Polynomials – Bezier Curves – Blending Functions – The B-Spline Basis
Functions – Modeling Curved Surfaces – Rational Splines and NURBS – Interpolation – Modeling
Curved Surfaces – Color Theory – Overview of the Ray Tracing Process – Intersecting Rays with
other Primitives – Adding Shadows for Greater Realism – Reflections and Transparency – Boolean
Operations on Objects – Ray Casting

UNIT V  ANIMATIONS  9
Design of Animation Sequence – Animation Function – Raster Animation – Key Frame Systems –
Motion Specification – Morphing – Tweening – Types of Animation – Fractals – Tools for Animation
Creations

TOTAL: 45 PERIODS

OUTCOMES:
CO 1 : Articulate the concepts and techniques used in three-dimensional graphics.
CO 2 : Understand and Implement algorithms related to graphics creation.
CO 3 : Design and model graphical structures.
CO 4 : Understand and comprehend the graphical algorithms.
CO 5 : Design and develop simple and realistic animations.

REFERENCES:
OBJECTIVES:

- To understand the basics and applications of database systems in real-world scenarios.
- To learn the various roles in database administration and basic issues of transaction processing.
- To understand data and storage management.
- To learn the database recovery and performance tuning of database systems.
- To study user management and database security.

UNIT I: CREATING THE DATABASE ENVIRONMENT

DBMS Architectures-DBMS Clustering-DBMS Proliferation-Hardware Issues - Cloud Database Systems-Installing the DBMS-DBMS Installation Basics-Hardware Requirements-Storage Requirements-Memory Requirements -Configuring the DBMS-Installing and upgrading various database packages (MS SQL Server, Oracle, MySQL)-Connecting the DBMS to Supporting Infrastructure Software-Installation Verification-Database standards and Procedures.

UNIT II: DATABASE PROCESS


UNIT III: DATA AND STORAGE MANAGEMENT


UNIT IV: BACKUP AND MAINTENANCE


UNIT V: USER MANAGEMENT AND DATABASE SECURITY


OUTCOMES:

CO 1: Impart the knowledge to use of different definition language to write query for a database.

CO 2: Understand the role of various database users including database administrator.

CO 3: Examine the fragmentation, loading and unloading of data.

CO 4: Understand the techniques for data backup and maintenance.

CO 5: Learn the user management, controlling and auditing user access of database.

TOTAL : 45 PERIODS
REFERENCES:

XT3075 DATABASE TUNING

OBJECTIVES:
- To get the feel of basics of database tuning
- To learn concepts behind database design optimization
- To write procedures involving query planning
- To understand how troubleshooting is done
- To formulate new indexing methods

UNIT I FUNDAMENTALS OF TUNING

UNIT II INDEX TUNING
Indexes – Clustering Indexes – Non Clustering Indexes – Composite Indexes – Comparison of Indexing and Hashing techniques – Hot Table – Storage Structure Optimization through Index Tuning

UNIT III DESIGN AND QUERY OPTIMIZATION
Tuning Relational Systems – Normalization – Tuning De-normalization – Clustering Two Tables – Aggregate Maintenance – Record Layout –Triggers – Client Server Mechanisms – Types of Queries –Query Tuning

UNIT IV INTERFACE AND CONNECTIVITY TUNING
Objects, Application Tools and Performance –Tuning the Application Interface – Bulk Loading Data – Accessing Multiple Databases – ODBC – JDBC Tuning — Case Studies: Tuning E-Commerce Application– Data Warehouse Tuning

UNIT V TROUBLESHOOTING

TOTAL : 45 PERIODS
OUTCOMES:
CO 1 : Design databases involving normalization.
CO 2 : Write optimized code for accessing multiple databases.
CO 3 : Use tuning tools for different database operations.
CO 4 : Troubleshoot database issues.
CO 5 : Use benchmark databases for demonstrating concepts behind database tuning.

REFERENCES:

OBJECTIVES:
- To know the fundamental concepts of data science and analytics
- To learn fundamental data analysis using R
- To understand various data modeling techniques
- To learn the basic and advanced features of open source big data tools and frameworks
- To study various analytics on stream data

UNIT I
INTRODUCTION TO DATASCIENCE AND BIG DATA

UNIT II
DATA ANALYSIS USING R

UNIT III
DATA MODELING
UNIT IV  DATA ANALYTICAL FRAMEWORKS  9

UNIT V  STREAM ANALYTICS  9

TOTAL : 45 PERIODS

OUTCOMES:
CO 1 : Convert real world problems to hypothesis and perform statistical testing.
CO 2 : Work with big data platform and its analysis techniques.
CO 3 : Select and employ mechanisms for tracking the software projects and maintaining quality.
CO 4 : Write efficient MapReduce programs for small problem-solving methods.
CO 5 : Implement suitable data analysis for stream data.

REFERENCES:

XC3074  DEEP LEARNING  L T P C
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OBJECTIVES:
- To provide the mathematical and computational demands of building neural networks
- To study the concepts of convolution neural network (CNN) and its architecture
- To introduce the sequence modelling using recurrent neural network (RNN)
- To understand the various challenges involved in designing deep learning algorithms for varied applications
- To apply deep learning techniques for real time applications

UNIT I  FOUNDATIONS OF DEEP NETWORKS  9
UNIT II  CONVOLUTIONAL NEURAL NETWORKS (CNNs)
Convolutional Operation, Motivation, Pooling layers, Fully connected layers, A complete CNN architecture: AlexNet - VGG - Inception - ResNet, Training a Convnet: weights initialization - batch normalization - hyperparameter optimization

UNIT III  SEQUENCE MODELING USING RECURRENT NETS
Recurrent Neural Networks (RNN), Bidirectional RNNs, Encoder-Decoder sequence-to-sequence architectures, Deep RNNs, Recursive NN, Challenge of long-term dependencies, Long Short-term Memory (LSTM) and other Gated RNNs

UNIT IV  DEEP LEARNING RESEARCH
Linear Factor Models, variants of Autoencoders, Representational Learning, Structured probabilistic models for deep learning, Monte Carlo Methods, Generative adversarial networks - Deep generative models

UNIT V  APPLICATIONS OF DEEP LEARNING
Case studies (one in each) in Computer Vision, Speech Processing, Natural Language Processing

TOTAL: 45 PERIODS

OUTCOMES:
CO 1: Understanding the basics concepts of deep learning.
CO 2: Understanding of CNN and RNN to model for real world applications.
CO 3: Emphasizing knowledge on various deep learning algorithms.
CO 4: Analyse the deep learning algorithms which are more appropriate for various types of learning tasks in various domains.
CO 5: Solve real-world problems by implementing deep learning algorithms.

REFERENCES:

XC3075  DIGITAL IMAGE PROCESSING  L T P C
3 0 0 3

OBJECTIVES:
- To learn the fundamental concepts and applications of Digital Image Processing
- To study about various Filters and its types
- To understand segmentation and feature analysis processes
- To understand various compression techniques
- To learn about image processing applications in recent trends
UNIT I  FUNDAMENTALS OF IMAGE PROCESSING  

UNIT II  IMAGE ENHANCEMENT  

UNIT III  IMAGE RESTORATION AND MULTiresolution ANALYSIS  

UNIT IV  IMAGE SEGMENTATION AND FEATURE ANALYSIS  

UNIT V  APPLICATIONS OF IMAGE PROCESSING  

TOTAL : 45 PERIODS

OUTCOMES:
CO 1 : Understand the fundamentals of image and implement basic image processing operations.
CO 2 : Apply filtering techniques in the areas of image enhancement.
CO 3 : Apply image restoration algorithms and analyze the image.
CO 4 : Understand the image segmentation algorithms and extract features from images.
CO 5 : Apply image processing techniques in various fields.

REFERENCES:
OBJECTIVES:
- To get an overview about e-learning
- To understand the importance of psychological background in e-learning
- To completely understand the models of e-learning
- To get updated about the recent trends in e-learning
- To familiarize with the current technologies in e-learning

UNIT I Concept of E-Learning

UNIT II Psychological Background in E-Learning

UNIT III Models of E-Learning
Role of Web-Based Instruction in Learning – Definition, Models of Instructional Design: ISD Model & Hyper Media Design Model (HMD) – Tools for web based instruction

UNIT IV Trends in E-Learning
Challenges of Distance Education – Electronic Media in Distance Education – Open Educational Resources – Internet in Distance Education – Virtual University System, E-Patashala, E-Content Development by Indian Institutions

UNIT V Current Technologies in E-Learning
Augmented Reality, Artificial Intelligence, Internet of Things, Learning Management System, School Management systems, cloud computing, remote virtual laboratories

OUTCOMES:
CO 1: Get an overview about e-learning.
CO 2: Understand the importance of psychological background in e-learning.
CO 3: Completely understand the models of e-learning.
CO 4: Get updated about the recent trends in e-learning.
CO 5: Familiarize with the current technologies in e-learning.

REFERENCES:
OBJECTIVES:

- To introduce the basics and benefits of enterprise resource planning
- To learn the ERP implementation and its methodology
- To know the ERP technologies used for online businesses
- To learn the business modules in the ERP
- To know the future trends in the ERP

UNIT I ENTERPRISE RESOURCE PLANNING


UNIT II ERP IMPLEMENTATION

Implementation Of ERP – Overview – Post-Implementation Options, ERP Implementation Methodology – Guidelines for ERP Implementation. ERP Domain – Industrial and financial systems- Bann IV – SAP - SAP R/3 Applications

UNIT III ERP AND TECHNOLOGY

ERP and Technology –Introduction - Business intelligence – E-commerce and E-Business – Business process re-engineering (BPR) – online analytical processing (OLAP)-Supply Chain Management (SCM) – Customer Relational ship Management (CRM)

UNIT IV MODULES IN ERP

Business Modules in ERP- Finance – Manufacturing (production) – Human resources – plant maintenance – Material management – Marketing – sales, distribution and services

UNIT V CURRENT TRENDS IN ERP


OUTCOMES:

CO 1: To know the strategic importance of Enterprise Resource Planning.
CO 2: To know the implementation of ERP.
CO 3: To understand the ERP technology and how its supports for online business.
CO 4: To understand and implement ERP in various sectors.
CO 5: To understand the current and future trends in ERP.

REFERENCES:

OBJECTIVES:
- To know the basics of 2D and 3D graphics for game development
- To know the stages of game development
- To understand the basics of game engine
- To survey the gaming development environment and toolkits
- To learn and develop simple games using Pygame environment

UNIT I 3D GRAPHICS FOR GAME PROGRAMMING 9
Game – Definition – Genres of Games, Basics of 2D and 3D Graphics, Game Objects Design – 2D and 3D Transformations – Projections – Colour Models – Illumination and Shader Models – Animation – Controller based Animation

UNIT II GAME DESIGN PRINCIPLES 9

UNIT III GAME ENGINE DESIGN 9

UNIT IV GAMING PLATFORMS AND FRAMEWORKS 9
Pygame Game development – Unity – Unity Scripts – Mobile Gaming, Game Studio, Unity – Single player and Multi-Player games

UNIT V GAME DEVELOPMENT USING PYGAME 9

TOTAL: 45 PERIODS

OUTCOMES:
CO 1 : Have knowledge on the concepts of 2D and 3D graphics.
CO 2 : Prepare game design documents.
CO 3 : Understand the implementation of gaming engines.
CO 4 : Survey gaming environments and frameworks.
CO 5 : Implement a simple game in Pygame.

REFERENCES:
OBJECTIVES:
- To develop an understanding of the world's quickly-growing spatial data infrastructure
- To study how to put GIS to work for producing location-based information
- To identify the relevant spatial characteristics of diverse application areas enabling professionals to integrate spatial thinking
- To study GIS analysis into their careers
- To have an ability to use geospatial technologies to gain a significant advantage in the information technology field

UNIT I    GIS OVERVIEW
GIS – Definition -History of GIS -Basic Components of GIS – Hardware, Software, Data, Methods, People – List of GIS Software: Popular software, Open Source software

UNIT II  GIS DATA

UNIT III   GIS MODEL AND COMPRESSION

UNIT IV    GIS FILE FORMATS

UNIT V    TECHNIQUES USED IN GIS

TOTAL : 45 PERIODS

OUTCOMES:
CO 1 : How to describe what GIS is; name the major GIS software available; know where to find more information.
CO 2 : How to explain the components and functionality of a GIS and the differences between GIS and other information systems.
CO 3 : The nature of geographic information and explain how it is stored in computer (including map projection) and the two types of GIS data structure.
CO 4 : How to conduct simple spatial analysis using GIS software.
CO 5 : How to design and complete a GIS project from start to finish (data capture, data storage and management, analysis, and presentation).
REFERENCES:

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OUTCOMES:
CO 1: Understand the fundamentals of information.
CO 2: Know the basic notions of information and channel capacity.
CO 3: Convolutional and block codes, decoding techniques.
CO 4: Understand how error control coding techniques are applied in communication systems.
CO 5: Compression techniques for text, image, audio and video.

REFERENCES:

XT3080 INFORMATION RETRIEVAL TECHNIQUES

OBJECTIVES:
- To learn the concepts behind IR
- To understand the operation of web search
- To learn the algorithms related to text classification, indexing and searching
- To understand various IR models
- To understand how IR is applied in real world problems

UNIT I MODELLING

UNIT II QUERY LANGUAGES & OPERATIONS
Keyword based querying – Pattern matching – Structural queries – Query protocols – User relevance feedback – Automatic local analysis – Automatic global analysis

UNIT III INDEXING & SEARCHING
Inverted files – Other indices for text – Boolean queries – Sequential searching – Pattern matching – Structural queries

UNIT IV USER INTERFACES
Human-computer interaction – Information access process – Starting points – Query specification – Context – Using relevance judgements – Interface support for the search process

UNIT V MULTIMEDIA IR
Data modelling – Query languages – Generic Multimedia Indexing approach – One-dimensional time series – Two-dimensional color images – Automatic feature extraction

TOTAL: 45 PERIODS

OUTCOMES:
CO 1: Use an open source search engine framework and explore its capabilities.
CO 2: Represent documents in different ways and discuss its effect on similarity calculations and on search.
CO 3: Design and implement an innovative feature in a search engine.
CO 4: Build an IR model.
CO 5: Enhance an existing IR model.
REFERENCES:

XT3081 INFORMATION SECURITY

OBJECTIVES:
- To Understand basic information security principles and approaches
- To Recognize the major information security threats and countermeasures
- To understand the importance of information security
- To understand the various security protocols
- To design a secure system model

UNIT I INTRODUCTION TO INFORMATION SECURITY
- History - What is Information Security
- Critical Characteristics of Information
- NSTISSC Security Model
- Components of an Information System
- Securing the Components
- Balancing Security and Access
- The SDLC - The Security SDLC

UNIT II SECURITY INVESTIGATION

UNIT III SECURITY ANALYSIS
- Risk Management: Identifying and Assessing Risk - Assessing and Controlling Risk

UNIT IV LOGICAL DESIGN

UNIT V PHYSICAL DESIGN
- Security Technology – IDS - Scanning and Analysis Tools – Cryptography - Access Control Devices
- Physical Security - Security and Personnel

TOTAL : 45 PERIODS

OUTCOMES:
CO 1: Identify both external and internal vulnerabilities to enterprise computer infrastructures and sensitive digital assets and devise a mitigation plan against them.
CO 2: Have comprehensive information about security policies, establishing necessary organizational processes/functions for information security and will be able to arrange necessary resources.
CO 3 : Differentiating among the models, architectures, challenges and global legal constraints of secure electronic commerce technologies used to ensure transmission, processing and storage of sensitive information.

CO 4 : About cyber law and ethics.

CO 5 : About recent information security threats and preventive measures.

REFERENCES:

XT3082 MARKETING ANALYTICS L T P C

OBJECTIVES:
- To give an overview of models and metrics
- To explain competitive analysis and business strategy
- To understand product, service and price analytics
- To familiarize with distribution and promotion analytics
- To introduce to sales analytics

UNIT I MODELS AND METRICS 9
Marketing Analytics, Models and metrics- Market insight – Market data sources, sizing, PESTLE trend analysis, and porter five forces analysis – Market segment identification and positioning

UNIT II COMPETITIVE ANALYSIS AND BUSINESS STRATEGY 9
Competitor identification, Intelligence gathering, analysis and strategy- Analytics based strategy selection, with strategic models and metrics, Forecasting, balanced scorecard, and critical success factors

UNIT III PRODUCT, SERVICE AND PRICE ANALYTICS 9
Conjoint analysis model, decision tree model, portfolio resource allocation, Pricing techniques, pricing assessment, pricing for business markets, price discrimination

UNIT IV DISTRIBUTION AND PROMOTION ANALYTICS 9
Retail location selection, distribution channel evaluation, and multi-channel distribution, Promotion budget estimation and allocation, promotion metrics for traditional media and social media

UNIT V SALES ANALYTICS 9
E-Commerce sales mode, sales metrics, profitability metrics and support metrics

TOTAL : 45 PERIODS

OUTCOMES:
CO 1 : Get an overview of models and metrics.
CO 2 : Understand competitive analysis and business strategy.
CO 3 : Understand product, service and price analytics.
CO 4 : Familiarize with distribution and promotion analytics.
CO 5 : Understanding about sales analytics.
OBJECTIVES:

- To learn about the basics of wireless communication
- To learn basic concepts and systems issues in telecommunication and satellite systems
- To illustrate architecture and protocols in pervasive computing and to identify the trends and latest development of the technologies in the area to design successful mobile and pervasive computing applications and services research project
- To design successful mobile and pervasive computing applications and services research project
- To evaluate critical design trade-offs associated with different mobile technologies, architectures, interfaces and business models and how they impact the usability, security, privacy and commercial viability of mobile and pervasive computing services and applications

UNIT I OVERVIEW OF WIRELESS COMMUNICATION


UNIT II TELECOMMUNICATION AND SATELLITE SYSTEMS


UNIT III PERVERSIVE COMPUTING

Introduction - Principles, Characteristics- interaction transparency, context aware, automated experience capture. Architecture for pervasive computing - Pervasive devices-embedded controls - smart sensors and actuators -Context communication and access services

UNIT IV PROTOCOLS

Open protocols- Service discovery technologies- SDP, Jini, SLP, UpnP protocols–data synchronization- SyncML framework - Context aware mobile services - Context aware sensor networks, addressing and communications- Context aware security

REFERENCES:

UNIT V TECHNOLOGIES, PLATFORMS AND RECENT TRENDS


TOTAL : 45 PERIODS

OUTCOMES:
CO 1: To deploy better strategies for radio and signal transmission.
CO 2: To develop suitable scripts and applications for recent networks.
CO 3: To use context aware sensor and mesh networks to develop mobile computing environment.
CO 4: To develop better protocols and effective communication mechanism for mobile and context aware computing.
CO 5: To develop more system model by using different simulators and design an appropriate mechanism to evaluate the system performance.

REFERENCES:

XC3079 MODELLING AND SIMULATION

OBJECTIVES:
- To introduce system, models and simulation
- To understand random numbers and the techniques to generate random numbers
- To know the different queueing models
- To analyze the various simulation data with different techniques
- To understand the simulation of computer network system

UNIT I INTRODUCTION TO SYSTEMS

UNIT II RANDOM NUMBERS AND RANDOM-VARIATE GENERATION

Attested

DIRECTOR
Centre for Academic Courses
Anna University, Chennai-600 025
UNIT III  QUEUEING MODELS
Characteristics of queueing systems – Long-run measures of performance of queueing systems – Little’s Formula – Steady-state behavior of Finite and Infinite population Markovian queueing models Networks of Queues

UNIT IV  ANALYSIS OF SIMULATION DATA
Data collection – Identifying the distribution with data – Parameter estimation – Goodness of fit tests – Fitting a non-stationary Poisson process – Selecting input models without data – Multi-variate and Time series input models

UNIT V  SIMULATION OF NETWORKED COMPUTER SYSTEMS
Simulation tools – Model Input – Mobility models in wireless systems – The OSI stack model – Physical layer in wireless systems – Media Access control – Data link layer – TCP – Model construction

TOTAL : 45 PERIODS

OUTCOMES:
CO 1 : Understand the system concept and simulation models.
CO 2 : Know about random numbers and techniques to generate random numbers.
CO 3 : Understand the queuing models.
CO 4 : Understand the different analyzing techniques of simulation data.
CO 5 : Understand the simulation of computer network system.

REFERENCES:

XT3083  MULTIMEDIA ANALYTICS

OBJECTIVES:
• To introduce the basics of multimedia databases and its architecture
• To deal with multimedia databases include text, image and video analysis
• To learn the techniques of text mining in multimedia
• To learn architectural support of multimedia data mining and video retrieval in video mining
• To design content-based image and video retrieval system

UNIT I  MULTIMEDIA DATABASES

Attested

DIRECTOR
Centre for Academic Courses
Anna University, Chennai-600 025
UNIT II DEALING WITH MULTIMEDIA DATABASES

UNIT III MULTIMEDIA TEXT MINING

UNIT IV MULTIMEDIA DATA AND AUDIO MINING

UNIT V IMAGE AND VIDEO RETRIEVAL SYSTEM
Feature Extraction and Representation, Similarity Measurements, Dimension Reduction and High-dimensional Indexing, Clustering, The Semantic Gap, Learning, Relevance Feedback, Benchmarking Solutions. Video Parsing, Video Abstraction and Summarization, Video Content Representation, Indexing and Retrieval. Video Browsing Schemes, Samples of Video Retrieval Systems

OUTCOMES:
CO 1: To understand the basics of the multimedia database and its architecture.
CO 2: To extract and deal with the text, image and the video data from multimedia database.
CO 3: To predict from text, classification and pattern recognition from text.
CO 4: To understand the approaches and techniques used in data and audio mining.
CO 5: To deal with the content-based image and video retrieval system.

REFERENCES:
OBJECTIVES:
- To learn the fundamentals of natural language processing
- To appreciate the use of CFG and PCFG in NLP
- To understand the role of semantics and pragmatics
- To understand how to model a language
- To understand how NLP is applied in real world problems

UNIT I OVERVIEW OF WORDS, EXPRESSIONS and AUTOMATA

UNIT II SPEECH
Speech – Phonetics - Speech Synthesis - Automatic Speech Recognition - Speech Recognition: - Advanced Topics - Computational Phonology

UNIT III SYNTAX
Formal Grammars of English - Syntactic Parsing - Statistical Parsing - Features and Unification - Language and Complexity

UNIT IV SEMANTICS AND PRAGMATICS
The Representation of Meaning - Computational Semantics - Lexical Semantics - Computational Lexical Semantics - Computational Discourse

UNIT V APPLICATIONS
Information Extraction - Question Answering and Summarization - Dialogue and Conversational Agents - Machine Translation

OUTCOMES:
CO 1 : Tag a given text with basic Language features.
CO 2 : Design an innovative application using NLP components.
CO 3 : Implement a rule based system to tackle morphology/syntax of a language.
CO 4 : Design a tag set to be used for statistical processing for real-time applications.
CO 5 : Compare and contrast use of different statistical approaches for different types of NLP applications.

REFERENCES:
OBJECTIVES:
- To learn the concepts of random networks
- To understand the model of Barabási-Albert
- To examine the scale-free network
- To learn the networks with degree correlation
- To understand the robustness of scale-free network

UNIT I RANDOM NETWORKS
Basics of networks and graphs, random network model - degree distribution, evolution, small world property, six degrees of separation, Watts- Strogatz model, local clustering coefficient, random networks and network science

UNIT II BARABÁSI-ALBERT MODEL
Growth and preferential attachment, Barabási - Albert model, degree dynamics, degree distribution, diameter and the clustering coefficient, preferential attachment - absence of growth, measure, non-linearity, the origins

UNIT III SCALE-FREE PROPERTY
Power laws and scale-free networks, Hubs, Universality, Ultra-small property, role of the degree exponent, Generating networks with a pre-defined degree distribution

UNIT IV EVOLVING NETWORKS AND DEGREE CORRELATION
Bianconi-Barabási model, measuring fitness, Bose-Einstein condensation, evolving networks. Assortativity and disassortativity, Measuring degree correlations, Structural cutoffs, Degree correlations in real networks

UNIT V NETWORK ROBUSTNESS
Percolation theory, robustness of scale-free networks, attack tolerance, cascading failures, modeling cascading failures, building robustness

OUTCOMES:
CO 1 : Understand the concept of random networks
CO 2 : Examine the model of Barabási-Albert.
CO 3 : Investigate the scale-free network with its properties.
CO 4 : Understand the degree correlation in real networks.
CO 5 : Examine the network robustness with cascading failures.

REFERENCES:
OBJECTIVES:
- To expose the context and operation of open-source software
- To understand open-source operating system and database
- To learn programming language like: PHP – Python
- To learn configuration of web servers
- To learn some important OSS tools

UNIT I  PRINCIPLES OF OPEN-SOURCE SOFTWARE  9

UNIT II  OPEN-SOURCE OPERATING SYSTEMS AND DATABASE  9

UNIT III  OPEN-SOURCE PROGRAMMING LANGUAGES  9
Introduction to Open-Source Programming and Scripting Languages- Execution Environment - Programming in Web Environment - File Handling and Data Storage - Working with Forms - Case Study: PHP – Python

UNIT IV  OPEN-SOURCE WEB SERVER  9
Web Server - Feature – Architectures - Case Study: Apache Web Server - Configuring and Using Web Server - Comparison of Apache Web Server with Commercial Web Servers

UNIT V  TOOLS AND TECHNOLOGIES  9

TOTAL :45 PERIODS

OUTCOMES:
CO 1 : Understand how to install and run open-source operating systems.
CO 2 : Apply the security concept in open-source database.
CO 3 : Contribute software to and interact with Free and Open-Source software development projects.
CO 4 : Build and modify one or more Free and Open-Source web server’s configuration.
CO 5 : Use a version control system.

REFERENCES:
OBJECTIVES:
- To learn about Supervised and unsupervised Learning
- To study about feature extraction and structural pattern recognition
- To explore different classification models
- To learn Artificial Intelligence techniques
- To understand Fuzzy Pattern Classifiers and Perception

UNIT I OVERVIEW OF PATTERN RECOGNITION
Discriminant functions - Supervised learning - Parametric estimation - Maximum Likelihood estimation - Bayesian parameter estimation - Problems with Bayes Approach - Pattern classification by distance functions - minimum distance Pattern classifier

UNIT II UNSUPERVISED CLASSIFICATION
Clustering for unsupervised learning and classification, clustering concepts C – means algorithm – hierarchical clustering – Graph theoretic approach to pattern clustering - Validity of clustering solutions

UNIT III FEATURE EXTRACTION AND STRUCTURAL PATTERN RECOGNITION
KL Transforms – feature selection through functional approximation – Binary selection – Elements of formal grammars, syntactic description, stochastic grammars, Structural representation

UNIT IV AI TECHNIQUES

UNIT V RECENT ADVANCES AND IMAGE APPLICATIONS
Learning of neural pattern recognition - Fuzzy logic – Fuzzy pattern classifiers – image segmentation – Credit scoring – Applications in Computer vision, Automated Target recognition, Finger print Identification, Industrial Inspection

OUTCOMES:
CO 1 : Classify data and identifying patterns.
CO 2 : Extract feature set and select the features from given data set.
CO 3 : Apply graph theory approaches to pattern clustering.
CO 4 : Apply AI techniques.
CO 5 : Apply Fuzzy logic and neural pattern rules.

REFERENCES:
OBJECTIVES:
- To study how to manage and track the time for software processes and personal life
- To study how to plan a product and how to measure size of a product
- To learn how to schedule a process and how to be committed in work
- To learn about software Development process and how to produce defect free product
- To learn how to estimate the product and process quality

UNIT I  OVERVIEW AND PLANNING PROCESS  9

UNIT II  SOFTWARE SIZE, PROBE SIZE ESTIMATION AND SCHEDULE ESTIMATION  9

UNIT III  DESIGN AND CODE METHODOLOGIES AND REVIEWS  9

UNIT IV  SOFTWARE QUALITY MANAGEMENT AND PROCESS DESCRIPTION  9

UNIT V  DATA SUMMARY AND CAUSAL ANALYSIS AND DEVELOPING PSP PROCESS SCRIPTS  9

TOTAL : 45 PERIODS

OUTCOMES:
CO 1 :  Able to implement software development life cycle.
CO 2 :  Analyze, prioritize, and manage requirements and do scheduling the jobs based on estimation plan.
CO 3 :  Design checklist which is used in reducing defect injection in coding and planning.
CO 4 :  Identify and prioritize risks in producing quality product.
CO 5 :  Do analyze the root cause for defect and will be committed towards quality.

REFERENCES:
OBJECTIVES:
- To understand the building blocks of a quantum computer
- To Implement the simple quantum algorithms and information channels in the quantum circuit model
- To understand the principles of quantum information
- To understand the applications and limitations of quantum operations formalizing
- To simulate a simple quantum error-correcting code

UNIT I  FUNDAMENTAL CONCEPTS
Global Perspectives, Quantum Bits, Quantum Computation, Quantum Algorithms, Quantum Information, Postulates of Quantum Mechanisms

UNIT II  QUANTUM COMPUTING
Quantum Circuits – Quantum algorithms, Single Orbit operations, Control Operations, Measurement, Universal Quantum Gates, Simulation of Quantum Systems, Quantum Fourier transform, Phase estimation, Applications, Quantum search algorithms – Quantum counting – Speeding up the solution of NP – complete problems – Quantum Search for an unstructured database

UNIT III  QUANTUM COMPUTERS
Guiding Principles, Conditions for Quantum Computation, Harmonic Oscillator Quantum Computer, Optical Photon Quantum Computer – Optical cavity Quantum electrodynamics, Ion traps, Nuclear Magnetic resonance

UNIT IV  QUANTUM INFORMATION
Quantum noise and Quantum Operations – Classical Noise and Markov Processes, Quantum Operations, Examples of Quantum noise and Quantum Operations – Applications of Quantum operations, Limitations of the Quantum operations formalism, Distance Measures for Quantum information

UNIT V  QUANTUM ERROR CORRECTION
Introduction, Shor code, Theory of Quantum Error Correction, Constructing Quantum Codes, Stabilizer codes, Fault – Tolerant Quantum Computation, Entropy and information – Shannon Entropy, Basic properties of Entropy, Von Neumann, Strong Sub Additivity, Data Compression, Quantum cryptography

TOTAL :45 PERIODS

OUTCOMES:
CO 1 : Understand the basics of quantum computing.
CO 2 : Understand the background of quantum mechanics.
CO 3 : Analyse the computation models.
CO 4 : Model the circuits using quantum computation environments and frameworks.
CO 5 : Understand the quantum operations such as noise and error-correction.

REFERENCES:
OBJECTIVES:
- To learn the fundamentals of semantic web and to conceptualize and depict Ontology for semantic web
- To make a study of languages for semantic web
- To learn about the ontology learning algorithms and to utilize in the development of an application
- To know the fundamental concepts of management of ontology
- To understand the working of ontology models

UNIT I  THE QUEST FOR SEMANTICS

UNIT II  LANGUAGES FOR SEMANTIC WEB AND ONTOLOGIES

UNIT III  ONTOLOGY LEARNING FOR SEMANTIC WEB

UNIT IV  ONTOLOGY MANAGEMENT AND TOOLS

UNIT V  APPLICATIONS

OUTCOMES:
CO 1 : Create Ontology for a given domain.
CO 2 : Develop an application using ontology languages and tools.
CO 3 : Perform ontology management effectively.
CO 4 : Evaluate different ontology models.
CO 5 : Design and develop web service applications using semantic portals.

REFERENCES:
OBJECTIVES:
- To study how people view themselves
- To study how people view others
- To study how people influence group
- To study how people interact with group
- To study how people act when they are a part of a group

UNIT I OVERVIEW OF SOCIAL PSYCHOLOGY
Social Psychology – Origin and development – Social behavior and social thought – social relationships - social cognition - Applications in society and business

UNIT II PERCEIVING AND UNDERSTANDING OTHERS
Social perception – Nonverbal communication – Attribution – Impression formation and impression management

UNIT III COGNITION IN THE SOCIAL WORLD
Self, Self Esteem and Social Comparison, self-efficacy, narcissism, Social cognition – Schemas – Heuristics – Errors – Attitudes and Behavior – Persuasion – Cognitive dissonance

UNIT IV INTERPERSONAL RELATIONS
Social identity – Prejudice – Discrimination – Aggression – Interpersonal attraction and Relationships

UNIT V APPLIED SOCIAL PSYCHOLOGY
Social Influence – Conformity – Compliance – Social Influence – Pro social behavior – Groups – Social issues, Stress, personal beliefs and health

OUTCOMES:
CO 1: The fundamentals of social psychology.
CO 2: Social perception and impression management.
CO 3: Social cognition and comparison.
CO 4: Social Identity and interpersonal attraction and relations.
CO 5: Social influence and the application of social psychology.

REFERENCES:
OBJECTIVES:
- To present the concepts software processes methodologies and quality Standards
- To understand the models and metrics of software quality and reliability
- To know the behavior of the testing techniques
- To design test cases to detect the errors in the software
- To enable students to gain a working knowledge of techniques for management of testing projects

UNIT I  INTRODUCTION TO SOFTWARE QUALITY

UNIT II  SOFTWARE QUALITY METRICS AND RELIABILITY

UNIT III  TEST CASE DESIGN

UNIT IV  TEST MANAGEMENT

UNIT V  CONTROLLING AND MONITORING

TOTAL : 45 PERIODS

OUTCOMES:
CO 1 : To appreciate the importance of software quality assurance.
CO 2 : To apply quality and reliability metrics to ensure the performance of the software.
CO 3 : To test the software by applying various testing techniques.
CO 4 : To prepare test planning based on the document.
CO 5 : To know the inputs and deliverables of the testing process.
REFERENCES:
OBJECTIVES:
- To learn the basic concepts of TQM
- To understand the various principles, practices of TQM to achieve quality
- To learn the various statistical approaches for quality control
- To understand the TQM tools for continuous process improvement
- To learn the importance of ISO and quality systems

UNIT I INTRODUCTION TO QUALITY
Introduction - Need for quality - Evolution of quality - Definition of quality - Dimensions of product and service quality - Basic concepts of TQM – TQM Framework - Contributions of Quality Gurus – Barriers to TQM — Cost of Quality

UNIT II TQM PRINCIPLES
Quality statements - Customer focus – Customer orientation, Customer satisfaction, Customer complaints, Customer retention - Continuous process improvement – PDCA cycle, 5s, Kaizen service quality frameworks and gaps – Control charts for variables and attributes

UNIT III TQM TOOLS & TECHNIQUES I

UNIT IV TQM TOOLS & TECHNIQUES II

UNIT V QUALITY SYSTEMS

OUTCOMES:
CO 1 : Develop and understand the quality management philosophies and frameworks.
CO 2 : Develop in-depth knowledge on various tools and techniques of quality management.
CO 3 : Learn the applications of quality tools and techniques used in both manufacturing and service industry.
CO 4 : Develop analytical skills for investigating and evaluating the quality management issues in the industry.
CO 5 : Measure exactly where an organization stands on quality management with respect to the ISO 9000 quality management standard and the Baldrige Award criteria.

REFERENCES:
OBJECTIVES:
- To learn the basics of UNIX OS and IPC
- To learn the basics of socket programming using TCP and UDP
- To learn about the EchoServer, DayTimeServer, and I/O multiplexing
- To learn about the various socket options
- To learn to create and implement raw sockets

UNIT I  BASICS OF UNIX OS and IPC  9
Introduction — Overview of UNIX OS - Environment of a UNIX process - Process control - Process relationships - Signals - Interprocess Communication - Overview of TCP/IP protocol

UNIT II  ELEMENTARY TCP SOCKETS  9
Introduction to Socket Programming — Introduction to Sockets — Socket address Structures — Byte ordering functions — address conversion functions — Elementary TCP Sockets — socket, connect, bind, listen, accept, read, write, close functions — Iterative Server — Concurrent Server

UNIT III  APPLICATION DEVELOPMENT  9
TCP Echo Server — TCP Echo Client — Posix Signal handling — Server with multiple clients —boundary conditions: Server process Crashes, Server host Crashes, Server Crashes and reboots, Server Shutdown — I/O multiplexing — I/O Models — Select function — Shutdown function — TCP echoServer(with multiplexing) — Poll function — TCP echoClient(with multiplexing)

UNIT IV  SOCKET OPTIONS, ELEMENTARY UDP SOCKETS  9
Socket options — getSocket and setSocket functions — generic socket options — IP socket options — ICMP socket options — TCP socket options — Elementary UDP sockets — UDP echo Server — UDP echoClient — Multiplexing TCP and UDP sockets — Domain name system gethostbyname function — ipv6 support in DNS — gethostbyaddr function — getservbyname and getservbyport functions

UNIT V  ADVANCED SOCKETS  9
Ipv4 and Ipv6 interoperability — Threaded servers — Thread creation and termination — TCP echoserver using threads — Mutexes — condition variables — Raw sockets — Raw socket creation — Rawsocket output — Rawsocket input — Ping program — Traceroute program

TOTAL: 45 PERIODS

OUTCOMES:
CO 1 : The idea about the UNIX Operating System and Inter-Process Communication.
CO 2 : Ability to do socket programming using TCP and UDP.
CO 3 : Knowledge about EchoServer, DayTimeServer, and I/O multiplexing.
CO 4 : Knowledge of various socket options and able implement socket programming.
CO 5 : Ability to create and implement raw sockets.

REFERENCES:
OBJECTIVES:
- To understand the concepts of user interface
- To learn the process of user interface design
- To learn the system menus and its navigation schemes
- To study the characteristics and components of windows and the various controls for the windows
- To examine the various screen based controls

UNIT I  INTRODUCTION TO THE USER INTERFACE  9
The User Interface-Introduction, Overview, The importance of user interface – Defining the user interface, The importance of Good design, Characteristics of graphical and web user interfaces, Principles of user interface design

UNIT II  THE USER INTERFACE DESIGN PROCESS  9
Obstacles, Usability, Human characteristics in Design, Human Interaction speeds, Business functions-Business definition and requirement analysis, Basic business functions, Design standards

UNIT III  SYSTEM MENUS AND NAVIGATION SCHEMES  9
Structures of menus, Functions of menus, Contents of menus, Formatting of menus, Phrasing the menu, Selecting menu choices, Navigating menus, Kinds of graphical menus

UNIT IV  WINDOWS  9
Windows - Characteristics, Components of window, Window presentation styles, Types of window, Window management, Organizing window functions, Window operations, Web systems, Characteristics of device based controls

UNIT V  SCREEN BASED CONTROLS  9
Screen based controls- Operable control, Text control, Selection control, Custom control, Presentation control, Windows Tests-prototypes, kinds of tests

TOTAL : 45 PERIODS

OUTCOMES:
CO 1: Understand the basic concepts of user interface.
CO 2: Understand the process of user interface design.
CO 3: Implement an application for system menus with its navigation methods.
CO 4: Examine windows with operations and device based controls.
CO 5: Implement an application with different screen based controls.

REFERENCES:
OBJECTIVES:
- To get an overview of the foundation of web analytics
- To understand the importance of data collection
- To get introduced to web analytics strategy
- To familiarise with web analytics tools
- To get introduced to Google Analytics

UNIT I  FOUNDATION OF WEB ANALYRICS  9
Understanding web analytics – The foundations of Web analytics: Techniques and Technologies – Present and Future of Web analytics

UNIT II  DATA COLLECTION  9
Importance and Options – Web server log files: Click stream data – User submitted information – Web server performance data – Page tags – First and third party tracking

UNIT III  WEB ANALYTICS STRATEGY  9

UNIT IV  WEB ANALYTICS TOOLS  9

UNIT V  WEB METRICS  9
Common metrics: Hits, Page views, Visits, Unique visitors, Unique page views, Bounce, Bounce rate, Page/visit, Average time on site, New visits; Optimization (e-commerce, non e-commerce sites): Improving bounce rates, Optimizing adwords campaigns; Real time report, Audience report, Traffic source report, Custom campaigns. Content report, Google analytics, Introduction to KPI, characteristics, Need for KPI, Perspective of KPI, Uses of KPI

OUTCOMES:
CO 1 : Get an overview of the foundation of web analytics.
CO 2 : Understand the importance of data collection.
CO 3 : Get introduced to web analytics strategy.
CO 4 : Familiarise with web analytics tools.
CO 5 : Get introduced to web metrics.

REFERENCES: