SRI VENKATESWARA UNIVERSITY : TIRUPATI

Scheme of Instruction and Syllabi of 4 Year BTech (Computer Science and Engineering), BTech (Honors in CSE) and BTech (Minor in CSE) under Regulations - 2020

By

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SRI VENKATESWARA UNIVERSITY COLLEGE OF ENGINEERING
TIRUPATI – 517 502, Andhra Pradesh

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(With effect from the academic year 2020-21)

Scheme of Instruction and Examinations

I Semester

Course Code	Category	Course Title	Scheme of Instruction (Hours/Week)				No. of Credits
			L	T	P	Total	
MA101	Basic Sci.	Mathematics I	3	1		4	4
PY102	Basic Sci.	Modern Physics	3	1		4	4
CS103	Basic Eng.	Programming for Problem Solving	2	1		3	3
MA104	Basic Sci.	Probability & Statistics	3	1		4	4
ME105	Basic Engg. Lab	Workshop / Manufacturing Practices			3	3	1.5
CS106	Basic Engg. Lab	Programming for Problem Solving Lab			3	3	1.5
CE107	Audit Course	Environmental Science	4			4	
Total			15	4	6	25	18

- All Courses - 40 marks (Internal) + 60 Marks (Univ. Semester End)
- Audit Course - 100 marks (Internal) - Zero Credits

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Scheme of Instruction and Examinations

II Semester

Course Code	Category	Course Title	Scheme of Instruction (Hours/Week)				No. of Credits
			L	T	P	Total	
MA201	Basic Sci.	Mathematics II	3	1		4	4
CY202	Basic Sci.	Engineering Chemistry	3	1		4	4
EN203	Humanities	English	2			2	2
CS204	Basic Eng.	Data Structures	3			3	3
ME205	Basic Engg. Lab	Engineering Graphics and Design	2		3	5	3.5
EN206	Humanities Lab	English Communication Lab			3	3	1.5
CS207	Basic Engg. Lab	Data Structures Lab			2	2	1
Total			13	2	8	23	19

- All Courses - 40 marks (Internal) + 60 Marks (Univ. Semester End)

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Scheme of Instruction and Examinations

III Semester

Course Code	Course Title	Scheme of Instruction (Hours/Week)				No. of Credits
		L	T	P	Total	
MA301C	Mathematics III	3			3	3
CS302C	Database Management Systems	3	1		4	4
CS303C	Discrete Mathematical Structures	3			3	3
CS304C	Basic Electrical Engineering	3			3	3
CS305C	Elements of Electronics and Communication Engineering	3			3	3
CS306L	Database Management Systems Laboratory			3	3	1.5
CS307L	Electronics and Communication Engineering Laboratory			3	3	1.5
CS309S	Skill Oriented Course - Basic Python Programming	1		2	3	2
PA310A	Audit Course - Constitution of India	2			2	0
Total		18	1	8	27	21

- All Courses - 40 marks (Internal) + 60 Marks (Univ. Semester End)
- Audit Course - 100 marks (Internal) - Zero Credits

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IV Semester

Course Code	Course Title	Scheme of Instruction (Hours/Week)				No. of Credits
		L	T	P	Total	
CS401C	Digital Electronics and Logic Design	3			3	3
CS402C	Simulation and Modeling	3			3	3
HS403C	Managerial Economics and Accountancy	3			3	3
CS404C	Computer Oriented Numerical Methods	3			3	3
CS405C	Computer Organization	3			3	3
CS406C	Design and Analysis of Algorithms	3			3	3
CS407L	Assembly Language Programming and VHDL Laboratory			3	3	1.5
CS408L	Algorithms Laboratory			3	3	1.5
CS409S	Skill Oriented Course - Basic Web Designing	1		2	3	2
Total		19		8	27	23
Internship for 4 to 6 Weeks (Mandatory) during summer vacation.						

- All Courses - 40 marks (Internal) + 60 Marks (Univ. Semester End)

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Scheme of Instruction and Examinations

V Semester

Course Code	Course Title	Scheme of Instruction (Hours/Week)				No. of Credits
		L	T	P	Total	
CS501C	Formal Languages and Automata Theory	3			3	3
CS502C	Operating Systems	3			3	3
CS503C	Computer Networks	3			3	3
CS504C	Software Engineering	3	1		4	4
CS505O	Open Elective I (Through MOOCs)	2		2	4	3
CS506L	Operating Systems Laboratory			3	3	1.5
CS507L	Computer Networks Laboratory			3	3	1.5
CS508S	Java Programming (Skill Advanced Course)	2		2	4	3
CS509M	Universal Human Values (Mandatory Course)	2			2	0
Summer Internship 2 Months (Mandatory) after second year (to be evaluated during V semester)					0	1.5
Total		18	1	10	29	23.5

- All Courses - 40 marks (Internal) + 60 Marks (Univ. Semester End)
- Mandatory Course - 100 marks (Internal) - Zero Credits

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VI Semester

Course Code	Course Title	Scheme of Instruction (Hours/Week)				No. of Credits
		L	T	P	Total	
CS601C	Compiler Design	3			3	3
CS602C	Artificial Intelligence	3			3	3
CS603C	Cryptography and Network Security	3			3	3
CS604C	Computer Graphics	3			3	3
CS605E	Professional Elective I: Data Mining / Distributed Systems / Object Oriented Analysis and Design	3			3	3
CS606L	Artificial Intelligence and Compiler Design Laboratory			3	3	1.5
CS607L	Cryptography and Network Security Laboratory			3	3	1.5
CS608L	Computer Graphics Laboratory			3	3	1.5
CS609S	Advanced Python Programming (Skill Advanced Course)	2		2	4	3
CS610M	Professional Ethics (Mandatory Course)	2			2	0
Total		19		11	30	22.5

- All Courses - 40 marks (Internal) + 60 Marks (Univ. Semester End)
- Mandatory Course - 100 marks (Internal) - Zero Credits

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B.Tech (CSE) – Choice Based Credit System – 2020 Regulations

(With effect from the academic year 2023-24)

Scheme of Instruction and Examinations

VII Semester

Course Code	Course Title	Scheme of Instruction (Hours/Week)				No. of Credits
		L	T	P	Total	
CS701E	Professional Elective – II	3			3	3
CS702E	Professional Elective – III	3			3	3
CS703E	Professional Elective – IV	3			3	3
CS704O	Open Elective II (Through MOOCs)	2		2	4	3
CS705O	Open Elective III (Through MOOCs)	2		2	4	3
HS706E	Optimization Techniques	3			3	3
CS707S	Mobile Application Development (Skill Advanced Course)	2		2	4	3
Industrial/Research Internship 2 Months (Mandatory) after third year (to be evaluated during VII semester)					-	3
Total		18	-	6	24	24

- All Courses - 40 marks (Internal) + 60 Marks (Univ. Semester End)

Professional Electives II, III & IV (Any three shall be chosen)

1. Cyber Security
2. Machine Learning
3. Big Data Analytics
4. Cloud Computing
5. Image Processing
6. Soft Computing

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(With effect from the academic year 2023-24)

Scheme of Instruction and Examinations

VIII Semester

Course Code	Course Title	Scheme of Instruction (Hours/Week)				No. of Credits
		L	T	P	Total	
CS/PROJ	Project Work				-	12
Internship (6 Months)						
Total		-	-	-	-	12

CS103

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

I Semester B.Tech (CSE) – CBCS Regulations-2020

(With effect from the academic year 2020-21)

PROGRAMMING FOR PROBLEM SOLVING

No.of Credits: 4 Instruction Hours/ Week: 4

Course Objectives:

1. To acquire problem solving skills
2. To be able to develop flowcharts and algorithms for the given problem
3. To learn how to write modular programs in C
4. To enable to use arrays, pointers, strings and structures in solving problems.
5. To explain the difference between object oriented programming and procedural programming.
6. To understand principles of object oriented pogromming.

UNIT-I

Problem Solving : Problem solving techniques, Computer as a problem solving tool, Programming Languages - Machine Language, Assembly Language, Low and High-Level Languages, Procedural and Object-Oriented Languages. Algorithm definition, Features, Criteria, Flowchart definition, Basic symbols, Sample flowcharts, Problem solving aspects, Efficiency of algorithms.

Basics of C: Structure of a C program, C tokens, Keywords, Identifiers, Basic data types and sizes, Constants, Variables, Operators in C, Operator Precedence and Associativity, Expressions, Type conversions, Basic input/output statement, Sample programs.

UNIT-II

Conditional Statements : Selection statements, Decision making within a program, Simple if statement, if-else statement, Nested if-else, if-else ladder and switch-case. Iterative statements: while-loop, do-while loop, for loop, Nested loops, Infinite loops, goto, break and continue statements, Sample programs.

Functions: Introduction to modular programming and functions, Basics, Standard Library of C functions, Prototype of a function, Parameter passing, User defined functions, Recursive functions, Passing arguments to a function: Call by reference, Call by value, Storage Classes in a single source file, Scope rules, Header files, C Pre-processor.

UNIT-III

Arrays: Introduction to arrays, Definition, Declaration, Storing elements, Accessing elements, One dimensional arrays: Array manipulation; Searching, Insertion, Deletion of an element from an array, Two dimensional arrays, Addition/Multiplication of two matrices, Transpose of a square matrix, Passing array to functions, String fundamentals, String manipulations, Standard library string functions.

Pointers: Definition of pointer, pointer type declaration, pointer assignment, pointer initialization, Pointer arithmetic, Functions and Pointers, Dangling memory, Character pointers and functions, Pointers to pointers, Arrays and Pointers, Pointer arrays, Pointers and structures, Dynamic memory management functions.

UNIT-IV

Structures: Structures declaration, Structure variables, Initialization of structures, Accessing structures, Nested structures, Arrays of structures, Structures containing arrays, Structures and functions, Pointers to structures, Self-referential structures, Unions, Typedef, Bit-fields.

File Processing: Concept of Files, Text files and binary files, File opening in various modes and closing of a file, Reading from a file, Writing onto a file.

UNIT V

Introduction to Object-Oriented Programming (OOP): Need for OOP, Principles of OOP, Basics of C++ Programming, Operator Overloading, Function Overloading, Inheritance: Derived classes, Protected access specifier, Derived class constructors, Overriding member functions, Class hierarchies, Public and Private inheritance, Multiple inheritance.

Course Outcomes:

At the end of the course, student will be able to

1. Develop and test programs in C and correct syntax and logical errors.
2. Implement conditional branching, iteration and recursion.
3. Decompose a problem into functions and synthesize a complete program.
4. Use arrays, pointers, strings and structures to formulate algorithms and programs
5. Use files to perform read and write operations.
6. Handle programming assignments based on class, abstraction, encapsulation, overloading and inheritance.

Text Books

1. Ashok N Kamthane, Amit Ashok Kamthane, Programming in C, 3rd Edition, Pearson Education, 2019.
2. Scheldt H, C: The Complete Reference, 4th Edition, Tata McGraw-Hill, 2002.
3. R.G. Dromey, How to solve it by Computer, Pearson Education, 2019.
4. Hanly J R & Koffman E.B, “Problem Solving and Program design in C”, Pearson Education, 2019.
5. Herbert Schildt, The Complete Reference C++, 4th Edition, Tata McGraw-Hill.

Reference Books

1. C Programming-A Problem Solving Approach, Forouzan, Gilberg, Cengage.
2. Programming with C, Bichkar, Universities Press.
3. Programming in C, ReemaThareja, OXFORD.
4. C by Example, Noel Kalicharan, Cambridge.
5. The C++ Programming Language, Bjarne Stroustrup, 3rd Edition, Pearson Education.
6. Problem solving with C++: The Object of Programming, 9th Edition, Walter Savitch, Pearson Education.

CS106

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

I Semester B.Tech (CSE) – CBCS Regulations-2020
(With effect from the academic year 2020-21)

PROGRAMMING FOR PROBLEM SOLVING LABORATORY

No. of Credits: 1.5 Instruction Hours/Week: 3

Course Objectives:

1. To provide exposure to problem-solving through programming
2. To train the student on the concepts of the C- Programming language

The following programs shall be developed and executed in Programming Language C.

1. Programs on conditional control constructs.
2. Programs on iterative statements (while, do-while, for).
3. Programs on recursive procedures
4. Programs on arrays, matrices (single and multi-dimensional arrays).
5. Programs using user defined functions, demonstrating parameter passing methods viz. call by value and call by reference.
6. Programs using different library functions viz. ctype.h, math.h, stdio.h, stdlib.h, string.h, conio.h and pre-processor directives.
7. Programs using pointers (int pointers, char pointers) and pointer arrays.
8. Programs on structures and unions
9. Programs on File Processing.
10. Programs on Pointers to structures and Self-referential structures

Course Outcomes:

After Completion of this course the student would be able to

1. Develop the C code for the given algorithm.
2. Understand, debug and trace the execution of programs written in C language.

Reference Books:

1. Scheldt H, C: The Complete Reference, 4th Edition, Tata McGraw-Hill, 2002.
2. Hanly J R & Koffman E.B, “Problem Solving and Program design in C”, Pearson Education, 2019.
3. R.G. Dromey, How to solve it by Computer, Pearson Education, 2019.
4. Behrouz A. Forouzan& Richard F. Gilberg, Computer Science: A Structured Programming Approach Using C, Third Edition, Cengage Learning

CS204

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

II Semester B.Tech (CSE) – CBCS Regulations-2020
(With effect from the academic year 2020-21)

DATA STRUCTURES

No.of Credits: 4 Instruction Hours/ Week: 4

Course objectives:

1. Develop skills to design and analyze linear and nonlinear data structures.
2. Develop algorithms for manipulating linked lists, stacks, queues, trees and graphs.
3. Develop recursive algorithms as they apply to trees and graphs.
4. Strengthen the ability to identify and apply the suitable data structure for the given real world problem
5. Understand the various techniques of sorting and searching

UNIT I

Introduction: Data types/Objects/Structures, Abstract definition of Data Structures, Overview of linear and nonlinear data structures, Analysis of algorithms, Algorithm specification, Asymptotic notation, Time-Space trade-off, Searching: Linear, Binary and Fibonacci search and their complexity analysis.

Arrays: Definition, Multidimensional arrays, Pointer arrays, Representation of arrays – Row major and Column major orders, Application of arrays – Polynomials, Sparse matrices representation.

UNIT II

Stacks and Queues: Introduction, ADT, Array representation, Operations and Applications of Stacks - Evaluation of expressions, Code generation for stack machines, Implementation of recursion, Factorial calculation and Towers of Hanoi; Circular Queue, Priority Queue, Double ended queue, Applications of Queues - Simulation, CPU Scheduling; Multiple stacks and queues

UNIT III

Linked Lists: Singly linked lists and chains, Circular linked list, Doubly linked list, Circular doubly linked list, Complexity analysis of the same, Linked representation of Stacks and Queues, Applications of linked lists - Polynomial representation, Sparse matrix multiplication, Dynamic storage management; Generalized list representation, Recursive algorithms for lists, Recursive lists

UNIT IV

Trees: Basic tree terminologies, Binary trees – Definition, Properties, ADT, Representations, Operations and Applications; Binary Search Trees, Heap Trees, Threaded binary trees, Height balanced trees – AVL Trees, Red black tree, Splay tree Their operations and complexity analysis.

UNIT V

Sorting Techniques: Insertion sort, Selection sort, Bubble sort, Quick sort, Radix sort Merge sort, External sort – Introduction, K-way Merge sort.

Graphs: Basic terminologies, Representations, ADT, Operations on graphs – DFS, BFS, Spanning trees, Biconnected components, Minimum cost spanning trees.

Course Outcomes:

After completion of the course the students will be able to

1. Choose appropriate data structure for the specified problem definition.
2. Implement linear and non-linear data structures viz. stacks, queues, linked list, trees, graphs.
3. Apply the concept of trees and graph data structures for the real world problems.
4. Comprehend the implementation of sorting and searching algorithms

Text Books:

1. Ellis Horowitz and Sartaj Sahani, "Fundamentals of Data Structures", Computer Science Press.
2. Ellis Horowitz, Sartaj Sahni and Dinesh Mehta, Fundamentals of Data Structures in C++ Universities Press, Second Edition.
3. Debasis Samanta, Classic Data Structures, Second Edition, Prentice Hall of India

Reference Books:

1. Aaron M. Tenenbaum,Yedidyah Langsam and Moshe J. Augenstein "Data Structures Using C and C++", PHI Learning Private Limited
2. Jean Paul Trembley and Paul G. Sorenson, "An Introduction to Data Structures with applications", McGraw Hill.
3. R. Kruse et al, "Data Structures and Program Design in C", Pearson Education

CS207

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

II Semester B.Tech (CSE) – CBCS Regulations-2020
(With effect from the academic year 2020-21)

DATA STRUCTURES LABORATORY

No. of Credits: 1 Instruction Hours/Week: 2

Course Objectives:

1. To understand the practical application of linear and nonlinear data structures.
2. To develop and execute programs in C++/C to solve problems using data structures such as arrays, linked lists, stacks, queues, trees, and graphs.
3. To develop and execute programs in C to implement various sorting and searching techniques

1. Develop an algorithm to implement stack using arrays. Code it in C++.
2. Develop an algorithm to evaluate a given postfix expression using stack. Code it in C.
3. Develop an algorithm to convert a given infix expression to postfix form using stacks. Code it in C.
4. Develop algorithms to implement i) Linear queue and ii) Circular queue using arrays. Code it in C++.
5. Develop an algorithm to implement double ended queue (de queue) using arrays. Code it in C++.
6. Develop algorithms using dynamic variables and pointers, to construct a singly linked list consisting of the following information in each node: student id (integer), student name (character string) and semester (integer). The operations to be supported are:
    a. Inserting a node i) at the front of a list ii) at the rear of the list ii) at any position in the list
    b. Deleting a node based on student id. If the specified node is not present in the list, an error Message should be displayed.
    c. Searching a node based on student id. If the specified node is not present in the list an error message should be displayed.
    d. Displaying all the nodes in the list.

    Code the same in C++.
7. Develop an algorithm using dynamic variables and pointers to construct a stack of integers using singly linked list and to perform the following operations:
    i) Push, ii) Pop iii) Display (The program should print appropriate messages for stack overflow and stack empty). Code the same in C++.
8. Develop an algorithm using dynamic variables and pointers to construct a queue of integers using singly linked list and to perform the following operations: a. Insert
    b. Delete c. Display. The program should print appropriate messages for queue full and queue empty. Code the same in C++.
9. Develop an algorithm to support the following operations on a doubly linked list where each node consists of integer data object:
    a. Create a doubly linked list
    b. Insert a new node

c. Delete the specific node
d. Display the contents of the list.

Code the same in C++.

10. Develop algorithms to
    a. Construct a binary tree of integers.
    b. Traverse the binary tree using inorder, preorder and postorder. (both recursive and non-recursive versions)
    c. Display the elements in the tree.

    Code the same in C++.
11. Develop algorithms to create a binary search tree (BST) and perform the following operations on it. Find (a) Minimum element (b) Maximum element (c) Search for a given element (d) Find predecessor of a node (e) Find successor of a node (f) Delete a node with specific key value. Code the same in C++.
12. Develop an algorithm to construct an AVL tree for the given set of elememnts. Code it in C++.
13. Develop algorithms to Sort the given list of elements (i.e. numbers or strings)
    (a) Insertion sort (b) Merge sort (c) Quick sort (d) Heap sort
    Code the same in C.
14. Develop algorithms to implement of graph traversals by applying:
    (a) BFS (b) DFS. Code the same in C/C++.
15. Develop algorithms to find out a minimum spanning tree of a simple connected undirected graph by applying: (a) Prim's algorithm (b) Kruskal's algorithm
    Code the same in C/C++.

Course Outcomes:

At the end of this course students will demonstrate the ability to

1. Identify the appropriate data structure for given problem.
2. Have practical knowledge on the application of data structures.
3. Analyze the time and space efficiency of the data structure.

Text Books:

1. Object Oriented Programming with ANSI & Turbo C++, Ashok N.Kamthane, Pearson Education
2. Scheldt H, C: The Complete Reference, 4th Edition, Tata McGraw-Hill, 2002.
3. Ellis Horowitz, Sartaj Sahni and Dinesh Mehta, Fundamentals of Data Structures in C++ Universities Press, Second Edition.
4. Data Structures using C and C++, YedidyahLangsam.MosheJ.Augenstein Aaron M.Tenenbaum, 2nd Edition,PHI
5. ADTs, Data Structures and Problem Solving with C++, Larry Nyhoff, Pearson Education.

MA301C

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

III Semester B.Tech (CSE) – CBCS Regulations-2020
(With effect from the academic year 2021-22)

MATHEMATICS III

No.of Credits: 3 Instruction Hours/Week: 3

Course Objectives:

- This course aims at providing the student to acquire the knowledge on the calculus of functions of complex variables.
- To understand power series and expansion of analytic function.
- To understand Laurent Series, poles, singular points, Residue theorem and its applications.
- The aim is to analyze the solutions of partial differential equations.
- To discuss the boundary value problems, one dimensional wave equation, heat equation and Laplace Equation.

UNIT I

Complex analysis - I: Analytical functions - Cauchy- Reimann equations – Construction of Analytic functions- Complex integration - Cauchy's theorem - Integral formula - Evaluation of integrals.

UNIT II

Complex analysis - II**:** Taylor's and Laurents' series - Transformations - Conformal mapping - Bilinear transformations - Transformation of 1/z, z^2, sin z and cos z.

UNIT III

Complex analysis - III: Singularities - Poles - Residues - Residue theorem – Contour integration- Evaluation of real integrals.

UNIT IV

Partial differential equations - I : Formation of differential equations - Classification - First order linear partial differential equations – Legranges' linear equation - Method of multipliers - first order non-linear partial differential equations - Charpits method.

UNIT V

Partial differential equations - II: Method of separation of variables - One dimensional wave equation - Heat equation – Laplace's equation.

Course Outcomes:

Upon successful completion of this course, the student should be able to

- Understand the analyticity of complex functions and conformal mappings.
- Apply Cauchy's integral formula and Cauchy's integral theorem to evaluate improper integrals along contours.
- Describe basic properties of complex integration and having the ability to compute such integrals.
- Describe conformal mappings between various plane regions.

- Apply the concepts of Complex Analysis in many branches of Engineering, including the branches of hydrodynamics, thermodynamics, and particularly quantum mechanics.
- Compute the residue of a function and use the Residue Theory to evaluate a contour integral or an integral over the real line.
- Formulate/solve/classify the solutions of Partial differential equations.
- Identify linear and nonlinear PDE and solve nonlinear PDE by Charpit's method.
- Apply Variables separable methods to solve boundary value problems.
- Find the solution of one dimensional wave equation, heat equation and Laplace equation.

Text/Reference Books:

1. Grewal B S, Higher Engineering Mathematics, 40th Edition, Khanna Publications, 2007.
2. Venkataraman M K, Engineering Mathematics, Vol. I & II, National Publishing Company, 1993.
3. Venkataraman M K, Engineering Mathematics, National Publishing Company, 1995.
4. Grewal B S, Engineering Mathematics, 13th Edition, Khanna Publications.
5. Kreyszig E, Advanced Engineering Mathematics, 8th edition, Wiley, 1998.

CS302C

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

III Semester B.Tech (CSE) – CBCS Regulations-2020
(With effect from the academic year 2021-22)

DATABASE MANAGEMENT SYSTEMS

No.of Credits: 4 Instruction Hours/Week: 3L+1T

Course Objectives:

- To learn data models, conceptualize and depict a database system using ER diagram
- To understand the internal storage structures in a physical DB design
- To demonstrate the fundamental concepts, operation and function of different components of database systems.
- To describe the roles of transaction processing and concurrency control in a modern DBMS.
- To demonstrate key issues in the operation of a DBMS including query processing, security and integrity.
- To design and implement a database application.

UNIT-I

Introduction: Managing Data, File Systems versus a DBMS, Advantages of a DBMS, Storing data in a DBMS, Queries in a DBMS, Transactions, Structure of a DBMS.

Introduction to Data base design: ER diagrams, Beyond ER Design, Entities, Attributes and Entity sets, Relationships and Relationship sets, Additional features of ER Model, Conceptual Design with the ER Model, Conceptual Design for Large enterprises.

Relational Model: Introduction to the Relational Model, Integrity Constraints over Relations, Enforcing Integrity constraints, Querying relational data, Logical data base Design, Introduction to Views Destroying/ altering Tables and Views.

UNIT-II

Relational Algebra and Calculus: Relational Algebra , Relational calculus, Expressive Power of Algebra and calculus.

SQL: Form of Basic SQL Query, UNION, INTERSECT and EXCEPT, Nested Queries, Aggregate Operators, NULL values , Complex Integrity Constraints in SQL, Triggers and Active Databases, Designing Active Databases

UNIT-III

Schema Refinement and Normal Forms: Introduction, Functional Dependencies, Reasoning about FDS, Normal Forms - FIRST, SECOND, THIRD Normal forms, BCNF, Properties of Decompositions, Normalization, Schema Refinement in Data base Design, Multi valued Dependencies , FOURTH Normal Form, Join Dependencies, FIFTH Normal form, Inclusion Dependencies.

Database Application Development: Accessing Databases from Applications, Introduction to JDBC, JDBC Classes and Interfaces, SQLJ, Stored Procedures.

UNIT-IV

Overview of Transaction Management: ACID Properties, Transactions and Schedules, Concurrent Execution of Transactions, Lock-based Concurrency Control, Performance Locking, Transaction Support in SQL, Introduction to Crash Recovery.
Concurrency Control: 2PL, Serializability and Recoverability, Introduction to Lock Management, Lock Conversions, Dealing with Deadlocks, Specialized Locking Techniques, Concurrency Control without Locking

Crash Recovery: Introduction to ARIES, Log, Recovery related Structures, Write-Ahead Log Protocols, Checkpointing, Recovering from a System Crash, Media Recovery, Interaction with Concurrency Control

UNIT-V

Overview of Storage and Indexing: Data on External Storage, File Organization and Indexing, Index data Structures, Comparison of File Organizations, Indexes and Performance Tuning.

Indexing and Hashing: Intuitions for tree indexes, Indexed Sequential Access Method, B+ Trees: A Dynamic Index Structure, Search, Insert, Delete, Duplicates, B+ Trees in Practice, Static Hashing, Extendable Hashing, Linear Hashing, Extendible vs. Linear Hashing.

Parallel and Distributed Databases: Introduction, Architectures for Parallel Databases, Parallel Query Evaluation, Parallelizing Individual Operations, Introduction to Distributed Databases, Distributed DBMS Architectures, Storing Data in Distributed DBMS, Distributed Catalog Management, Distributed Query Processing

Course Outcomes:

Upon successful completion of this course, the student should be able to

- Use relational algebra and relational calculus, to express database queries.
- Use SQL to interact with database management systems.
- Design appropriate database tables, using functional dependencies and normal forms.
- Implement a disk-oriented database storage manager with heap table and indexes.
- Understand, compare, and implement the major concurrency control algorithms.
- Implement database recovery algorithms and verify their correctness.
- Identify trade-offs among database systems techniques and contrast distributed/parallel alternatives for both on-line transaction processing and on-line analytical workloads.

Text Books:

1. Raghu Ramakrishnan and Johannes Gehrke, Database Management Systems, Third Edition, McGraw-Hill, 2014.
2. C. J. Date, A. Kannan and S. Swamynathan, An Introduction to Database Systems, 8th edition, Pearson Education, 2006.

Reference Books:

1. Silberschatz A, Korth H F, and Sudarshan S, Database System Concepts, 6th edition, McGraw-Hill, 2011.
2. Ramez Elmasri and Shamkant B. Navathe, Fundamentals of Database Systems,

Fourth Edition, Pearson/Addision wesley, 2007.
3. J D Ullman, H. Garcia-Molina and J. Widom, Database Systems: The Complete Book, Prentice-Hall, 2009.
4. Jeffrey A. Hoffer, Ramesh Venkataraman, Heikki Topi, Modern Database Management, 12th edition, Pearson, 2015.

CS303C

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

III Semester B.Tech (CSE) – CBCS Regulations-2020
(With effect from the academic year 2021-22)

DISCRETE MATHEMATICAL STRUCTURES

No.of Credits: 3 Instruction Hours/Week: 3

Course Objectives:

This course is designed to

- Use mathematical reasoning in order to read, comprehend, and construct mathematical arguments and theorem proving techniques.
- Familiarize students with the basic concept of functions, basic set theory, countability and counting arguments.
- Present basic concepts of number theory and teach students how to apply the same to cryptography.
- Reinforce the method of recursion and use of structural induction.
- Introduce fundamental concepts of graph theory and present different graph models.
- Familiarize students with minimum spanning trees and shortest-path problems.

UNIT I

Logic, Prepositional Equivalences, Predicates and Quantifiers, Nested Quantifiers, Rules of Inference, Introduction to Proofs, Methods of Proof and Strategy.

UNIT II

Sets, Set Operations, Functions, Sequences and Summations, Introduction to Semigroups, Groups, Subgroups, Normal subgroups.
Relations and their properties, n-ary relations and their applications, Representing relations, Closures of relations, Equivalence relations, Partial orderings, Lattices.

UNIT III

Counting: Basics of Counting, Pigeonhole principle, Permutations and Combinations, Binomial Coefficients, Generalized Permutations and Combinations, Generating Permutations and Combinations.
Advanced Counting Techniques: Recurrence Relations, Solving Recurrence Relations, Divide-and-Conquer Algorithms and Recurrence Relations, Generating Functions, Inclusion-and-Exclusion and its Applications.
Number Theory and its Applications.

UNIT IV

Introduction to graphs, Graph terminology, Applications of some special graphs, Representation of graphs, Graph isomorphism.
Connectivity: Connectedness in undirected and directed graphs, Paths and Isomorphism, Construction of reliable communication networks, Euler path, Hamilton path, Chinese postman problem, Shortest path problems, Traveling salesman problem.

UNIT V

Planar graphs, Kuratowski's theorem, Graph coloring and applications.

Introduction to trees, Application of trees, Spanning trees, Applications of backtracking, Minimum spanning trees, Flows, Cuts, Max-flow Min-cut problem.

Course Outcomes

On successful completion of this course the students will be able to:

- Verify the correctness of an argument using propositional and predicate logic
- Construct proofs using direct proof, proof by contraposition, proof by contradiction, proof by cases, and mathematical induction.
- Solve problems involving recurrence relations and generating functions.
- Construct and analyze graph models for problems in different areas.
- Design and develop real time application using graph theory

Text Books:

1. Kenneth H Rosen, Discrete Mathematics and its Applications, 6th edition, McGraw-Hill Companies.
2. Mott J L, Kandel A, and Baker T P, Discrete Mathematics for Computer Scientists and Mathematicians, 2nd edition, PHI, 2004.

Reference Books:

1. Malik D S, Sen M K, Discrete Mathematical Structures: Theory and Applications, Thomson Course Technology, 2004.
2. Mott J L, Kandel A, and Baker T P, Discrete Mathematics for Computer Scientists and Mathematicians, 2nd edition, PHI, 2004.
3. Kolman B, Busby R C, Ross S C, and Rehman N, Discrete Mathematical Structures, 5th edition, Pearson Education, 2006.
4. Lipschutz S, Lipson M, Discrete Mathematics, 2nd edition, TMH, 2006.

CS304C

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

III Semester B.Tech (CSE) – CBCS Regulations-2020
(With effect from the academic year 2021-22)

BASIC ELECTRICAL ENGINEERING

No.of Credits: 3 Instruction Hours/Week: 3

UNIT I

Basic Circuit Concepts: Electrical circuit elements (R, L and C), Classification of Circuit elements, Voltage and Current sources, Source transformation Techniques – Kirchhoff's laws – Star-delta transformation – Network reduction techniques – Mesh and Nodal Analysis for D.C. Circuits – Concept of mutual inductance – Dot convention.

UNIT II

Network Topology: Graph, tree, incidence matrix, and tie set and cut set matrices – Formulation of equilibrium equations based on graph theory. Duality and dual circuits.
A.C. Fundamentals: Periodic wave forms – Average and effective values of different waveforms – Form factor and crest factor.

UNIT III

A.C. Circuits: Phase and phase difference – Phasor notation – Concept of reactance, impedance, susceptance and admittance – Power factor – Active and reactive power – Impedance Triangle – Power triangle – Steady State analysis of single-phase A.C. circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel) – Phasor diagrams. Mesh and Nodal Analysis for A.C. Circuits.

UNIT IV

D.C. Machines: Construction of a D.C. Machine, D.C. Generator: Operation, Classification and EMF equation. D.C. Motor: Operation, Back E.M.F, Types and Applications.
Single Phase Transformers: Principle of Operation, Types, EMF equation.

UNIT V

Three Phase Induction Motor: Production of Rotating Magnetic Field, Construction and operation of 3-Phase Induction Motor.
Alternators: Construction and working of Alternators.

Course Outcomes

Having successfully completed this course the students will be able to:

- understand and analyze basic electric and magnetic circuits.
- study the working principles of electrical machines and power converters.
- introduce the components of low-voltage electrical installations.

Text/Reference Books:

1. Sudhakar and Shyammohan, Circuits and Networks: Analysis and Synthesis, 5th Edition, Tata McGraw-Hill.

2. Ravish R. Singh, Network Analysis and Synthesis, Tata McGraw-Hill.
3. Nagrath and Kothari, Basic Electrical Engineering, 4th Edition, Tata McGraw-Hill.
4. D.C.Kulshreshtha, Basic Electrical Engineering, McGraw-Hill.

CS305C

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

III Semester B.Tech (CSE) – CBCS Regulations-2020
(With effect from the academic year 2021-22)

ELEMENTS OF ELECTRONICS AND COMMUNICATION ENGINEERING

No.of Credits: 3 Instruction Hours/Week: 3

UNIT I

Basic Electronic Devices: Semiconductor fundamentals, Principle of operation and V-I Characteristics of Diodes (PN, Zener, Photo, LED, Laser Diode), Transistors (BJT, JFET, MOSFET).

Microelectronics: Concept of miniaturization of electronic systems, Basic principles of monolithic integrated circuit technology, IC fabrication of simple circuit elements.

UNIT II

Transistor Amplifiers: Concept of an amplifier -Gain, Input and Output impedance, Frequency response, Biasing of a transistor, CB, CE and CC Configurations and their characteristics, Multi stage Amplifiers.

Concept of feedback: Negative and Positive feedback, Advantages and limitations, Oscillator Operation, RC phase shift oscillator and Crystal oscillator.

UNIT III

Analog ICs: Concept of differential amplifier, Operational Amplifier (OPAMP), Characteristics of an OP AMP and its applications - Inverting and non-inverting amplifiers, Summer, Integrator, Differentiator.

555 timer, and its application as multi-vibrator, Phase Locked Loop (PLL), and its application as frequency multiplier.

UNIT IV

Basics of Communication Engineering: Introduction, Signal Spectrum, Bandwidth, Noise; Concept of Communication - Source, Channel, Sink; Types of channels; Concept of information and entropy, Shannon's law, Bit rate; Analog Modulation Schemes - AM, FM; Pulse Modulation Schemes - Sampling, PAM, PWM, PPM, PCM, DM; Multiplexing - FDM,TDM.

UNIT V

A/D and D/A Converters: D to A converters- Basic principle, Weighted resistor and ladder types; A to D Converters - Basic principle, Ramp, Successive approximation types.

Basic Electronics Instruments: Block diagram and principle of operation of - Digital Multi-meter, Function generator, Cathode Ray Oscilloscope (CRO).

Text Books:

1. Bogart Jr. T F, Beasley J S, and Rico G, Electronic Devices and Circuits, 6th edition, Pearson Education, 2006.

2. Malvino A, and Bates D J, Electronic Principles, 7th edition, Tata McGraw-Hill, 2007.

Reference Books:

1. Deshpande N P, Electronic Devices and Circuits - Principles and Applications, Tata McGraw-Hill, 2007.
2. Muthusubramanian R, Salivahanan S, and Muraleedharan K A, Basic Electrical, Electronics, and Computer Engineering, 2nd edition, Tata McGraw-Hill, 2001. (Part II - Electronics Engineering only)
3. Stanley W D, Hackworth J R, and Jones R L, Fundamentals of Electrical Engineering and Technology, Thomson Delmar Learning, 2007. (Part III - Electronic Devices and Linear Electronics only)
4. Gates E D, Introduction to Electronics, 5th edition, Thomson Delmar Learning, 2007. (Sections 3 and 4 only)
5. Storey N, Electronics - A Systems Approach, 2nd edition, Pearson Education Asia, 2001.

CS306L

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

III Semester B.Tech (CSE) – CBCS Regulations-2020

(With effect from the academic year 2021-22)

DATABASE MANAGEMENT SYSTEMS LABORATORY

No.of Credits: 1.5 Instruction Hours/Week: 3

At least 10 assignments are to be given covering the topics of the course, "Database Management Systems".

CS307L

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

III Semester B.Tech (CSE) – CBCS Regulations-2020

(With effect from the academic year 2021-22)

ELECTRONICS AND COMMUNICATION ENGINEERING LABORATORY

No.of Credits: 1.5 Instruction Hours/Week: 3

At least 10 assignments are to be given covering the topics of the courses, "Elements of Electronics and Communication Engineering".

CS309S

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

III Semester B.Tech (CSE) – CBCS Regulations-2020
(With effect from the academic year 2021-22)

BASIC PYTHON PROGRAMMING

No.of Credits: 2 Instruction Hours/Week: 1T+2P

Course Objectives:

The course is designed to:

- Python syntax and semantics and be fluent in the use of Python flow control and functions.
- the concepts of Object-Oriented Programming as used in Python.
- various problems solving approaches of computer science in various Domains.
- various data structures like lists and dictionaries using python.
- introduce Python third- Party Tools for various domains.

UNIT I

Introduction to Python Programming: Features and History of Python, The Future of Python, Writing and Executing First Python Program, Literal Constants, Variables and Identifiers, Data Types, Input Operation, Comments, Reserved Words, Indentation, Operators and Expressions, Expressions in Python, Operations on Strings, Other Data Types, Type Conversion.

Decision Control Statements: Introduction to Decision Control Statements, Selection/ Conditional Branching Statements, Basic Loop Structures/Iterative Statements, Nested Loops, The break, continue and pass Statement, The else Statement used with Loops.

UNIT II

Functions and Modules: Introduction, Function Definition, Function Call, Variable Scope and Lifetime, The return statement, More on Defining Functions, Lambda Functions or Anonymous Functions, Documentation Strings, Good Programming Practices, Recursive Functions, Modules, Packages in Python, Standard Library modules, Globals(), Locals(), and Reload(), Function Redefinition.

Python Strings Revisited: Introduction, Concatenating, Appending, and Multiplying Strings, Strings are Immutable, String Formatting Operator, Built-in String Methods and Functions, Slice Operation, ord() and chr() Functions, in and not in operators, Comparing Strings, Iterating String, The String Module, Regular Expressions, Metacharacters in Regular Expression.

UNIT III

File Handling: Introduction, File Path, Types of Files, Opening and Closing Files, Reading and Writing Files, File Positions, Renaming and Deleting Files, Directory Methods.

Data Structures: Sequence, Lists, Functional Programming, Tuple, Sets, Dictionaries.

Classes and Objects: Introduction, Defining Classes, Creating Objects, Data Abstraction, Class Method and self Argument, The _init_() Method, Class Variables and Object Variables, The _del_() Method, Other Special Methods, Public and Private Data Members, Private Methods, Calling a Class Method from Another Class Method, Built-in Functions to Check, Get, Set, and Delete Class Attributes, Built-in Class Attributes, Garbage Collection, Class Methods, Static Methods.

UNIT IV

Inheritance: Introduction, Inheriting Classes in Python, Types of Inheritance, Composition or Containership or Complex Objects, Abstract Classes and Interfaces, Metaclass.

Operator Overloading: Introduction, Implementing Operator Overloading, Reverse Adding, Overriding _getitem_() and _setitem_() Methods, Overriding the in Operator, Overloading Miscellaneous Functions, Overriding the _call_() Method.

Error and Exception Handling: Introduction to Errors and Exceptions, Handling Exceptions, Multiple Except Blocks, Multiple Exceptions in a Single Block, Except Block Without Exception, The else Clause, Raising Exceptions, Instantiating Exceptions, Handling Exceptions in Invoked Functions, Built-in and User-defined Exceptions, The finally Block, Pre-defined Clean–up Action, Re-raising Exception, Assertions in Python, Multi-threading.

UNIT V

Survey of The Most Common 3rd Party Packages: Requests, Numpy/Scipy, Matplotlib/ Pyplot, Pandas, Pillow, Flask/Django/Twisted, Pep8, Scikit-Learn/Nltk, Stanford-Corenlp, Bcrypt, Beautiful Soup, and More.

GUI Design with Tkinter: Button, Canvas, Check Button, Entry, Frame, Label, List Box, Menu, Menu Button, Message, Radio Button, Scale, Scrollbar, Text Graphics with Turtle: Motion Control, Pen, Colour, Fill, Multiple Turtles, Reset and Clear.

Course Outcomes

Having successfully completed this course the students will be able to:

- understand the structure, syntax, and semantics of the Python language.
- interpret the concepts of Object-Oriented Programming as used in Python.
- demonstrate proficiency in handling Strings and File Systems.
- implement desktop/Web-based applications using the Python programming language.

Text Books:

1. Reema Thareja, Python Programming using problem solving approach, First Edition, Oxford University Press, 2017.
2. Mark Lutz, Learning Python, Fifth Edition, O'Rielly, 2016.

Reference Books:

1. Mark Lutz, Programming Python, Fourth Edition, O'Reilly, 2010.
2. John V.Guttag, Introduction to Computation and Programming Using Python with Application to Understanding, PHI.
3. Allen Downey, Think Python: How to think like a Computer Scientist, Green Tea Press.
4. Paul Barry, Head First Python: A Brain-Friendly Guide, Second Edition, O'Reilly.
5. The Python Standard Library, Python 3.6.5 documentation (Web Resource) https://docs.python.org/3/library/.

PA310A

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

III Semester B.Tech (CSE) – CBCS Regulations-2020
(With effect from the academic year 2021-22)

CONSTITUTION OF INDIA

No.of Credits: Nil Instruction Hours/Week: 2

Course Objectives:

The objective of the course is to impart to the students

- understand the premises informing the twin themes of liberty and freedom from a civil rights perspective.
- address the growth of Indian opinion regarding modern Indian intellectuals' constitutional role and entitlement to civil and economic rights as well as the emergence of nationhood in the early years of Indian nationalism.
- address the role of socialism in India after the commencement of the Bolshevik Revolution in 1917 and its impact on the initial drafting of the Indian Constitution.

UNIT I

History and philosophy of the Indian Constitution:
History -Drafting Committee, (Composition & Working) - Preamble - Salient Features

UNIT II

Contours of Constitutional Rights & Duties: Fundamental Rights, Right to Equality, Right to Freedom, Right against Exploitation, Right to Freedom of Religion, Cultural and Educational Rights, Right to Constitutional Remedies, Directive Principles of State Policy, Fundamental Duties.

UNIT III

Organs of Governance: Parliament – Composition - Qualifications and Disqualifications - Powers and Functions, Executive President – Governor - Council of Ministers - Judiciary, Appointment and Transfer of Judges, Qualifications - Powers and Functions.

UNIT IV

Local Administration:
District's Administration Head: Role and Importance, Municipalities: Introduction, Mayor and role of Elected Representative, CEO of Municipal Corporation. Pachayati raj: Introduction, PRI: ZilaPachayat. Elected officials and their roles, CEO ZilaPachayat: Position and role. Block level: Organizational Hierarchy (Different departments), Village level: Role of Elected and Appointed officials, Importance of grass root democracy

UNIT V

Election Commission: Election Commission: Role and Functioning - Chief Election Commissioner and Election Commissioners. State Election Commission: Role and Functioning.
Institute and Bodies for the welfare of SC/ST/OBC and women.

Course Outcomes

Having successfully completed this course the students will be able to know:

- the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.
- the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India.
- the circumstances surrounding the foundation of the Congress Socialist Party [CSP] under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution.
- the passage of the Hindu Code Bill of 1956.

Text/Reference Books:

1. The Constitution of India, 1950 (Bare Act), Government Publication.
2. Dr. S. N. Busi, Dr. B. R. Ambedkar framing of Indian Constitution, 1st Edition, 2015.
3. M. P. Jain, Indian Constitution Law, Lexis Nexis, 7th Edition, 2014.
4. D.D. Basu, Introduction to the Constitution of India, Lexis Nexis, 2015.

CS401C

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

IV Semester B.Tech (CSE) – CBCS Regulations-2020
(With effect from the academic year 2021-22)

DIGITAL ELECTRONICS AND LOGIC DESIGN

No.of Credits: 3 Instruction Hours/Week: 3

Course Objectives

- To understand the essential knowledge on the fundamental of digital circuits
- To understand the overview on the design principles of digital computing systems

UNIT I
Number Representation, Signed and Unsigned, Code Conversion, Review of Boolean Algebra and DeMorgan's Theorem, Sum-of-Product and Product-of-Sum forms, Canonical forms, Karnaugh maps up to 6 variables.

UNIT II
MSI devices like Comparators, Multiplexers, Encoder, Decoder, Driver & Multiplexed Display, Half andFull Adders, Subtractors, Serial and Parallel Adders, BCD Adder, Barrel shifter and ALU

UNIT III
Sequential Logic Design: Building blocks like S-R, JK and Master-Slave JK FF, Edge triggered FF, Ripple and Synchronous counters, Shift registers, Finite state machines, Design of synchronous FSM, Algorithmic State Machines charts. Designing synchronous circuits like Pulse train generator, PseudoRandom Binary Sequence generator, Clock generation

UNIT IV
Logic Families and Semiconductor Memories: TTL NAND gate, Specifications, Noise margin, Propagation delay, fan-in, fan-out, Tristate TTL, ECL, CMOS families and their interfacing, Memory elements, Conceptof Programmable logic devices like FPGA. Logic implementation using Programmable Devices.

UNIT V
VLSI Design flow: Design entry: Schematic, FSM & HDL, different modeling styles in VHDL, Data typesand objects, Dataflow, Behavioral and Structural Modeling, Synthesis and Simulation VHDL constructs and codes for combinational and sequential circuits.

Course outcomes:
At the end of this course students will demonstrate the ability to

- Design and analyze combinational logic circuits
- Design and analyze synchronous sequential logic circuits
- Design and implement complicated digital systems using Verilog
- Design a VLSI circuit for an application

Text/Reference Books:

1. R.P. Jain, "Modern digital Electronics", Tata McGraw Hill, 4th edition, 2010.

2. Douglas Perry, “VHDL: Programming by Example”, Tata McGraw Hill, 4th edition.
3. Brown S, and Vranesic Z, Fundamentals of Digital Logic with VHDL Design, 3rd edition, McGraw Hill, 2012.
4. Kinney L L, and Roth Jr. C H, Fundamentals of Logic Design, 7th edition, Cengage Learning, 2015.

CS402C

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

IV Semester B.Tech (CSE) – CBCS Regulations-2020
(With effect from the academic year 2021-22)

SIMULATION AND MODELING

No.of Credits: 3 Instruction Hours/Week: 3

Course Objectives

- To introduce various system modeling and simulation techniques, and highlight their applications in different areas.
- To provide an overview of modeling, through the basic concepts of systems analysis.
- To provide the elements needed to understand how the models can be used in simulation, forecasting, planning and management, and how they can be integrated to support decision-making

UNIT -I

Introduction to Simulation, Definitions, Types of Simulation Models, Applications, System and Environment, Components of System, Scope, Advantages and Limitations of Simulation.

UNIT- II

Introduction to Sampling, Statistical Distributions – Discrete and Continuous, Generation of Random Numbers and Random Variates.

UNIT- III

Introduction to Mathematical Modeling and Types, Applications, Simulations of Queuing, Inventory and Manufacturing Systems.

UNIT- IV

Introduction to Input data and output Analysis for single Model, Comparing Alternative System Configurations.

UNIT- V

Simulation of computer system, Introduction, Simulation Tools – Process and Event Orientation, CPU and Memory simulation, Simulation of Complex Systems.

Course Outcomes

After successful completion of the course the students would be able to

- describe the components of continuous and discrete systems and simulate the same.
- model any system from different fields.
- discuss the simulation methods and select the suitable technique on the problems.
- implement the model on the computer and from the results, check for the validity of the model and correctness of the assumptions present in the model.
- understand the limitations of their model and nuances in computer modeling of systems.

Text Books:

1. Banks J, Carson II J S, Nelson B L, Nicole D M and Shahabudeen P, Discrete-Event System Simulation, Pearson Education, 2007.

2. Geoffrey Gordon, System Simulation, 2nd edition, Pearson Education, 2015.

Reference Book:

1. Seila A F, Ceric V, and Tadimalla P, Applied Simulation Modeling, Thomson Brooks/Cole, 2003.

HS403C

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

IV Semester B.Tech (CSE) – CBCS Regulations-2020
(With effect from the academic year 2021-22)

MANAGERIAL ECONOMICS AND ACCOUNTANCY

No.of Credits: 3 Instruction Hours/Week: 3

UNIT I

Introduction to Engineering Economics, Fundamental concepts, Time value of money, Cash flow and Time Diagrams, choosing between alternative investment proposals, Methods of Economic analysis (pay back, ARR, NPV, IRR and B/C ratio), The effect of borrowing on investment, Equity vs Debt Financing, concept of leverage, Income tax leverage.

UNIT II

Depreciation and methods of calculating depreciation (straight line, sum of the years digit method, Declining balance method, Annuity method, Sinking fund method), National income accounting Methods of estimation, Various concepts of National Income, Significance of National income Estimation and its limitations.

UNIT III

Inflation: Definition, Process and Theories of inflation and Measure of control. New Economic Policy 1991(Industrial Policy, Trade Policy, Fiscal Policy), Impact on Industry.

UNIT IV

Accounting Principles, procedure, Double entry system, Journal, ledger, Trial balance, Cashbook, preparation of Trading and Profit and Loss account, Balance sheet.

UNIT V

Cost Accounting: Introduction, Classification of costs, Methods of costing, Techniques of costing, Cost sheet and preparation of cost sheet, Break-even Analysis, Meaning and its application, Limitation.

Course Outcomes:

On successful completion of this course the students will be able to

- Understand Macro Economic environment of the business and its impact on enterprise.
- Identify various cost elements of the product and its effect on decision making.
- Understand the concepts of financial management and smart investment.
- Prepare the Accounting records and interpret the data for Managerial Decisions.

Text/Reference Books:

1. Henry Malcom Steiner, Engineering Economics Principles, 2nd Edition, McGraw Hill Education, 1996.
2. Dewett. K.K., Modern Economic Theory, Sultan Chand and Co., 2006.
3. A.N. Agarwal, Indian Economy, Wiley Eastern Limited, New Delhi.
4. Jain and Narang, Accounting Part-I, Kalyani Publishers, 2011.
5. Arora, M.N. Cost Accounting: Principles and Practice, 12th Edition, Vikas Publication, 2012.

CS404C

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

IV Semester B.Tech (CSE) – CBCS Regulations-2020
(With effect from the academic year 2021-22)

COMPUTER ORIENTED NUMERICAL METHODS

No.of Credits: 3 Instruction Hours/Week: 3

UNIT I

Errors in Numerical Calculations: Truncation and Round-off errors, Effect of errors in data; Closed form solution versus Iterative methods.
Roots of Nonlinear Equations: Bisection, False position and, Newton-Raphson methods.

UNIT II

Iterative Solution of Liner Equations - Jacobi iteration, Gauss-Seidel and Relaxation methods; Convergence of iteration methods.

UNIT III

Interpolation - Lagrange polynomials, Newton's difference formula, Cubic splines, and Two dimensional interpolation.

UNIT IV

Numerical Differentiation - Differentiating continuous and tabulated functions, Difference tables and Richardson extrapolation. Numerical integration - Trapezoidal, Simpson's 1/3 and Simpson's 3/8 Rules.

UNIT V

Numerical Solution of Ordinary Differential Equations - Taylor's Series, Euler's, Runge-Kutta methods.

Text Books:

1. Schilling R J, and Harries S L, Applied Numerical Methods for Engineers Using MATLAB and C, Thomson Brooks/Cole, 2006.

Reference Books:

1. Chapra S C, Applied Numerical Methods with MATLAB for Engineers and Scientists, 2nd edition, Tata McGraw-Hill, 2007.
2. Gerald C F, and Wheatley P O, Applied Numerical Analysis, 6th edition, Pearson Education Asia, 2002.
3. Niyogi P, Numerical Analysis and Algorithms, Tata McGraw Hill, 2003.
4. Heath M T, Scientific Computing: An Introductory Survey, McGraw-Hill, 1997.

CS405C

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

IV Semester B.Tech (CSE) – CBCS Regulations-2020
(With effect from the academic year 2021-22)

COMPUTER ORGANIZATION

No.of Credits: 3 Instruction Hours/Week: 3

Course Objectives

The course is designed to

- make the students understand the basic structure and operations of various functional units of a digital computer.
- familiarize the students with arithmetic and logic unit and implementation of fixed point and floating-point arithmetic operations.
- Make the stdents understand how to design processing unit using hardwired control and microprogrammed control approaches.
- familiarize the students with hierarchical memory system.
- expose the students with different ways of communicating with I/O devices and standard I/O interfaces.

UNIT I

Structure of Computers: Introduction, Performance, Memory addressing and Operations, Instructions and Instruction sequencing, Addressing modes, Basic l/0 operations, Pushdown stacks, Subroutines, Encoding of machine instructions, Brief description and functional classification of IA-32 Pentium instruction set

UNIT II

Basic Processing Unit: Fundamental concepts, Single and Multiple bus organization, Hardwired control, Multiprogrammed control – Microinstructions, Microprogram sequencing, Wide-branch addressing, Microinstructions with next-address field, Prefetching microinstructions.

Arithmetic: Multiplication – Booth algorithm; Integer division, Floating-Point Addition and Subtraction.

UNIT III

The memory System: Basic concepts, RAM and ROM Memories and their internal organization, Cache Memories - Mapping functions, Replacement algorithms; Performance Considerations, Virtual Memories, Secondary Storage.

UNIT IV

Input/ Output Organization: Accessing l/O devices; Interrupts –Enabling and disabling, Handling multiple devices; Direct Memory Access - Bus Arbitration; Buses – Synchronous and Asynchronous; Interface circuits – Parallel port, Serial port

UNIT V

Pipelining: Basic concepts, Data hazards, Instruction hazards, Influence on instruction sets, Data path and control considerations, Superscalar operation.

Processor Families: The ARM family, The Motorola 680x0 and Coldfire families, The IA-32 family.

Course Outcomes:

On successful completion of this course the students will be able to

- Identify the basic structure and functional units of a digital computer.
- Analyze the effect of addressing modes on the execution time of a program.
- Design processing unit using the concepts of hardwired control or microprogrammed control.
- Select appropriate interfacing standards for I/O devices.
- Identify the roles of various functional units of a computer in instruction execution.
- Understand memory hierarchy and its impact on computer cost/performance.
- Understand the advantage of instruction level parallelism and pipelining for high performance processor design.

Text Books

1. Hamacher C, Vranesic Z, and Zaky S, Computer Organization, 5th edition, McGraw-Hill.

Reference Books

1. Heuring V P, and Jordan H F, Computer systems Design and Architecture Addison-Wesley.
2. Carpinelli J D, Computer System Organization and Architecture. Addison-Wesley 2001.
3. Mano M M, Computer system Architecture, 4th edition, Pearson Education Asian 2002.

CS406C

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

IV Semester B.Tech (CSE) – CBCS Regulations-2020
(With effect from the academic year 2021-22)

DESIGN AND ANALYSIS OF ALGORITHMS

No.of Credits: 3 Instruction Hours/Week: 3

Course Objectives:

- To understand how to design an algorithm for the given problem.
- To analyze the complexity of an algorithm in terms of time and space.
- To get better insight on different strategies of algorithm design.

UNIT-I

Introduction: What is an Algorithm?, Algorithm Specification, Performance Analysis - Space Complexity, Time Complexity, Amortized Complexity, Asymptotic Notation (O, Ω, Θ), Practical Complexities, Performance Measurement, Randomized Algorithms: An Informal Description, Identifying the Repeated Element, Primality Testing, Advantages and Disadvantages.

Sets and Disjoint Set Union: Introduction, Union and Find Operations.

UNIT-II

Divide-and-Conquer: General Method, Defective Chess Board, Binary Search, Finding the Maximum and Minimum, Merge Sort, Quicksort, Selection, Strassen's Matrix Multiplication, Convex Hull.

UNIT-III

The Greedy Method: The General Method, Container Loading, Knapsack Problem, Tree Vertex Splitting, Job Sequencing with Deadlines, Minimum-Cost Spanning Trees, Optimal Storage on Tapes, Optimal Merge Patterns, Single-Source Shortest Paths.

Basic Traversal and Search Techniques: Techniques for Binary Trees, Techniques for Graphs, Connected Components and Spanning Trees, Biconnected Components and DFS.

UNIT-IV

Dynamic Programming: The General Method, Multistage Graphs, All Pairs Shortest Paths, Single-Source Shortest Paths: General Weights, Optimal Binary Search Trees, String Editing, 0/1-Knapsack, Reliability Design, The Traveling Salesperson Problem, Flow Shop Scheduling.

Backtracking: The General Method, The 8-Queens Problem, Sum of Subsets, Graph Coloring, Hamiltonian Cycles, Knapsack Problem.

UNIT-V

Branch-and-Bound: The Method, 0/1 Knapsack Problem, Traveling Salesperson, Efficiency Considerations.

$\mathcal{NP}$-Hard and $\mathcal{NP}$-Complete Problems: Basic Concepts, Cook's Theorem, NP-Hard Graph Problems, NP-Hard Scheduling Problems.

PRAM Algorithms: Introduction, Computational Model, Fundamental Techniques and Algorithms, Selection.

Course Outcomes:

Upon successful completion of this course, the student should be able to

- Develop systematically an algorithm for solving a problem
- Analyze the time and space complexity of the given algorithm
- Identify algorithm design methodology to solve problems.
- Distinguish between P and NP classes of problems

Text Books:

1. Ellis Horowitz, Sartaj Sahni, and Sanguthevar Rajasekaran, Fundamentals of Computer Algorithms, 2nd edition, Universities Press, 2008.
2. Cormen T H, Leiserson C E, Rivest R L, and Stein C, Introduction to Algorithms, 3rd edition, Prentice-Hall of India, 2009.

Reference Books:

1. Levitin A, Introduction to the Design and Analysis of Algorithms, 3rd edition, Pearson Education, 2012.
2. Goodrich M T, Tamassia R, Algorithm Design, Wiley, 2008.
3. Skiena S S, The Algorithm Design Manual, 2nd edition, Springer, 2012.
4. Heineman G T, Pollice G, Selkow S, Algorithms in a Nutshell, 2nd edition, O'Reilly, 2016.
5. Dave P H, and Dave H B, Design and Analysis of Algorithms, 2nd edition, Pearson Education, 2008.

CS407L

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

IV Semester B.Tech (CSE) – CBCS Regulations-2020

(With effect from the academic year 2021-22)

ALP AND VHDL LABORATORY

No.of Credits: 1.5 Instruction Hours/Week: 3

At least 10 assignments are to be given covering the topics of the course, "Assembly Language Programming and VHDL".

CS408L

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

IV Semester B.Tech (CSE) – CBCS Regulations-2020

(With effect from the academic year 2021-22)

ALGORITHMS LABORATORY

No.of Credits: 1.5 Instruction Hours/Week: 3

At least 10 assignments are to be given covering the topics of the courses, "Design and Analysis of Algorithms".

CS409S

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

IV Semester B.Tech (CSE) – CBCS Regulations-2020
(With effect from the academic year 2021-22)

BASIC WEB DESIGNING

No.of Credits: 2 Instruction Hours/Week: 1T+2P

Course Objectives:
The objectives of this course is to acquire knowledge on the

- Web related terminology and how does a website work.
- Web standards and W3C elements
- Responsive Web Designing
- Client-side Scripting Languages (Front End)
- Domains and Hosting

UNIT I
Introduction to Web and Web Design Principles:
Brief History of Internet, What is World Wide Web, Why create a web site, Web Standards, Web pages, Website, Web browsers and Web servers and Web protocols. Basic principles involved in developing a web site, Planning process, Five Golden rules of web designing, Designing navigation bar, Page design, Home Page Layout, Design concept.

UNIT II
Introduction to HTML:
What is HTML, HTML Documents, Basic structure of an HTML document, Creating an HTML document, Mark up Tags, Heading-Paragraphs, Line Breaks, HTML Tags. Introduction to elements of HTML, Working with Text, Working with Lists, Tables and Frames, Working with Hyperlinks, Images and Multimedia, Working with Forms and controls.

UNIT III
Introduction to Cascading Style Sheets:
Concept of CSS, Creating Style Sheet, CSS Properties, CSS Styling (Background, Text Format, Controlling Fonts), Working with block elements and objects, Working with Lists and Tables, CSS Id and Class, Box Model (Introduction, Border properties, Padding Properties, Margin properties), CSS Advanced (Grouping, Dimension, Display, Positioning, Floating, Align, Pseudo class, Navigation Bar, Image Sprites, Attribute sector), CSS Color, Creating page Layout and Site Designs.

UNIT IV
Introduction to Java Script:
What is Java Script? Basics of Java Script: Variables, functions, and Operators, select HTML elements with Java Script, Java Script Events and Event Handlers, Regular expressions and pattern matching in Java Script. Form validation using Java Script.

UNIT V
Introduction to Web Publishing or Hosting:
Creating the Web Site, Saving the site, Working on the web site, Creating web site structure,

Creating Titles for web pages, Themes-Publishing web sites. Case study: Web publishing and hosting using Heroku cloud platform (https://www.heroku.com/).

Course Outcomes

Having successfully completed this course the students will be able to:

- describe and explain the relationship among HTML, XHTML, CSS, JavaScript, XML and other web technologies.
- create and publish advanced web pages with the help of HTML frames, scripting languages, and CSS.
- design forms for thick clients using JavaScript with interactive responsiveness and validations.
- design, host and publish websites in various domains.

Text Books:

1. Kogent Learning Solutions Inc., HTML 5 in simple steps, Dreamtech Press.
2. A beginner's guide to HTML, NCSA, 14th May 2003.
3. Murray, Tom/Lynchburg, Creating a Web Page and Web Site, College, 2002.

Reference Books:

1. Web Designing and Architecture-Educational Technology Centre, University of Buffalo.
2. Steven M Schafer, HTML, XHTML, CSS and JavaScript, Wiley India.
3. Ian Pouncey, Richard York, Beginning CSS: Cascading Style Sheets for Web Design, Wiley India.
4. Kogent Learning, Web Technologies: HTML, JavaScript, Wiley India.

CS501C

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

V Semester B.Tech (CSE) – CBCS Regulations-2020
(With effect from the academic year 2022-23)

FORMAL LANGUAGES AND AUTOMATA THEORY

No.of Credits: 3 Instruction Hours/Week: 3

Course Objectives:

The course is designed to

- Identify different formal language classes and their relationships
- Design grammars and recognizers for different formal languages
- Understand the logical limits to computational capacity
- Get proper insight on un-decidable problems

UNIT I

Why study Automata Theory, Central Concepts of Automata Theory, Informal Picture of Finite Automata, Deterministic Finite Automata, Nondeterministic Finite Automata and Applications, Finite Automation with Epsilon Transitions.

UNIT II

Regular Expressions and their Applications, Finite Automata and Regular Expressions, Algebraic Laws for Regular Expressions.
Properties of Regular Languages, Equivalence and Minimization of Automata.

UNIT III

Context Free Grammars (CFG), Parse Trees, Applications of CFG, Ambiguity in Grammars and Languages.
Definition of Pushdown Automaton, The Languages of a PDA, Equivalence of PDA's and CFG's, Deterministic Pushdown Automata.

UNIT IV

Normal forms for CFG, Pumping Lemma for Context Free Languages, Closure and Decision Properties of CFLs
Turing Machine Model, Representation of Turing Machines, Language Acceptability by TM, Design of TMs, Universal Turing Machine, Halting Problem of TM, Church-Turing Thesis.

UNIT V

A Language that is not Recursively Enumerable, An Undecidable Problem that is Recursively Enumerable, Undecidable Problems about Turing Machines,
The Classes of P and NP, NP Complete Problem.

Text Books:

1. John E. Hopcroft, Rajeev Motwani and Jeffrey D. Ullman, Introduction to Automata Theory, Languages, and Computation, Pearson Education Asia.
2. Martin J C, Introduction to Languages and the Theory of Computation, 3rd edition, Tata McGraw-Hill, 2003.

Reference Books:

1. Krithivasan K, Introduction to Formal Languages, Automata Theory and Computation, Pearson Education, 2009.
2. Rich E, Automata, Computability, and Complexity – Theory and Applications, Pearson Education, 2012.
3. Singh A, Elements of Computation Theory, Springer, 2009.
4. Cohen D I A, Introduction to Computer Theory, 2nd edition, John Wiley, 2000.
5. Lewis H, Papadimitriou C H, Elements of the Theory of Computation, 2nd edition, Prentice Hall, 1997.

Course Outcomes

At the end of the course, students will be able to

- Write a formal notation for strings, languages and machines.
- Design finite automata to accept a set of strings of a language.
- Determine whether the given language is regular or not.
- Design context free grammars to generate strings of context free language.
- Determine equivalence of languages accepted by pushdown automata and languages generated by context free grammars
- Distinguish between computability & non-computability and decidability & undecidability.

CS502C

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

V Semester B.Tech (CSE) – CBCS Regulations-2020
(With effect from the academic year 2022-23)

OPERATING SYSTEMS

No.of Credits: 3 Instruction Hours/Week: 3

Course Objectives:

The course is designed to

- provide knowledge about the services rendered by operating systems
- present detail discussion on processes, threads and scheduling algorithms.
- discuss various file-system design and implementation issues
- provide good insight on various memory management techniques
- expose the students with different techniques of handling of deadlocks
- familiarize students the basics of Linux system and perform administrative tasks on Linux servers
- discuss how the protection domains help to achieve security in a system

UNIT I

Operating Systems Overview: Operating system functions, Operating system structure, Operating systems operations, protection and security, Computing environments, Open-Source Operating Systems

System Structures: Operating System Services, User and Operating-System Interface, systems calls, Types of System Calls, system programs, operating system structure, operating system debugging, System Boot.

UNIT II

Process Concept: Process scheduling, Operations on processes, Interprocess communication, Communication in client server systems.

Multithreaded Programming: Multitheading models, Thread libraries, Threading issues, Examples.

Process Scheduling: Basic concepts, Scheduling criteria, Scheduling algorithms, Multiple processor scheduling, Thread scheduling, Examples.

Inter-process Communication: Race conditions, Critical Regions, Mutual exclusion with busy waiting, Sleep and wakeup, Semaphores, Mutexes, Monitors, Message passing, Barriers, Classical IPC Problems - Dining philosophers problem, Readers and writers problem.

UNIT III

Memory-Management Strategies: Introduction, Swapping, Contiguous memory allocation, Paging, Segmentation, Examples.

Virtual Memory Management: Introduction, Demand paging, Copy on-write, Page replacement, Frame allocation, Thrashing, Memory-mapped files, Kernel memory allocation, Examples.

UNIT IV

Deadlocks: Resources, Conditions for resource deadlocks, Ostrich algorithm, Deadlock detection and recovery, Deadlock avoidance, Deadlock prevention.

File Systems: Files, Directories, File system implementation, management and optimization.
Secondary-Storage Structure: Overview of disk structure, and attachment, Disk scheduling, RAID structure, Stable storage implementation.

UNIT V

System Protection: Goals of protection, Principles and domain of protection, Access matrix, Access control, Revocation of access rights.
System Security: Introduction, Program threats, System and network threats, Cryptography for security, User authentication, Implementing security defenses, Firewalling to protect systems and networks, Computer security classification.
Case Studies: Linux, Microsoft Windows 7.

Text Books:

1. Silberschatz A, Galvin P B, and Gagne G, Operating System Concepts, 9th edition, Wiley, 2013.
2. Tanenbaum A S, Modern Operating Systems, 3rd edition, Pearson Education, 2008. (for Interprocess Communication and File systems.)

Reference Books:

1. Tanenbaum A S, Woodhull A S, Operating Systems Design and Implementation, 3rd edition, PHI, 2006.
2. Dhamdhere D M, Operating Systems A Concept Based Approach, 3rd edition, Tata McGraw-Hill, 2012.
3. Stallings W, Operating Systems -Internals and Design Principles, 6th edition, Pearson Education, 2009
4. Nutt G, Operating Systems, 3rd edition, Pearson Education, 2004

Course Outcomes

By the end of this course students will be able to:

1. Recognize how the applications interact with the operating system as the later working as intermediary program between the machine and the application.
2. Understand how operating system manages resources such as processors, memory and I/O.
3. Demonstrate knowledge and understanding of how concurrency in OS is handled.
4. Understand the techniques used to implement the process manager
5. Implement various memory management and demand paging techniques.
6. Comprehend virtual memory abstractions in operating systems
7. Design and develop file system interface.
8. Understand various schemes available for achieving system protection and system security

CS503C

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

V Semester B.Tech (CSE) – CBCS Regulations-2020
(With effect from the academic year 2022-23)

COMPUTER NETWORKS

No.of Credits: 3 Instruction Hours/Week: 3

Course Objectives:
The course is designed to

- Provide insight about fundamental concepts, basic taxonomy and terminology of Computer Networks.
- Gain comprehensive knowledge about the principles, protocols, and significance of Layers in OSI and TCP/IP

UNIT I

Introduction to Computer Networks: Networks, Component and Categories, Topologies, Transmission Media, Reference Models: ISO/OSI Model and TCP/IP Model.
Physical Layer: Analog and Digital Signals, Periodic Analog Signals, Transmission Impairments, Data rate limits, Performance, Digital data transmission techniques, Analog data transmission techniques, Multiplexing: FDM, WDM and TDM; Spread Spectrum, Switching: Circuit and Packet.

UNIT II

Data Link Layer and Medium Access Sub Layer: Design Issues, Error Detection and Error Correction, Elementary Data Link Protocols, Sliding Window Protocols, Channel allocation problems, Multiple Access Protocols: Pure ALOHA, Slotted ALOHA, CSMA/CD, CSMA/CA; IEEE 802.3 Ethernet.

UNIT III

The Network Layer: Network layer design issues, Routing Algorithms, Congestion Control Algorithms, Quality of Service, Internetworking, The Network layer in the Internet: IPV4 Addresses, IPV6, Internet Control protocol, OSPF, BGP, IP, ICMPv4, IGMP.

UNIT IV

The Transport Layer: The Transport Service, Elements of Transport Protocols, Congestion Control, Internet Transport Protocols: UDP, TCP; Network Performance Measurement.

UNIT V

The Application Layer: Introduction, Client-Server Programming, Domain Name System (DNS), WWW and HTTP, FTP, E-mail, TELNET, Secure Shell, SNMP, IP Security Architecture, Firewalls.

Text Books:

1. Computer Networks, Andrew S. Tanenbaum, Wetherall, Pearson, 5th edition, 2010.
2. Data communications and Networking, Behrouz A. Forouzan, Mc Graw Hill Education, 5th edition, 2012.

Reference Books:

1. Kurose J F, Ross K W, *Computer Networking – A Top-Down Approach*, 5th edition, Pearson Education, 2010.
2. Peterson L L, Davie B S, *Computer Networks - A Systems Approach*, 5th edition, Morgan Kaufmann, 2011.
3. Forouzan B A, Mosharraf F, *Computer Networks – A Top-Down Approach*, Tata McGraw-Hill, 2012.
4. Olifer N, Olifer V, *Computer Networks – Principles, Technologies, and Protocols for Network Design*, Wiley, 2006.

Course Outcomes

By the end of this course students will be able to:

- Choose the transmission media depending on the requirements.
- Explain the functions of different layer of the OSI Protocol
- Analyze MAC layer protocols and LAN technologies
- Implement routing and congestion control algorithms
- Design new protocols for computer network.
- Configure DNS, DDNS, TELNET, EMAIL, FTP, WWW, HTTP, SNMP, Bluetooth, Firewalls using open source software and tools.

CS504C

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

V Semester B.Tech (CSE) – CBCS Regulations-2020
(With effect from the academic year 2022-23)

SOFTWARE ENGINEERING

No.of Credits: 3 Instruction Hours/Week: 3

Course Objectives:

The course is designed to understand

- Software life cycle models.
- Software requirements and SRS document.
- Different software design strategies
- Quality control and how to ensure good quality software.
- Planning and estimation of software projects.
- Maintenance of software and gain knowledge of the overall project activities.

UNIT I

Introduction to Software Engineering: The Nature of Software, The Unique Nature of WebApps, Software Engineering, Software Process, Software Engineering Practice, Software Myths.

Process Models: A Generic Process Model, Process Assessment and Improvement, Prescriptive Process Models, Specialized Process Models, The Unified Process, Personal and Team Process Models, Process Technology, Product and Process.

Agile Development: Agility, Agility and the Cost of Change, Extreme Programming, Agile Process Models

UNIT II

Understanding Requirements: Requirements Engineering, Eliciting Requirements, Developing Use Cases, Building the Requirements Model, Negotiating Requirements, Validating Requirements.

Requirements Modeling: Requirements Analysis, Scenario based Modeling, Class based Modeling, Requirements Modeling Strategies, Flow Oriented Modeling, Patterns for Requirement Modeling, Requirements Modeling for WebApps

Design Concepts: Design Process, Design Concepts, Design Model.

Architectural Design: Software Architecture, Architectural Genres, Architectural Styles, Architectural Design, Alternative Architectural Designs, Architectural Mapping using Data flow.

UNIT III

Component Level Design: Component, Class based Components, Conducting Component level design, Component level Design for WebApps, Designing Traditional Components, Component based Development.

User Interface Design: The Golden Rules, User Interface Analysis and Design, Interface Analysis, Interface Design Steps, WebApp Interface Design, Design Evaluation.

Pattern Based Design: Design Patterns, Pattern based Software Design, Architectural Patterns, Component Level Design Patterns, User Interface Design Patterns.

UNIT IV

Software Quality Concepts: Software Quality, Software Quality Dilemma, Achieving Software Quality.

Software Quality Assurance: Elements of Software Quality Assurance, SQA Goals and Metrics, Formal Approaches to SQA, Statistical SQA, Software Reliability.

Software Testing Strategies: A Strategic Approach to Software Testing, Strategic Issues, Unit Testing and Integration Testing (both Conventional and OO Software), Test Strategies for WebApps, Validation Testing, System Testing, Art of Debugging.

Testing Conventional Applications: Software Testing Fundamentals, Internal and External View of Testing, White-Box Testing, Basis Path Testing, Control Structure Testing, Black-Box Testing, Model based Testing, Testing for Specialized Environments, Patterns for Software Testing.

Computer Aided Software Engineering: CASE and its Scope, CASE Environment, CASE Support in Software Life Cycle, Characteristics of CASE Tools, Towards Second Generation CASE Tool.

UNIT V

Managing Software Projects: Project Management Concepts, Metrics in the Process and Project Domains, Software Measurement, Metrics for Software Quality, Project Planning Process, Software Scope and Feasibility, Software Project Estimation, Decomposition Techniques, Empirical Estimation Models, Estimation for OO Projects, Project Scheduling – Basic Principles, Defining a Task Set and Task Network, Scheduling, Introduction to Risk Management, Software Maintenance, Software Supportability, Software Reengineering, Reverse Engineering, Restructuring, Forward Engineering, Economics of Reengineering.

Text Books:

1. Pressman R S, *Software Engineering: A Practitioner's Approach*, 7th edition, McGraw-Hill, 2010.
2. Sommerville I, *Software Engineering*, 9th edition, Pearson Education, 2011.

Reference Books:

1. Jalote P, *Software Engineering: A Precise Approach*, Wiley, 2010.
2. Braude E J, Bernstein M E, *Software Engineering: Modern Approaches*, 2nd edition, Wiley, 2010.
3. Saleh K A, *Software Engineering*, J Ross Publishing, 2009.
4. Bruegge B, Dutoit A H, *Object-Oriented Software Engineering Using UML, Patterns, and Java*, 3rd edition, Prentice Hall, 2009.
5. Bennett S, McRobb S, Farmer R, *Object-Oriented System Analysis and Design Using UML*, 4nd edition, McGraw-Hill, 2010.
6. Lethbridge T C, Laganiere R, *Object-Oriented Software Engineering*, 2nd edition, McGraw-Hill, 2005.

Course Outcomes

By the end of this course students will be able to

- Define and develop a software project from requirement gathering to implementation.
- Obtain knowledge about principles and practices of software engineering.
- Focus on the fundamentals of modeling a software project.
- Obtain knowledge about estimation and maintenance of software systems
- Comprehend, assess, and calculate the cost of risk involved in a project management
- Implement testing methods at each phase of SDLC

CS505O

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

V Semester B.Tech (CSE) – CBCS Regulations-2020

(With effect from the academic year 2022-23)

OPEN ELECTIVE I

No.of Credits: 3 Instruction Hours/Week: 2L+2P

- Open elective courses are to be successfully completed on SWAYAM online portal of Government of India.
- Courses offered by Department as Program Core/ Program Elective/ Audit courses shall not be opted as open elective.

CS506L

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

V Semester B.Tech (CSE) – CBCS Regulations-2020
(With effect from the academic year 2022-23)

OPERATING SYSTEMS LABORATORY

No.of Credits: 1.5 Instruction Hours/Week: 3

At least 12 assignments are to be given covering the topics of the course, "Operating Systems".

CS507L

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

V Semester B.Tech (CSE) – CBCS Regulations-2020
(With effect from the academic year 2022-23)

COMPUTER NETWORKS LABORATORY

No.of Credits: 1.5 Instruction Hours/Week: 3

At least 12 assignments are to be given covering the topics of the course, "Computer Networks".

CS508S

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

V Semester B.Tech (CSE) – CBCS Regulations-2020
(With effect from the academic year 2022-23)

JAVA PROGRAMMING (Skill Advance Course)

No.of Credits: 3 Instruction Hours/Week: 2T+2P

Course Objectives:
The course is designed to

- Identify Java language components and how they work together in applications.
- Learn how to design a graphical user interface (GUI) with Java Swing.
- Understand how to use Java APIs for program development.
- Learn how to extend Java classes with inheritance and dynamic binding.
- Learn how to use exception handling in Java applications.
- Understand how to design applications with threads in Java.

The course shall cover the following topics:

- Introduction
- Data Types, Variables, Arrays, Operators
- Control Statements
- Classes and Methods
- Inheritance
- Packages and Interfaces
- Exception handling
- Stream based I/O
- Multithreaded Programming
- The Collections Framework
- Networking
- Applet and AWT
- GUI Programming with Swings
- Introduction to JDBC

Text Books:

1. Herbert Schildt, *Java The complete reference*, 9th edition, McGraw Hill Education (India) Pvt. Ltd.

Reference Books:

1. Paul Dietel, Harvey Dietel, *Java How to Program*, 10th Edition, Pearson Education.
2. T. Budd, *Understanding Object-Oriented Programming with Java*, updated edition, Pearson Education.
3. Cay S. Horstmann, *Core Java Volume – 1 Fundamentals*, Pearson Education.
4. Sagayaraj, Dennis, Karthik and Gajalakshmi, *Java Programming for core and advanced learners*, University Press
5. Y. Daniel Liang, *Introduction to Java programming*, Pearson Education.
6. P. Radha Krishna, *Object Oriented Programming through Java*, University Press.
7. S. Malhotra, S. Chaudhary, *Programming in Java*, 2nd edition, Oxford Univ. Press.
8. R.A. Johnson, *Java Programming and Object-oriented Application Development*, Cengage Learning.

Course Outcomes

Having successfully completed this course the students will be able to:

- Write programs for solving real world problems using java collection frame work.
- Write multithreaded programs.
- Write GUI programs using swing controls in Java.

ME509M

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

V Semester B.Tech (CSE) – CBCS Regulations-2020
(With effect from the academic year 2022-23)

UNIVERSAL HUMAN VALUES

No.of Credits: Nil Instruction Hours/Week: 2

Course Objectives:
The course is designed to

- develop a holistic perspective based on self-exploration about themselves (human being), family, society and nature/existence.
- understand (or developing clarity) the harmony in the human being, family, society and nature/existence.
- strengthen self-reflection and to develop commitment and courage to act.
- understand social responsibility of an engineer.
- appreciate ethical dilemma while discharging duties in professional life.

UNIT I

Introduction - Need, Basic Guidelines, Content and Process for Value Education: Purpose and motivation for the course, Self-Exploration–what is it? - Its content and process; 'Natural Acceptance' and Experiential Validation- as the process for self-exploration. Continuous Happiness and Prosperity- A look at basic Human Aspirations. Right understanding, Relationship and Physical Facility- the basic requirements for fulfilment of aspirations of every human being with their correct priority. Understanding Happiness and Prosperity correctly - A critical appraisal of the current scenario. Method to fulfil the above human aspirations: understanding and living in harmony at various levels.

UNIT II

Understanding Harmony in The Human Being - Harmony in Myself! :
Understanding human being as a co-existence of the sentient 'I' and the material 'Body'. Understanding the needs of Self ('I') and 'Body' - happiness and physical facility (Sukh and Suvidha). Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer). Understanding the characteristics and activities of 'I' and harmony in 'I'. Understanding the harmony of I with the Body: Sanyam and Health; correct appraisal of Physical needs, meaning of Prosperity in detail. Programs to ensure Sanyam and Health.

UNIT III

Understanding Harmony in The Family and Society- Harmony in Human-Human Relationship: Understanding harmony in the Family - the basic unit of human interaction. Understanding values in human-human relationship; meaning of Justice (nine universal values in relationships) and program for its fulfilment to ensure mutual happiness (Ubhay-tripti); Trust (Vishwas) and Respect (Samman) as the foundational values of relationship. Understanding the meaning of Trust; Difference between intention and competence. Understanding the meaning of Respect, Difference between respect and differentiation; the other salient values in relationship. Understanding the harmony in the society (society being an extension of family): Resolution (Samadhan), Prosperity (Samridhi), fearlessness (Abhay) and co-existence as comprehensive Human Goals. Visualizing a universal harmonious order

in society- Undivided Society (Akhand Samaj), Universal Order (Sarvabhaum Vyawastha) - from family to world family.

UNIT IV

Understanding Harmony in The Nature and Existence - Whole Existence as Coexistence: Understanding the harmony in the Nature. Interconnectedness and mutual fulfilment among the four orders of nature- recyclability and self-regulation in nature. Understanding Existence as Co-existence of mutually interacting units in all-pervasive space. Holistic perception of harmony at all levels of existence.

UNIT V

Implications of The Above Holistic Understanding of Harmony on Professional Ethics: Natural acceptance of human values. Definitiveness of Ethical Human Conduct. Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order. Competence in professional ethics: a. Ability to utilize the professional competence for augmenting universal human order b. Ability to identify the scope and characteristics of people friendly and eco-friendly production systems, c. Ability to identify and develop appropriate technologies and management patterns for above production systems. Case studies of typical holistic technologies, management models and production systems. Strategy for transition from the present state to Universal Human Order: a. At the level of individual: as socially and ecologically responsible engineers, technologists and managers b. At the level of society: as mutually enriching institutions and organizations.

Text Books:

1. Human Values and Professional Ethics by R R Gaur, R Sangal, G P Bagaria, Excel Books, New Delhi, 2010.
2. Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amarkantak, 1999.

Reference Books:

1. E. F. Schumancher, 1973, Small is Beautiful: a study of economics as if people mattered. Blond & Briggs, Britain.
2. A. N. Tripathy, 2003, Human Values, New Age International Publishers.
3. Ivan IIIich, 1974, Energy & Equity, The Trinity Press, Worcester, and HarperCollins, USA
4. A Nagraj, 1998 Jeevan Vidya ek Parichay, Divya Path Sansthan, Amarkantak.
5. Sussan George, 1976, How the Other Half Dies, Penguin Press, Reprinted 1986, 1991.
6. Subhas Palekar, 2000, How to practice Natural Farming, Pracheen(Vaidik) Krishi Tantra Shodh, Amravati.
7. E G Seebauer & Robert L.Berry, 2000, Fundamentals of Ethics for Scientists & Engineers, Oxford University Press.
8. M Govindrajan, S Natrajan & V. S Senthil kumar, Engineering Ethics (including Humna Values), Eastern Economy Edition, Prentice Hall of India Ltd.
9. The Story of My Experiments with Truth - by Mohandas Karamchand Gandhi.
10. India Wins Freedom - Maulana Abdul Kalam Azad.

Relevant CDs, Movies, Documentaries & Other Literature:

1. Value Education website, http://www.uptu.ac.in
2. Story of Stuff, http://www.storyofstuff.com
3. AI Gore, An Inconvenient Truth, Paramount Classics, USA
4. Charle Chaplin, Modern Times, United Artists, USA

5. IIT Delhi, Modern Technology - the Untold Story.

Course Outcomes

Having successfully completed this course the students will be able to:

- become more aware of themselves, and their surroundings (family, society, nature)
- distinguish between values and skills, happiness and accumulation of physical facilities, the Self and the Body, Intention and Competence of an individual, etc.
- understand the role of a human being in ensuring harmony in society and nature.
- become sensitive to their commitment towards what they have understood (human values, human relationship and human society)
- distinguish between ethical and unethical practices, and start working out the strategy to actualize a harmonious environment wherever they work.

CS601C

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

VI Semester B.Tech (CSE) – CBCS Regulations-2020
(With effect from the academic year 2022-23)

COMPILER DESIGN

No.of Credits: 3 Instruction Hours/Week: 3

Course Objectives:

The course is designed to

- Enrich the knowledge in various phases of compiler and its use
- Identify different methods of lexical analysis
- Design top-down and bottom-up parsers
- Develop syntax directed translation schemes
- Develop algorithms to generate code for a target machine
- Use the tools related to compiler design effectively and efficiently

UNIT I

Introduction to Assembler, Compiler and Interpreter; Elements of ALP, Single Pass and Two Pass Assemblers, Structure of a Compiler

Lexical Analysis: Role of Lexical Analyzer, Input Buffering, Specification of Tokens, Recognition of Tokens, Lexical Analyzer Generator (Lex)

UNIT II

Syntax Analysis: Introduction, Context Free Grammars, Writing a Grammar, Top-down Parsing, Bottom-up Parsing, Introduction to LR Parsing, More Powerful LR Parsers, Introduction to YAAC.

UNIT III

Syntax Directed Translation (SDT): Syntax Definitions, Evaluation Orders for SDTs, Applications of SDTs, Schemes of SDTs

Run Time Environments: Storage Organization, Stack Allocation of Space, Access to Nonlocal Data on the Stack, Heap Management.

UNIT IV

Intermediate Code Generation: Variants of Syntax Trees, Three Address Code, Types and Declarations, Translation of Expressions, Type Checking, Control Flow Statements, Back Patching.

UNIT V

Code Generation: Issues in the Design of a Code Generator, The Target Language, Addresses in the Target Code, Basic Blocks and Flow Graphs, Optimization of Basic Blocks, A Simple Code Generator, Peephole Optimization.

Text Books:

1. Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffrey D. Ullman, Compilers Principles, Techniques and Tools, Second Edition, Pearson Education, 2014.
2. D M Dhamdhere, Systems Programming, TMH Education, 2011.

Reference Books:

1. Jean Paul Tremblay, Paul G Serenson, "The Theory and Practice of Compiler Writing", BS Publications, 2005
2. Dhamdhere, D. M., "Compiler Construction Principles and Practice", 2nd edition, Macmillan India Ltd., New Delhi, 2008

Course Outcomes

By the end of this course students will be able to:

- Design a compiler for a simple programming language
- Understand phases in the design of compiler
- Design top-down and bottom-up parsers
- Develop syntax directed translation schemes
- Comprehend and adapt to Lex and Yacc tools in compiler design

CS602C

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

VI Semester B.Tech (CSE) – CBCS Regulations-2020
(With effect from the academic year 2022-23)

ARTIFICIAL INTELLIGENCE

No.of Credits: 3 Instruction Hours/Week: 3

Course Objectives:

The course is designed to

- Understand the basic principles of AI toward problem solving, inference, perception, knowledge representation, and learning.
- Introduce the concepts of machine learning and neural networks.
- Examine the applications of AI techniques in intelligent agents, artificial neural networks and other machine learning models.

UNIT I

The History of AI: What is Intelligence, Search for Mechanical Intelligence, Evolution of Artificial Intelligence (AI), Systems Approach, Overview of topics.

Uninformed Search: General state space search, General Search Paradigms Depth-First Search, Depth-Limited Search, Iterative Deepening Search, Breadth-First Search, Bi-directional Search, Uniform-Cost Search.

Informed Search: Best-First Search, N-Queens problem, A* Search, Eight Puzzle problem, Hill Climbing Search, Simulated Annealing, Tabu Search, Constraint Satisfaction, Constraint Satisfaction algorithms: Generate and Test, Backtracking, Forward Checking and Look Ahead, Min-Conflicts Search.

UNIT II

AI and Games: Two Player Games, The Minimax Algorithm, Tic-Tac-Toe problem, Minimax with Alpha-Beta Pruning, Classical Game AI, Checkers, Chess, Scrabble, Video Game AI, Movement and Path finding, Table Lookup with Offensive and Defensive Strategy, NPC Behavior, Team AI, Real-Time Strategy AI.

Knowledge Representation (KR): Types and Role of Knowledge, Semantic Nets, Frames, Propositional Logic, First Order Logic (Predicate Logic), Semantic Web, Computational Knowledge Discovery, Ontology, Common Sense.

UNIT III

Machine Learning: Machine Learning Algorithms, Supervised Learning, Decision Trees, Unsupervised Learning, Markov Models and implementation, Nearest Neighbor Classification, 1NN and k-NN Examples. Evolutionary Computation: Introduction to Evolutionary Computation, Biological Motivation, Genetic Algorithms, Genetic Programming, Evolutionary Strategies, Differential Evolution.

UNIT IV

Neural Networks I: Concept of Neural Networks, Biological Motivation, Fundamentals of Neural Networks, The Perceptron, Least-Mean-Square (LMS) Learning, Learning with Backpropagation, Probabilistic Neural Networks, Tips for Building Neural Networks. Neural Networks II: Unsupervised Learning, Hebbian Learning, Simple Competitive Learning, k-Means Clustering, Adaptive Resonance Theory, Hopfield Auto-Associative Model.

UNIT V

Robotics and AI: Introduction, Taxonomy of Robotics, Hard vs. Soft Robotics, Braitenburg Vehicles, Natural Sensing and Control, Perception with Sensors, Actuation with Effectors, Robotic Control Systems, Simple Control Architectures, Movement Planning, Distributed Robotics. Intelligent Agents: Anatomy of an Agent, Agent Properties and AI, Hybrid Agent, Agent Architectures, Types of Architectures, Agent Languages, Agent Communication. Biologically Inspired and Hybrid Models: Cellular Automata, Artificial Immune Systems, Artificial Life, Fuzzy Logic, Evolutionary Neural Networks, Ant Colony Optimization, Affective Computing.

Text Books:

1. M Tim Jones, Artificial Intelligence - A Systems Approach, Infinity Science Press, 2008.

Reference Books:

1. Russel S, Norvig P, Artificial Intelligence: A Modern Approach, 3rd edition, Pearson Education, 2010.
2. Rich E, Knight K, Nair S B, Artificial Intelligence, 3rd edition, Tata McGraw-Hill, 2009.
3. Luger G F, Artificial Intelligence, 6th edition, Pearson Education, 2009.
4. Carter M, Minds and Computers: An Introduction to the Philosophy of Artificial Intelligence, Edinburgh University Press, 2007.
5. Coppin B, Artificial Intelligence Illuminated, Jones & Bartlett, 2004.
6. Ertel W, Introduction to Artificial Intelligence, Springer, 2011.

Course Outcomes

By the end of this course students will be able to:

- Demonstrate basic understanding of artificial intelligence and its fundamentals.
- Identify a search algorithm for a problem and estimate its time and space complexities.
- Possess the skill for representing knowledge using the appropriate technique for a given problem
- Possess the ability to apply AI techniques to solve problems of game playing, expert systems, machine learning and robotics.

CS603C

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

VI Semester B.Tech (CSE) – CBCS Regulations-2020
(With effect from the academic year 2022-23)

CRYPTOGRAPHY AND NETWORK SECURITY

No.of Credits: 3 Instruction Hours/Week: 3

Course Objectives:
This course aims at training students to master the:

- Understand the basic categories of threats to computers and networks
- Discuss various cryptographic algorithms including secret key cryptography and public-key cryptography.
- Different encryption techniques along with hash functions, MAC, digital signatures
- Design issues and working principles of various authentication protocols and PKI standards.

UNIT I

Introduction to Security: Security Attacks, Security Services, Security Mechanisms, Fundamental Security Design Principles, Attack Surfaces and Attack Trees, a Model for Network Security Mathematics of Cryptography: Algebraic Structures (Groups, Rings, Fields and Galois Fields), Divisibility and the Division Algorithm, The Euclidean Algorithm, Modular Arithmetic, Prime Numbers, Fermat's and Euler's Theorems, Testing for Primality, The Chinese Remainder Theorem, Discrete Logarithms

UNIT II

Classical Encryption Techniques: Symmetric Cipher Model, Substitution Techniques, Transposition Techniques, Rotor Machines, Steganography Block Ciphers: Traditional Block Cipher Structure, The Data Encryption Standard, The Strength of DES, Block Cipher Design Principles, Advanced Encryption Standard, AES Structure, AES Transformation Functions, AES Key Expansion, Multiple Encryption and Triple DES, Block Cipher Modes of Operation

UNIT III

Public-Key Cryptography: Principles of Public-Key Cryptosystems, The RSA Algorithm, Diffie-Hellman Key Exchange, Elgamal Cryptographic System, Elliptic Curve Cryptography Cryptographic Hash Functions: Applications of Cryptographic Hash Functions, Requirements and Security, Secure Hash Algorithm (SHA) Message Authentication Codes: Requirements for Message Authentication Codes, HMAC, CMAC

UNIT IV

Digital Signatures: Digital Signatures, Elgamal Digital Signature Scheme, Schnorr Digital Signature Scheme, NIST Digital Signature Algorithm, Elliptic Curve Digital Signature Algorithm Key Management and Distribution: Symmetric Key Distribution Using Symmetric Encryption, Symmetric Key Distribution Using Asymmetric Encryption, Distribution of Public Keys, X.509 Certificates, Public-Key Infrastructure User Authentication: Remote User-Authentication Principles, Remote User-Authentication Using Symmetric Encryption, Kerberos, Remote User-Authentication Using Asymmetric Encryption.

UNIT V

Transport-Level Security: Web Security Considerations, Transport Layer Security, Secure Shell (SSH) Electronic Mail Security: S/MIME, Pretty Good Privacy IP Security: IP Security Overview, Encapsulating Security Payload, Combining Security Associations, Internet Key Exchange

Text Books:

1. William Stallings, *Cryptography and Network Security*, 8th Edition, Pearson Education

Reference Books:

1. Bernard L. Menezes, Ravinder Kumar, *Cryptography, Network Security and Cyber Laws*, Cengage Learning.
2. Behrouz A Forouzan, Debdeep Mukhopadhyaya, *Cryptography and Network Security*, 3rd Edition, Mc-GrawHill.
3. Jason Albanese, Wes Sonnenreich, *Network Security Illustrated*, McGraw Hill.

Course Outcomes

At the end of the course, the students will be able to:

- Apply different encryption and decryption techniques to solve problems related to confidentiality and authentication.
- Understand key management and distribution schemes and design user authentication protocols
- Apply different digital signature algorithms to achieve authentication and create secure applications
- Perform simple vulnerablility assessments and password audits.
- Configure simple firewall architectures

CS604C

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

VI Semester B.Tech (CSE) – CBCS Regulations-2020
(With effect from the academic year 2022-23)

COMPUTER GRAPHICS

No.of Credits: 3 Instruction Hours/Week: 3

Course Objectives:
The course is designed to

- Understand the basics of various inputs and output computer graphics hardware devices.
- Exploration of fundamental concepts in 2D and 3D computer graphics.
- Learn 2D raster graphics techniques, 3D modelling, geometric transformations, 3D viewing and rendering.

UNIT I

Introduction- Image processing as picture analysis, Advantages of Interactive Graphics, Representative uses of computer graphics, Classification of applications, Development of hardware and software for computer graphics, Conceptual framework for Interactive Graphics.

Scan Converting Lines – Basic Incremental algorithm, Midpoint Line algorithm and additional issues; Scan Converting Circles, Scan Converting Ellipses, Solid Filling– Rectangles, Polygons and Ellipse arcs; Pattern filling, Thick primitives, Cohen-Sutherland line clipping algorithm, Parametric line clipping algorithms, Sutherland-Hodgeman polygon clipping algorithm, Generating characters and Antialiasing.

UNIT II

Display Systems - Raster-scan and Random scan.

Geometrical transformations – 2D transformations, Homogeneous coordinates, Matrix representation of 2D transformations, Composition of 2D transformations, Window to view-port transformation, Matrix representation of 3D transformations, Composition of 3D transformations and Transformation as a change in coordinate system.

Representing Curves and surfaces – Polygon meshes, Parametric cubic curves, Parametric bicubic surfaces andQuadric surfaces.

Fractals – Lines and Surfaces.

UNIT III

Viewing in 3D - Projections, Specifying an arbitrary 3D view, Examples of 3D viewing, Mathematics of planar geometric projections, Implementing planar geometric projections, Coordinate systems.

Solid Modeling – Representing solids, Regularized Boolean set operations, Primitive instancing, Sweep representations, Boundary representations, Spatial-Partitioning Representations, Constructive solid geometry, Comparison of representations, User interfaces for solid modelling.

UNIT IV

Achromatic and Colored Light – Achromatic light, Chromatic color, Color models for raster graphics, Reproducing color, Using color in computer graphics.

Visible Surface Determination – Functions of two variables, Techniques for efficient visible surface algorithms, z-Buffer algorithm, Scan-line algorithms, Visible surface ray tracing.

UNIT V

Illumination Models - Ambient light, Diffuse reflection, Atmospheric attenuation.

Shading4 Models – Constant shading, Interpolated shading, Polygon mesh shading, Gouraud shading, Phong shading, Problems with interpolated shading.

Surface Detail – Surface-detail polygons, Texture mapping, Bump mapping.

Animation – Conventional and Computer-Assisted animation, Animation languages, Methods of controlling animation, Basic rules of animation, Problems peculiar to animation.

Text Books:

1. Hughes J F, Van Dam A, Foley J D, et al., Computer Graphics*:* Principles and Practice, 3rd edition, Addison-Wesley, 2013.

Reference Books:

1. Foley J D, Van Dam A, Feiner S K, John F H, Computer Graphics: Principles & Practice in C, 2nd edition, Pearson Education, 1995.
2. Ragiv Chopra, Computer Graphics, S. Chand& Company, 2012.

Course Outcomes

At the end of the course, students will be able to

- Understand the various computer graphics hardware and display technologies.
- Implement various 2D and 3D objects transformation techniques.
- Apply 2D and 3D viewing technologies into the real world applications.

CS605E1

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

VI Semester B.Tech (CSE) – CBCS Regulations-2020
(With effect from the academic year 2022-23)

DATA MINING (Professional Elective I)

No.of Credits: 3 Instruction Hours/Week: 3

Course Objectives:

The course is designed to

- Understand the principles of Data Warehousing and Data Mining
- Know the Architecture of a Data Mining system
- Learn pre-processing techniques and data mining functionalities
- Compare and contrast classification and clustering algorithms

UNIT I

Introduction: Why Data Mining? What Is Data Mining? What Kinds of Data Can Be Mined? What Kinds of Patterns Can Be Mined? Which Technologies Are Used? Which Kinds of Applications Are Targeted? Major Issues in Data Mining.

Data Objects and Attribute Types, Basic Statistical Descriptions of Data, Data Visualization, Measuring Data Similarity and Dissimilarity.

Data Preprocessing: An Overview, Data Cleaning, Data Integration, Data Reduction, Data Transformation and Data Discretization.

UNIT II

DataWarehouse: Basic Concepts, DataWarehouse Modeling: Data Cube and OLAP, DataWarehouse Design and Usage, DataWarehouse Implementation, Data Generalization by Attribute-Oriented Induction.

Data Cube Computation, Data Cube Computation Methods, Processing Advanced Kinds of Queries by Exploring Cube Technology, Multidimensional Data Analysis in Cube Space.

UNIT III

Mining Frequent Patterns, Associations and Correlations: Basic Concepts, Frequent Itemset Mining Methods, Which Patterns Are Interesting?—Pattern Evaluation Methods.

Advanced Pattern Mining: A Road Map, Pattern Mining in Multilevel, Multidimensional Space, Constraint-Based Frequent Pattern Mining, Mining High-Dimensional Data and Colossal Patterns, Mining Compressed or Approximate Patterns, Pattern Exploration and Application.

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

UNIT IV

Classification-Advanced Methods: Bayesian Belief Networks, Classification by Backpropagation, Support Vector Machines, Classification Using Frequent Patterns, Lazy Learners (or Learning from Your Neighbors), Other Classification Methods, Additional Topics Regarding Classification.

Cluster Analysis: Basic Concepts, Partitioning Methods, Hierarchical Methods, Density-Based Methods, Grid-Based Methods, Evaluation of Clustering.

UNIT V

Advanced Cluster Analysis: Probabilistic Model-Based Clustering, Clustering High-Dimensional Data, Clustering Graph and Network Data, Clustering with Constraints.

Outlier Detection: Outliers and Outlier Analysis, Outlier Detection Methods, Statistical Approaches, Proximity-Based Approaches, Clustering-Based Approaches, Classification-Based Approaches, Mining Contextual and Collective Outliers, Outlier Detection in High-Dimensional Data.

Overview of Data Mining Trends and Research Frontiers: Mining Complex Data Types, Other Methodologies of Data Mining, Data Mining Applications, Data Mining and Society, Data Mining Trends.

Text Books:

1. Jiawei Han, Micheline Kamber and Jian Pei, Data Mining: Concepts and Techniques, 3rd Edition, Morgan Kaufmann Publishers, Elsevier, 2012.

Reference Books:

1. Jiawei Han and Micheline Kamber, Data Mining: Concepts and Techniques, 2nd Edition, Morgan Kaufmann Publishers, Elsevier, 2006.
2. Pang-Ning Tan, Vipin Kumar, Michael Steinbanch, Introduction to Data Mining, Pearson Education, 2016.
3. Hongbo Du, Data mining Techniques and Applications: An Introduction, 1st Edition, Cengage India Publishing, 2013.
4. Arun K Pujari, Data Mining Techniques, 3rd Edition, Universities Press, 2013.
5. T.V Suresh Kumar, B Eswara Reddy, Jagadish S Kallimani, Data Mining: Principles and Applications, First edition, Elsevier, 2012.
6. Vikram Pudi, P Radha Krishna, Data Mining, Oxford University Press, 2009.
7. Sam Anahory and Dennis Murray, Data Warehousing in the Real World: A Practical Guide for Building Decision Support Systems, First Edition, Pearson Education India, 2002.
8. K.P.Soman, Shyam Diwakar,V.Ajay, Insight Into Data Mining: Theory and Practice, Prentice Hall India, 2006.

Course Outcomes

By the end of this course students will be able to

- Comprehend the various architectures and its application with data mining
- Design and develop data mining algorithms to analyze raw real world data
- Apply preprocessing techniques for data cleansing
- Analyze multi-dimensional modeling techniques and Classification & Clustering algorithms.

CS605E2

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

VI Semester B.Tech (CSE) – CBCS Regulations-2020
(With effect from the academic year 2022-23)

DISTRIBUTED SYSTEMS (Professional Elective I)

No.of Credits: 3 Instruction Hours/Week: 3

Course Objectives:
The course is designed to

- Familiarize the students with the basics of distributed computing systems.
- Understand issues related to clock Synchronization and distributed mutual exclusion.
- Introduce the concepts of distributed object based systems and distributed file systems.

UNIT I

Distributed Systems: Introduction, Goals, Types of Distributed Systems.
Architectures: Architectural Styles, System Architectures, Architectures versus Middleware, Self-Management in Distributed Systems.
Processes: Threads, Virtualization, Clients, Servers, Code Migration.

UNIT II

Communication: Fundamentals, Remote Procedure Call, Message-Oriented Communication, Stream-Oriented Communication, Multicast Communication.
Naming: Names, Identifiers and Addresses, Flat Naming, Structured Naming, Attribute-Based Naming.

UNIT III

Synchronization: Clock Synchronization, Logical Clocks, Mutual Exclusion, Global Positioning of Nodes, Election Algorithms.
Consistency and Replication: Introduction, Data-Centric Consistency Models, Client-Centric Consistency Models, Replica Management, Consistency Protocols.

UNIT IV

Fault Tolerance: Introduction, Process Resilience, Reliable Client-Server Communication, Reliable Group Communication, Distributed Commit, Recovery.
Security: Introduction, Secure Channels, Access Control, Security Management.

UNIT V

Distributed Object-Based Systems: Architecture, Processes, Communication, Naming, Synchronization, Consistency and Replication, Fault Tolerance, Security.
Distributed File Systems: Architecture, Processes, Communication, Naming, Synchronization, Consistency and Replication, Fault Tolerance, Security.

Text Books:

1. Andrew S. Tanenbaum, Maarten Van Steen, Distributed Systems: Principles and Paradigms, Second Edition, Pearson Education, 2007.

Reference Books:

1. Brendan Burns, Designing Distributed Systems: Patterns and Paradigms for Scalable, Reliable Services, O'Reilly, First Edition, 2018.
2. Sukumar Ghosh, Distributed Systems: An Algorithmic Approach, CRC Press, Second Edition, 2014.
3. Kenneth P Birman, Guide to Reliable Distributed Systems: Building High-Assurance Applications and Cloud-Hosted Services, Springer, 2014.
4. George Coulouris, Jean Dollimore, Tim Kindberg and Gordon Blair, Distributed Systems: Concepts and Design, Pearson Education, Fifth Edition, 2012.
5. Maarten Van Steen, Andrew S. Tanenbaum, Distributed Systems, CreateSpace Independent Publishing Platform/ Amazon Digital Services, Third Edition, 2017.
6. Roberto Vitillo, Understanding Distributed Systems, Roberto Vitillo, 2021.
7. Gerard Tel, Introduction to Distributed Algorithms, Cambridge University Press, Second Edition, 2000.
8. Andrew S. Tanenbaum, Distributed Operating Systems, Pearson Education, First Edition, 2002.

Course Outcomes

Having successfully completed this course the students will be able to:

- Understand the design principles in distributed systems and the architectures for distributed systems
- Apply various distributed algorithms related to clock synchronization, concurrency control, deadlock detection, load balancing.
- Develop the Mutual Exclusion and Deadlock detection algorithms in distributed systems.
- Analyze fault tolerance and recovery in distributed systems and algorithms for the same.
- Analyze the design and functioning of distributed file systems.

CS605E3

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

VI Semester B.Tech (CSE) – CBCS Regulations-2020
(With effect from the academic year 2022-23)

OBJECT ORIENTED ANALYSIS AND DESIGN

(Professional Elective I)

No.of Credits: 3 Instruction Hours/Week: 3

Course Objectives:
The course is designed to

- Understand the Object-based view of systems
- Develop robust object-based models for systems
- Inculcate necessary skills to handle complexity in software design
- Understand the notations of Unified Modelling Language

UNIT I

OOAD Basic Concepts – Complexity: The Structure of Complex Systems, The Inherent Complexity of Software, The Five Attributes of a Complex System, Organized and Disorganized Complexity, Bringing Order to Chaos, On Designing Complex Systems.

The Object Model: The Evolution of the Object Model, Foundations of the Object Model, Elements of the Object Model, Applying the Object Model.

UNIT II

Classes and Objects: The Nature of an Object, Relationships among Objects, The Nature of a Class, Relationships among Classes, The Interplay of Classes and Objects, On Building Quality Classes and Objects.

Classification: The Importance of Proper Classification, Identifying Classes and Objects, Key Abstractions and Mechanisms.

UNIT III

Method – Notation: The Unified Modeling Language, Package Diagrams, Component Diagrams, Deployment Diagrams, Use Case Diagrams, Activity Diagrams, Class Diagrams, Sequence Diagrams, Interaction Overview Diagrams, Composite Structure Diagrams, State Machine Diagrams, Timing Diagrams, Object Diagrams, Communication Diagrams.

UNIT IV

Process: First Principles, The Macro Process: The Software Development Lifecycle, The Micro Process: The Analysis and Design Process.

Pragmatics: Management and Planning, Staffing, Release Management, Reuse, Quality Assurance and Metrics, Documentation, Tools, Special Topics, The Benefits and Risks of Object-Oriented Development.

UNIT V

Applications - System Architecture: Satellite-Based Navigation - Inception, Elaboration, Construction, Post-Transition.

Artificial Intelligence: Cryptanalysis - Inception, Elaboration, Construction, Post-Transition.

Web Application: Vacation Tracking System - Inception, Elaboration, Construction, Transition and Post-Transition.

Course Outcomes

Having successfully completed this course the students will be able to:

- Analyse and model software specifications.
- Abstract object-based views for generic software systems.
- Deliver robust software components.

Text Books:

1. Grady Booch, Robert A. Maksimchuk, Michael W. Engle, Bobbi J. Young, Jim Conallen, Kelli A. Houston, *Object-Oriented Analysis and Design with Applications*, Addison-Wesley/Pearson, Third Edition, 2015.

Reference Books:

1. Michael Blaha and James Rumbaugh, *Object-oriented modelling and design with UML*, Prentice-Hall of India, 2005.
2. Craig Larman, *Applying UML and Patterns – An introduction to Object-Oriented Analysis and Design and Iterative Development*, 3rd edition, Pearson Education, 2005.
3. Ali Bahrami, *Object Oriented Systems Development*, McGraw-Hill, 1999.
4. Booch Grady, *Object Oriented Analysis and Design*, 2nd edition Pearson Education, 2000.
5. Fowler, Martin, *UML Distilled*, 3rd edition, Pearson Education, 2004.
6.
7. Lunn, Ken, *Software development with UML*, Palgrave Macmillan, 2003.
8. O'Docherty, Mike, *Object-Oriented Analysis & Design*, Wiley, 2005

CS606L

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

VI Semester B.Tech (CSE) – CBCS Regulations-2020
(With effect from the academic year 2022-23)

ARTIFICIAL INTELLIGENCE AND COMPILER DESIGN LABORATORY

No.of Credits: 1.5 Instruction Hours/Week: 3

At least 12 assignments are to be given covering the topics of the course, "Artificial Intelligence and Compiler Design".

CS607L

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

VI Semester B.Tech (CSE) – CBCS Regulations-2020
(With effect from the academic year 2022-23)

CRYPTOGRAPHY AND NETWORK SECURITY LABORATORY

No.of Credits: 1.5 Instruction Hours/Week: 3

At least 12 assignments are to be given covering the topics of the courses, "Cryptography and Network Security".

CS608L

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

VI Semester B.Tech (CSE) – CBCS Regulations-2020
(With effect from the academic year 2022-23)

COMPUTER GRAPHICS LABORATORY

No.of Credits: 1.5 Instruction Hours/Week: 3

At least 12 assignments are to be given covering the topics of the courses, "Computer Graphics".

CS609S

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

VI Semester B.Tech (CSE) – CBCS Regulations-2020
(With effect from the academic year 2022-23)

ADVANCED PYTHON PROGRAMMING

No.of Credits: 3 Instruction Hours/Week: 2T+2P

Course Objectives:
The course is designed to

- Familiarize the basics of Python Third Party Tools and usages.
- Understand the advantage of using Python libraries for implementing Machine Learning models.
- Understand the Python Data Structures for Full Stack Development.

The course shall cover the following topics:

- Parallel System Tools: Forking Processes, Threads, Program Exits, Interprocess Communication, The multiprocessing Module, Other Ways to Start Programs, A Portable Program-Launch Framework, Other System Tools Coverage.

- GUI Design with Tkinter: Menus, Listboxes and Scrollbars, Text, Canvas, Grids, Time Tools, Threads, and Animation, Other Widgets and Options.

- GUI Coding Techniques: GuiMixin: Common Tool Mixin Classes, GuiMaker: Automating Menus and Toolbars, ShellGui: GUIs for Command-Line Tools, GuiStreams: Redirecting Streams to Widgets, Reloading Callback Handlers Dynamically, Wrapping Up Top-Level Window Interfaces, GUIs, Threads, and Queues, More Ways to Add GUIs to Non-GUI Code, The PyDemos and PyGadgets Launchers.

- Complete GUI Programs: PyEdit: A Text Editor Program/Object, PyPhoto: An Image Viewer and Resizer, PyView: An Image and Notes Slideshow, PyDraw: Painting and Moving Graphics, PyClock: An Analog/Digital Clock Widget, PyToe: A Tic-Tac-Toe Game Widget.

- Network Scripting: Python Internet Development Options, Plumbing the Internet, Socket Programming, Handling Multiple Clients, Making Sockets Look Like Files and Streams, A Simple Python File Server.

- Client-Side Scripting: FTP: Transferring Files over the Net, Transferring Files with ftplib, Transferring Directories with ftplib, Transferring Directory Trees with ftplib, Processing Internet Email, POP: Fetching Email, SMTP: Sending Email, email: Parsing and Composing Mail Content, A Console-Based Email Client, The mailtools Utility Package, NNTP: Accessing Newsgroups, HTTP: Accessing Websites, The urllib Package Revisited, Other Client-Side Scripting Options.

- The PyMailGUI Client: Major PyMailGUI Changes, A PyMailGUI Demo, PyMailGUI Implementation, Ideas for Improvement.

- Server-Side Scripting: What's a Server-Side CGI Script?, Running Server-Side Examples, Climbing the CGI Learning Curve, Saving State Information in CGI Scripts, The Hello World Selector, Refactoring Code for Maintainability, More on HTML and URL Escapes, Transferring Files to Clients and Servers.

- The PyMailCGI Server: The PyMailCGI Website, The Root Page, Sending Mail by SMTP, Reading POP Email, Processing Fetched Mail, Utility Modules, Web Scripting Trade-Offs.

- Databases and Persistence: Persistence Options in Python, DBM Files, Pickled Objects, Shelve Files, The ZODB Object-Oriented Database, SQL Database Interfaces, ORMs: Object Relational Mappers, PyForm: A Persistent Object Viewer (External).

- Data Structures: Implementing Stacks, Implementing Sets, Subclassing Built-in Types, Binary Search Trees, Graph Searching, Permuting Sequences, Reversing and Sorting Sequences, PyTree: A Generic Tree Object Viewer.

- Text and Language: Strategies for Processing Text in Python, String Method Utilities, Regular Expression Pattern Matching, XML and HTML Parsing, Advanced Language Tools, Custom Language Parsers, PyCalc: A Calculator Program/Object.

- Python Data Structures for Data Science: Numpy, Pandas, Scipy, MatplotLib, Seaborn

- Python Data Structures for Full Stack Development, Python for Natural Language Processing

- Python for Machine Learning: Working with Beautiful Soup, Scikit-Learn, NLP with Python, Text mining with python.

- Python for Deep Learning: Working with Tensor flow, Keras and PyTorch

- Python for Cryptography and Network Security: Stanford-Corenlp, Bcrypt

Text Books:

1. Mark Lutz, Programming Python, O`Reilly, 4th Edition, 2010
2. Michael Urban and Joel Murach, Python Programming, Shroff/Murach, 2016

Reference Books:

1. Mark Lutz, Learning Python, O`Reilly, Fifth Edition, 2013.
2. Dattaraj Rao, Keras to Kubernetes: The Journey of a Machine Learning Model to Production, Wiley, 2019.
3. Wes McKinney, Python for Data Analysis: Data Wrangling with Pandas, NumPy, and IPython, O`Reilly, Second Edition, 2017.
4. Aurélien Géron, Hands-On Machine Learning with Scikit-Learn and TensorFlow: Concepts, Tools, and Techniques to Build Intelligent Systems, O`Reilly, First Edition, 2017.
5. Andreas C. Müller and Sarah Guido, Introduction to Machine Learning with Python: A Guide for Data Scientists, O`Reilly, First Edition, 2016.

6. Jake VanderPlas, Python Data Science Handbook: Essential Tools for Working with Data, O`Reilly, First Edition, 2016.
7. Delip Rao and Brian McMahan, Natural Language Processing with PyTorch: Build Intelligent Language Applications Using Deep Learning, O`Reilly, First Edition, 2019.
8. Miguel Grinberg, Flask Web Development: Developing Web Applications with Python, O`Reilly, Second Edition, 2018.
9. Joel Grus, Data Science from Scratch: First Principles with Python, O`Reilly, First Edition, 2015.
10. J. Burton Browning, Marty AlchinPro Python 3: Features and Tools for Professional Development, Apress, Third Edition, 2019.
11. Abhishek Nandy, Manisha Biswas, Reinforcement Learning: With Open AI, TensorFlow and Keras Using Python, Apress, 2018.
12. Navin Kumar Manaswi, Deep Learning with Applications Using Python: Chatbots and Face, Object, and Speech Recognition With TensorFlow and Keras, Apress, 2018.
13. Akshay Kulkarni, Adarsha Shivananda, Natural Language Processing Recipes: Unlocking Text Data with Machine Learning and Deep Learning using Python, Apress, 2019.
14. Sayan Mukhopadhyay, Advanced Data Analytics Using Python: With Machine Learning, Deep Learning and NLP Examples, Apress, 2018.
15. Jojo Moolayil, Learn Keras for Deep Neural Networks: A Fast-Track Approach to Modern Deep Learning with Python, Apress, 2019.
16. Manohar Swamynathan, Mastering Machine Learning with Python in Six Steps: A Practical Implementation Guide to Predictive Data Analytics Using Python, Apress, 2017.
17. Daniel Rubio, Beginning Django Web Application Development and Deployment with Python, Apress, 2017.
18. Fabio Nelli, Python Data Analytics: Data Analysis and Science Using Pandas, matplotlib, and the Python Programming Language, Apress, 2015.
19. Fabio Nelli, Python Data Analytics: With Pandas, NumPy, and Matplotlib, Apress, Second Edition, 2018.

Course Outcomes

Having successfully completed this course the students will be able to:

- Apply Python Third- Party Tools in real time environment.
- Apply Python for Cryptography and Network Security.
- Implement Full stack development apps.
- Apply Python libraries for implementing Machine Learning models.
- Apply basic principles of Python Data Structures for Data Science.

CE610M

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VI Semester B.Tech (CSE) – CBCS Regulations-2020
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PROFESSIONAL ETHICS

No.of Credits: Nil Instruction Hours/Week: 2

Course Objectives:
The course is designed to

- create an awareness on Engineering Ethics and Human Values.
- instill Moral and Social Values and Loyalty and to appreciate the rights of others.
- study the moral issues and decisions confronting individuals and organizations
- engaged in engineering profession.
- study the related issues about the moral ideals, character, policies, and
- relationships of people and corporations involved in technological activity.

UNIT I

Human Values: Morals, values and Ethics – Integrity – Work ethic – Service learning – Civic virtue – Respect for others – Living peacefully – Caring – Sharing – Honesty – Courage – Valuing time – Cooperation – Commitment – Empathy – Self-confidence – Character – Spirituality – Introduction to Yoga and meditation for professional excellence and stress management.

UNIT II

Engineering Ethics: Senses of Engineering Ethics – Variety of moral issues – Types of inquiry – Moral dilemmas – Moral Autonomy – Kohlberg''s theory – Gilligan's theory – Consensus and Controversy –Models of professional roles – Theories about right action – Self-interest – Customs and Religion – Uses of Ethical Theories.

UNIT III

Engineering as Social Experimentation: Engineering as Experimentation – Engineers as responsible Experimenters – Codes of Ethics – A Balanced Outlook on Law.

UNIT IV

Safety, Responsibilities and Rights: Safety and Risk – Assessment of Safety and Risk – Risk Benefit Analysis and Reducing Risk – Respect for Authority – Collective Bargaining – Confidentiality – Conflicts of Interest – Occupational Crime – Professional Rights – Employee Rights – Intellectual Property Rights (IPR)
Discrimination.

UNIT V

Global Issues: Multinational Corporations – Business Ethics - Environmental Ethics – Computer Ethics - Role in Technological Development – Weapons Development – Engineers as Managers – Consulting Engineers – Engineers as Expert Witnesses and Advisors – Honesty – Moral Leadership – Sample Code of Conduct – Corporate Social Responsibility.

Text Books:

1. Mike W. Martin and Roland Schinzinger, “Ethics in Engineering”, Tata McGraw Hill, New Delhi, 2003.
2. Govindarajan M, Natarajan S, Senthil Kumar V. S, “Engineering Ethics”, Prentice Hall of India, New Delhi, 2004.

Reference Books:

1. Charles B. Fleddermann, “Engineering Ethics”, Pearson Prentice Hall, New Jersey, 2004.
2. Charles E. Harris, Michael S. Pritchard and Michael J. Rabins, “Engineering Ethics – Concepts and Cases”, Cengage Learning, 2009.
3. John R Boatright, “Ethics and the Conduct of Business”, Pearson Education, New Delhi, 2003.
4. Edmund G Seebauer and Robert L Barry, “Fundamentals of Ethics for Scientists and Engineers”, Oxford University Press, Oxford, 2001.
5. Laura P. Hartman and Joe Desjardins, “Business Ethics: Decision Making for Personal Integrity and Social Responsibility” Mc Graw Hill education, India Pvt. Ltd., New Delhi, 2013.

Course Outcomes

Having successfully completed this course the students will be able to:

- Discuss the ethical issues related to engineering and realize the responsibilities and rights in the society.
- Learn the moral issues and problems in engineering; find the solution to those problems.
- Learn the need for professional ethics, codes of ethics and roles, concept of safety, risk assessment.
- Gain exposure to Environment Ethics & computer ethics; know their responsibilities and rights.

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CYBER SECURITY (Professional Elective)

No.of Credits: 3 Instruction Hours/Week: 3

Course Objectives:

The course is designed to

- Analyze and evaluate the cyber security needs of an organization.
- Design and develop security architecture for an organization.
- Develop cyber security strategies and policies.
- Determine and analyze software vulnerabilities and develop necessary security solutions.

UNIT I

Building a Secure Organization, Preventing System Intrusions, Guarding Against Network Intrusions, Internet Security, The Botnet Problem, Intranet Security, Local Area Network Security.

UNIT II

Wireless Network Security, Cellular Network Security, RFID Security, Protecting Mission-Critical Systems, Security Management Systems, Information Technology Security Management, Identity Management.

UNIT III

Intrusion Prevention and Detection Systems, Computer Forensics, Network Forensics, Firewalls, Penetration Testing, Vulnerability Assessment.

UNIT IV

NET Privacy, Personal Privacy Policies, Virtual Private Networks, Identity Theft, VoIP Security, SAN Security, SAN Devices Security.

UNIT V

Risk Management, Physical Security Essentials, Biometrics, Information Warfare, Security Through Diversity, Reputation Management, Content Filtering, Data Loss Protection.

Text Books:

1. Vacca J R (Editor), Computer and Information Security Handbook, 2nd edition, Elsevier / Morgan Kaufmann, 2013.
2. Belapure S, Godbole N, Cyber Security, Wiley, 2011.

Reference Books:

1. Gogolin G, Digital Forensics Explained, CRC / Auerbach, 2013.
2. Godbole N, Information Systems Security, Wiley, 2015.

3. Wu C H, Irwin J D, Introduction to Computer Networks and Cyber Security, CRC Press, 2013.
4. Singer P W, Friedman A, Cyber Security and Cyber War: What Everyone Needs to Know, Oxford University Press, 2014.
5. Boddington R, Practical Digital Forensics, Packt, 2016.
6. Drake J J, Lanier Z, et al., Android Hacker's Handbook, Wiley, 2014.
7. Graham J, Howard R, Olson R, Cyber Security Essentials, CRC Press, 2010.
8. Hadnagy C, Wilson P, Social Engineering: The Art of Human Hacking, Wiley, 2010

Course Outcomes

By the end of this course students will be able to:

- Effectively use cyber security and computer forensics software/tools
- Measure the performance and troubleshoot cyber security systems.
- Protect the network from both internal and external attacks
- Provide new security solutions and implement the same confidently.

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MACHINE LEARNING (Professional Elective)

No.of Credits: 3 Instruction Hours/Week: 3

Course Objectives:
The course is designed to

- Understand the basic concepts, techniques and algorithms used in machine learning.
- Formulate machine learning problems corresponding to different applications.
- Develop skills of using recent machine learning software for solving practical problems.
- Develop skills of using recent machine learning software for solving practical problems.
- Evaluate performance and to identify the limitations of machine learning algorithms.

UNIT I

Introduction to Machine Learning: Well-Posed Learning Problems, Designing a Learning System, Perspectives and Issues in Machine learning.
Concept Learning: Introduction, A Concept Learning Task, Concept Learning as Search, Find-S: Finding a Maximally Specific Hypothesis, Version Spaces and the Candidate-Elimination Algorithm, Remarks on Version Spaces and Candidate Elimination, Inductive Bias.
Decision Tree Learning: Introduction, Decision Tree Representation. Appropriate Problems for Decision Tree Learning, The Basic Decision Tree Algorithm, Hypothesis Space Search in Decision Tree Learning, Inductive Bias in Decision Tree Learning, Issues in Decision Tree Learning.

UNIT II

Artificial Neural Networks: Introduction, Neural Networks Representations, Appropriate Problems for Neural Network Learning, Perceptrons, Multilayer Networks and the Backpropagation Algorithm, Remarks on the Backpropagation Algorithm, An Illustrative Example: Face Recognition, Advanced Topics in Artificial Neural Networks.
Evaluating Hypothesis: Motivation, Estimating Hypothesis Accuracy, Basics of Sampling Theory, A General Approach for Deriving Confidence Intervals, Difference in Error of Two Hypothesis, Comparing Learning Algorithms.

UNIT III

Bayesian Learning: Introduction, Bayes Theorem, Concept Learning, Maximum Likelihood and Least-Squared Error Hypothesis, Maximum Likelihood Hypothesis for Predicting Probabilities, Minimum Description Length Principle, Bayes Optimal Classifier, Gibbs Algorithm, Naïve Bayes Classifier, An Example Learning to Classify Test, Bayesian Belief Networks, The EM Algorithm.

Computational Learning Theory: Introduction, Probably Learning an Approximately Correct Hypothesis, Sample Complexity for Finite Hypothesis Spaces, Sample Complexity for Infinite Hypothesis Spaces, The Mistake Bound Model of Learning.

UNIT IV

Instance-Based Learning: Introduction, k-Nearest Neighbor Learning, Locally Weighted Regression, Radial Basis Functions, Case-Based Reasoning, Remarks on Lazy and Eager Learning.

Genetic Algorithms: Motivation, Genetic Algorithms, An Illustrative Example, Hypothesis Space Search, Genetic Programing, Models of Evaluation and Learning, Parallelizing Genetic Algorithms.

Learning Sets of Rules: Introduction, Sequential Covering Algorithms, Learning Rule Sets: Summary, Learning First-Order Rules, Learning Sets of First-Order Rules: FOIL, Induction as Inverted Deduction, Inverting Resolution.

UNIT V

Analytical Learning: Introduction, Learning with Perfect Domain Theories: Prolog-EBG, Remarks on Explanation-Based Learning, Explanation-Based Learning of Search Control Knowledge.

Combining Inductive and Analytical Learning: Motivation, Inductive-Analytical Approaches to Learning, Using Prior Knowledge to Initialize the Hypothesis, Using Prior Knowledge to Alter the Search Objective, Using Prior Knowledge to Augment Search Operators, State of the Art.

Reinforcement Learning: Introduction, The Learning Task, Q learning, Non-deterministic Rewards and Actions, Temporal Difference Learning, Generalizing from Examples, Relationship to Dynamic Programming.

Text Books:

1. Tom M. Mitchell, Machine Learning, McGraw Hill Education, 2018.

Reference Books:

1. Stephen Marsland, Taylor & Francis, Machine Learning: An Algorithmic Perspective, 2nd Edition, CRC Press, 2015.
2. Ethem Alpaydin, Introduction to Machine Learning, 2nd Edition, MIT Press, 2010.
3. Stuart J. Russell and Peter Norvig, Artificial Intelligence A Modern Approach: 3rd Edition, Pearson Education, 2010.
4. M.Tim Jones, Artificial Intelligence: A Systems Approach,3rd Edition, Infinity Science Press, New Delhi, 2008.
5. Elaine Ritch, Kevin Knight, Shivashankar B Nair, Artificial Intelligence, 3rd Edition, Tata McGraw Hill Education, 2009.

Course Outcomes

Having successfully completed this course the students will be able to:

- Design and implement various machine learning algorithms in a range of real world applications
- Analyze the underlying mathematical relationships within machine learning techniques.
- Realize the strengths and weaknesses of popular machine learning approaches
- Comprehend the concepts in Bayesian analysis from probability models

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BIG DATA ANALYTICS (Professional Elective)

No.of Credits: 3 Instruction Hours/Week: 3

Course Objectives:

The course is designed to

- Discuss the challenges traditional data mining algorithms face when analyzing Big Data.
- Introduce the tools required to manage and analyze big data like Hadoop, NoSql MapReduce.
- Comprehend machine learning and deep learning algorithms for data analytics.
- Understand how big data analytics can leverage into a key component

UNIT I

Introduction to Analytics and Big Data - Characteristics of Big Data, Domain Specific Examples of Big Data Viz. Web, Financial, Healthcare, IoT, Environment, Logistics & Transportation, Industry, Retail; Analytics Flow for Big Data, Big Data Stack, Mapping Analytics Flow to Big Data Stack, Case Studies: Genome Data Analysis and Weather Data Analysis, Analytics Patterns.

UNIT II

Overview of Setting up Big Data Stack, Big Data Patterns - Analytics Architecture Components & Design Styles, MapReduce Patterns.
NoSQL - Key-Value Databases, Document Databases, Column Family Databases, Graph Databases.

UNIT III

Data Acquisition - Data Acquisition Considerations, Publish-Subscribe Messaging Frameworks, Big Data Collection Systems, Messaging Queues, Custom Connectors.
Big Data Storage - HDFS: Architecture and Usage Examples.
Batch Analysis - Hadoop and MapReduce, Hadoop-MapReduce Examples, Pig, Case Study: Batch Analysis of News Articles, Apache Oozie, Apache Spark, Apache Solr.

UNIT IV

Real-time Analysis - Stream Processing, Storm Case Studies, In-Memory Processing, Spark Case Studies.
Interactive Querying - Spark SQL, Hive, Amazon Redshift, Google BigQuery.
Serving Databases & Web Frameworks - Relational (SQL) Databases, Non-Relational (NoSQL) Databases, Python Web Application Framework-Django, Case Study: Django application for viewing weather data.

UNIT V

Analytics Algorithms - Frameworks, Clustering, Case Study: Song Recommendation System, Classification & Regression, Case Studies: Classifying Handwritten Digits and Genome Data Analysis (Implementation), Recommendation Systems.
Data Visualization - Frameworks & Libraries, Overview of Visualization Examples.

Text Books:

1. Arshdeep Bhaga, Vijay Madisetti, Big Data Science and Analytics: A Hands-On Approach, 1st Edition, VPT Publishers, 2019.
2. Michael Minelli, Michele Chambers, Ambiga Dhiraj, Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses, Wiley, 2013.

Reference Books:

1. EMC Education Services, "Data Science & Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data", Wiley, 2016.
2. Frank J Ohlhorst, "Big Data Analytics: Turning Big Data into Big Money", Wiley and SAS Business Series, 2012.
3. Rajkumar Buyya, Rodrigo N. Calheiros and Amir Vahid Dastjerdi (Editors), "Big Data Principles and Paradigms", Morgan Kaufmann (An imprint of Elsevier), 2016.
4. Colleen McCue, "Data Mining and Predictive Analysis: Intelligence Gathering and Crime Analysis", Elsevier, 2007.
5. Michael Berthold, David J. Hand, Intelligent Data Analysis, Springer, 2007.
6. Anand Rajaraman and Jeffrey David Ullman, Mining of Massive Datasets, Cambridge University Press, 2012.
7. Bill Franks, "Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics", Wiley and SAS Business Series, 2012.
8. Paul Zikopoulos, Chris Eaton, Paul Zikopoulos, "Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data", McGraw Hill, 2011.

Course Outcomes

By the end of this course students will be able to

- Understand big data challenges in different domains viz. social media, transportation, finance, medicine and apply the concepts of big data analytics for the said domains.
- Apply several newer algorithms for Clustering, Classifying and finding associations in Big Data
- Design and develop Hadoop and Map Reduce Framework
- Handle several Data Intensive tasks using the Map Reduce Paradigm

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CLOUD COMPUTING (Professional Elective)

No.of Credits: 3 Instruction Hours/Week: 3

Course Objectives:

The course is designed to

- Understand fundamental concepts of cloud computing and its services.
- Demonstrate an understanding of Service models, deployment models and Virtualization
- Understand the programming and implementation issues of Cloud

UNIT I

Computing Paradigms: High-Performance Computing, Parallel Computing, Distributed Computing, Cluster Computing, Grid Computing, Cloud Computing, Biocomputing, Mobile Computing, Quantum Computing, Optical Computing, Nano computing, Network Computing.

Cloud Computing Fundamentals: Motivation for Cloud Computing, Defining Cloud Computing, 5-4-3 Principles of Cloud computing, Cloud Ecosystem, Requirements for Cloud Services, Cloud Application, Benefits and Drawbacks.

Cloud Computing Architecture and Management: Introduction, Cloud Architecture, Anatomy of the Cloud, Network Connectivity in Cloud Computing, Applications on the Cloud, Managing the Cloud, Migrating Application to Cloud.

Cloud Deployment Models: Introduction, Private Cloud, Public Cloud, Community Cloud, Hybrid Cloud.

UNIT II

Cloud Service Models: Introduction, Infrastructure as a Service, Platform as a Service, Software as a Service, Other Cloud Service Models.

Technological Drivers for Cloud Computing: Introduction, SOA and Cloud, Virtualization, Multicore Technology, Memory and Storage Technologies, Networking Technologies, Web 2.0, Web 3.0, Software Process Models for Cloud, Programming Models, Pervasive Computing, Operating System, Application Environment.

UNIT III

Virtualization: Introduction, Virtualization Opportunities, Approaches to Virtualization, Hypervisors, From Virtualization to Cloud Computing.

Programming Models for Cloud Computing: Introduction, Extended Programming Models for Cloud, New Programming Models Proposed for Cloud,

Software Development in Cloud: Introduction, Different Perspectives on SaaS Development, New Challenges, Cloud-Aware Software Development Using PaaS Technology.

UNIT IV

Networking for Cloud Computing: Introduction, Overview of Data Center Environment, Networking Issues in Data Centers, Transport Layer Issues in DCNs, TCP Enhancements for DCNs.

Cloud Service Providers: Introduction, EMC, Google, Amazon Web Services, Microsoft, IBM, SAP Labs, Salesforce, Rackspace, VMware, Manjrasoft.

UNIT V

Open Source Support for Cloud: Introduction, Open Source Tools for IaaS, Open Source Tools for PaaS, Open Source Tools for SaaS, Open Source Tools for Research, Distributed Computing Tools for Management of Distributed Systems.

Security in Cloud Computing: Introduction, Security Aspects, Platform-Related Security Audit and Compliance.

Advanced Concepts in Cloud Computing: Intercloud, Cloud Management, Mobile Cloud, Media Cloud, Interoperability and Standards, Cloud Governance, Computational Intelligence in Cloud, Green Cloud, Cloud Analytics.

Text Books:

1. K. Chandrasekaran, Essentials of Cloud Computing, CRC press, 2014.

Reference Books:

1. Buyya R, Vecchiola C, Selvi S T, Mastering Cloud Computing, McGraw Hill Education (India), 2013.
2. Dan C. Marinescu, Cloud Computing - Theory and Practice, Morgan Kaufmann (an imprint of Elsevier), 2013.
3. Rajkumar Buyya, James Broberg, Andrzej Goscinski, Cloud Computing - Principles and Paradigms, Wiley India, 2011.
4. Kai Hwang, Geoffrey C Fox, Jack J Dongarra, Distributed and Cloud Computing - From Parallel Processing to the Internet of Things, Morgan Kaufmann (an imprint of Elsevier), 2012.
5. Tim Mather, SubraKumaraswamy, ShahedLatif, Cloud Security and Privacy: An Enterprise Perspective on Risks and Compliance, O'Reilly.
6. Rittinghouse J W, Ransome J F, Cloud Computing - Implementation, Management, and Security, CRC Press, 2010.
7. Velte A T, Velte T J, Cloud Computing - A Practical Approach, McGraw Hill, 2011.
8. Shroff G, Enterprise Cloud Computing - Technology, Architecture, Applications, Cambridge University Press, 2010.
9. Antonopoulos N, Gillam L, Cloud Computing - Principles, Systems and Applications, Springer, 2010.
10. Furht B, Escalante A, Handbook of Cloud Computing, Springer, 2010.

Course Outcomes

By the end of this course students will be able to:

- Develop the ability to understand the basics of cloud computing and different cloud deployment models.
- Handle resource management and security issues of cloud computing.
- Evaluate the performance of different cloud service models.
- Identify, analyze and use different cloud services/applications/tools available from key cloud providers.

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IMAGE PROCESSING (Professional Elective)

No.of Credits: 3 Instruction Hours/Week: 3

Course Objectives:
The course is designed to

- Understand the fundamentals of Digital imaging and Image Processing techniques.
- Discuss the concepts of image compression and segmentation.
- Evaluate the performance of image processing algorithms and systems.

UNIT I
Introduction: Fundamentals of Image Processing, Applications of Image Processing, Human Visual Perception, Introduction to Image Formation, Sampling and Quantization, Binary Image, Three-Dimensional Imaging, Image file formats. Color and Color Imagery: Perception of Colors.

UNIT II
Image Transformation: Fourier Transforms, Discrete Cosine Transform, Walsh-adamard Transform, Karhaunen-Loeve Transform or PCA. Discrete Wavelet Transform: Wavelet Transform, Extension to 2D Signals, Lifting Implementation of the Discrete Wave Transforms.

UNIT III
Image Enhancement and Restoration : Introduction, Distinction between image enhancement and restoration, Histrogram-based Contrast Enhancement, Frequency Domain Methods of Image Enhancement, Noise Modeling, Image Restoration, Image Reconstruction, Image Segmentation.

UNIT IV
Recognition of Image Patterns : Introduction, Decision Theoretic Pattern Classification, Baesian Decision Theory, Nonparametric Classification, Linear Discriminant Analysis, Unsupervised Classification Strategies-clustering, K-means clustering algorithm, Syntactic Pattern Classification, Syntactic Inference, Symbolic Projection method. Texture and Shape Analysis.

UNIT V
Fuzzy Set Theory in Image Processing : Introduction, Use of Fuzzy Image, Preliminaries and Background, Image as a Fuzzy Set, Fuzzy Methods of Contrast Enhancement, Image Segmentation using Fuzzy Methods, Fuzzy Approaches to Pixel Classification, Fuzzy c-Means Algorithm, Fusion of Fuzzy logic with neural network. Image mining and Content-Based Retrieval.

Text Books:

1. Maria Petrou and Costas Petrou , “Image Processing the Fundamentals”, John-Wiley and Sons Publishers, 2nd edition, 2010.

2. Rafael C. Gonzalez , Richard E. Woods, Steven L. Eddins, "Digital Image Processing Using MATLAB", 2nd edition, Gatesmark Publishing, 2009.
3. Tinku Acharya and Ajoy K. Ray, “Image Processing Principles and Applications”, John Wiley & Sons publishers, 2005.

Reference Books:

1. Rafael Gonzalez and Richard E. Woods, Digital Image Processing, 4th edition, Pearson, 2017.
2. Anil K Jain, Fundamentals of Digital Images Processing, First edition, Pearson, 2015.

Course Outcomes

By the end of this course students will be able to:

- Understand Image representation and modeling.
- Design and apply image enhancement and restoration techniques
- Develop image processing techniques for assisting digital forensics

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SOFT COMPUTING (Professional Elective)

No.of Credits: 3 Instruction Hours/Week: 3

Course Objectives:

The course is designed to

- Understand basic ANN architectures, algorithms and their limitations
- Understand the concepts of feed forward and feedback ANN.
- Discuss the Fuzzy logic concepts, Fuzzy principles and relations
- Familiarize Genetic Algorithm and its applications to Soft Computing.
- Design and develop ML techniques with assistance of MATLAB

UNIT I

Introduction of soft computing - Soft computing vs. Hard computing- Various types of soft computing techniques- Applications of soft computing-Neuron- Nerve structure and synapse- Artificial Neuron and its model- Activation functions- Neural network architecture- Single layer and Multilayer feed forward networks- McCullochPitts neuron model- Perceptron model- MLP- Back propagation learning methods- Effect of learning rule coefficient.

UNIT II

Counter propagation network - Architecture - Functioning & Characteristics of counter-propagation network - Hopfield/ Recurrent network – Configuration - Stability constraints associative memory- and characteristics- Limitations and applications- Hopfield vs Boltzman machine - Adaptive Resonance Theory – Architecture – Classifications -Implementation and training-Associative Memory.

UNIT III

Different faces of imprecision - Inexactness, Ambiguity, Undecidability, Fuzziness and certainty, Fuzzy sets and Crisp sets. Intersections of Fuzzy sets, Union of Fuzzy sets, the complement of Fuzzy sets - Fuzzy reasoning. Linguistic variables, Fuzzy propositions, Fuzzy compositional rules of inference - Methods of decompositions and Defuzzification.

UNIT IV

Basic concept of Genetic algorithm and detail algorithmic steps - Adjustment of free parameters- Solution of typical control problems using Genetic algorithm - Concept on some other search techniques like tabu search and ant colony search techniques for solving optimization problems.

UNIT V

GA application to optimization problems - Case studies: Identification and control of linear and nonlinear dynamic systems using MATLAB - Neural Network toolbox. Stability analysis of Neural Network interconnection systems - Implementation of fuzzy logic controller using MATLAB fuzzy logic toolbox - Stability analysis of fuzzy control systems.

Text Books:

1. Timothy J. Ross, “Fuzzy Logic with Engineering Applications”, Wiley India, 3rd edition, 2012.
2. Zimmermann H. J. "Fuzzy set theory and its Applications" Springer international edition, 2011.
3. David E. Goldberg, “Genetic Algorithms in Search, Optimization, and Machine Learning”, Pearson Education, 2009.
4. Laurene V. Fausett, “Fundamentals of Neural Networks: Architectures, Algorithms, And Applications”, Pearson Education, 1st edition, 1993.
5. W. T. Miller, R. S. Sutton and P. J. Webros, “Neural Networks for Control”, MIT Press, 1996.

Reference Books:

1. S. Rajasekaran, and G. A. Vijayalakshmi Pai, Neural Networks, Fuzzy Logic and Genetic Algorithms: Synthesis, and Applications, Prentice Hall of India, 2007.

Course Outcomes

By the end of this course students will be able to:

- Comprehend the fuzzy logic and the concept of fuzziness involved in various systems.
- Understand the role of soft computing techniques in solving real world applications
- Build optimal classifiers using genetic algorithms
- Implement fuzzy logic controller using MATLAB fuzzy logic toolbox

CS704O

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OPEN ELECTIVE II (Through MOOCs)

No.of Credits: 3 Instruction Hours/Week: 2L+2P

- Open elective courses are to be successfully completed on SWAYAM online portal of Government of India.
- Courses offered by Department as Program Core/ Program Elective/ Audit courses shall not be opted as open elective.

CS705O

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

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OPEN ELECTIVE III (Through MOOCs)

No.of Credits: 3 Instruction Hours/Week: 2L+2P

- Open elective courses are to be successfully completed on SWAYAM online portal of Government of India.
- Courses offered by Department as Program Core/ Program Elective/ Audit courses shall not be opted as open elective.

HSS706E

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

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OPTIMIZATION TECHNIQUES

No.of Credits: 3 Instruction Hours/Week: 3

Course Objectives:

The course is designed to

- Cast engineering extrema (minima/maxima) problems into optimization framework.
- Learn efficient computational procedures to solve optimization problems.

UNIT I

Overview of Operations Research, Modeling approach, Decision analysis and Games-Decision environments, Decision making under certainty, Decision making under risk, Decision making under uncertainty, Game theory.

UNIT II

Liner Programming – Formulation, Graphical method, Simplex method, Duality, Formulation of transportation, Assignment and Transshipment models. Goal programming – Formulation, Weighting and Preemptive methods.

UNIT III

Integer Linear Programming – Applications, Branch and bound, and Cutting plane algorithms.

UNIT IV

Nonlinear Programming - Sample applications, Graphical illustration of nonlinear programming problems, Types of nonlinear programming problems, One-variable unconstrained optimization, Multivariable unconstrained optimization.

UNIT V

Karush-Kuhn-Tucker conditions for constrained optimization, Quadratic programming, Separable programming, Convex programming and Non-convex programming.

Text Books:

1. Hillier F S, and Lieberman G J, *Introduction to Operations Research*, 7th edition, Tata McGraw-Hill, 2003.

Reference Books:

1. Taha H A, Operations Research – An Introduction, 8th edition, Prentice Hall of India, 2006.
2. Wagner H M, Principles of Operations Research with Applications to Managerial Decisions, 2nd edition, Prentice Hall of India, 2004.
3. Tulsian P C, and Pandey V, Quantitative Techniques – Theory and Problems, Pearson Education Asia, 2002.

Course Outcomes

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

- Apply basic concepts of mathematics to formulate an optimization problem
- Analyse and appreciate variety of performance measures for various optimization problems
- Select appropriate solution technologies and strategies,
- Interpret the solution of an optimization problem
- Understand the effects of problem variation on the optimal solution.

CS707S

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MOBILE APPLICATION DEVELOPMENT

No.of Credits: 2 Instruction Hours/Week: 2L+2P

Course Objectives

The course is designed to

- Impart both conceptual and practical knowledge on Android OS.
- Understand and develop robust applications for Mobile devices on Android platform.

The course shall cover the following topics:

- **Introduction to Android Programming:** What is Android?, Obtaining the Required Tools, Launching Your First Android Application.
- **Using Android Studio for Android Development:** Exploring the IDE, Using Code Completion, Debugging Your Application, Publishing Your Application.
- **Activities, Fragments, and Intents:** Understanding Activities, Linking Activities Using Intents, Fragments, Displaying Notifications.
- **Introduction to Android User Interface:** Understanding the Components of a Screen, Adapting to Display Orientation, Managing Changes to Screen Orientation, Utilizing the Action Bar, Creating the User Interface Programmatically, and Listening for UI Notifications.
- **Designing User Interface with Views:** Using Basic Views, Using Picker Views, Using List Views to Display Long Lists, Understanding Specialized Fragments.
- **Displaying Pictures and Menus with Views:** Using Image Views to Display Pictures, Using Menus with Views, Using WebView.
- **Data Persistence:** Saving and Loading User Preferences, Persisting Data to Files, Creating and Using Databases.
- **Content Providers:** Sharing Data in Android, Using a Content Provider, Creating Your Own Content Providers, Using the Content Provider.
- **Messaging:** SMS Messaging, Sending Email.
- **Location-Based Services:** Displaying Maps, Getting Location Data, Monitoring a Location.
- **Networking:** Consuming Web Services Using HTTP, Consuming JSON Services.
- **Developing Android Services:** Creating Your Own Services, Establishing Communication Between a Service and an Activity, Binding Activities to Services, Understanding Threading.
- **Publishing Android Applications:** Preparing for Publishing, Deploying APK Files.

Text Books:

1. J. F. DiMarzio, Beginning Android Programming with Android Studio, John Wiley & Sons, Inc., Fourth Edition, 2017.
2. Wei-Meng Lee, Beginning Android™ 4 Application Development, John Wiley & Sons, Inc., 2012.

Reference Books:

1. Ian Darwin, Android Cookbook: Problems and Solutions for Android Developers, O'Reilly, Second Edition, 2017.
2. Bill Phillips, Chris Stewart and Kristin Marsicano, Android Programming: The Big Nerd Ranch Guide, Big Nerd Ranch, Third Edition, 2017.
3. Wei-Meng Lee, Android™ Application Development Cookbook: 93 Recipes for Building Winning Apps, John Wiley & Sons, Inc., 2013.
4. Peter Späth, Pro Android with Kotlin: Developing Modern Mobile Apps, Apress, 2018.
5. Neil Smyth, Android Studio 3.0 Development Essentials – Android 8 Edition, Neil Smyth / Payload Media, Inc., 2017.

Course Outcomes

Having successfully completed this course the students will be able to:

- Demonstrate their skills of using Android software development tools
- Demonstrate knowledge on mobile platforms, mobile user interface and user interface design requirements.
- Develop mobile applications and publish in different mobile platforms.

CS/PROJ

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

VIII Semester B.Tech (CSE) – CBCS Regulations-2020
(With effect from the academic year 2023-24)

PROJECT WORK, SEMINAR AND INTERNSHIP IN INDUSTRY

No.of Credits: 12

Students, not exceeding four per batch, shall pursue either research-oriented or application-oriented Project Work. The steps to be followed in executing the Project Work are given below:

Research-Oriented Project Work

1. Motivation
2. Literature Survey
3. Problem Definition
4. Model Formulation (System Model)
5. System Design/ Algorithm Development
6. Proof of Correctness
7. Performance Analysis
8. Performance Measurement
9. Results and Conclusions

Application-Oriented Project Work

1. Motivation
2. Problem Definition
3. Feasibility Study
4. Software Requirements Analysis
5. Software Design
6. Test Case Design
7. Coding
8. Testing
9. Conclusions

SRI VENKATESWARA UNIVERSITY COLLEGE OF ENGINEERING :: TIRUPATI – 517 502

Department of Computer Science and Engineering

Choice Based Credit System – 2020 Regulations

Scheme of Instruction and Examinations

List of subjects for B.Tech (Honors) in Computer Science and Engineering**

Course Code	Course Title	Scheme of Instruction (Hours/Week)				No. of Credits
		L	T	P	Total	
CSHN01	Distributed Databases	3	1		4	4
CSHN02	Advanced Operating Systems	3	1		4	4
CSHN03	Multicore Computing	3	1		4	4
CSHN04	Natural Language Processing	3	1		4	4
CSHN05	Software Architecture and Design Patterns	3	1		4	4
CSHN06	Multi Agent Systems	3	1		4	4
CSHN07	Deep Learning	3	1		4	4
CSHN08	Advanced Parallel Processing	3	1		4	4

- All Courses - 40 marks (Internal) + 60 Marks (Univ. Semester End)

** Students shall register for any 4 subjects (4*4 = 16 credits) from the above listed subjects, choosing one subject each in IV, V, VI and VII semester. Further, they shall acquire 4 credits through two MOOCs (each of 2 credits), which shall be discipline-specific.

CSHN 01

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

B.Tech (Honors in CSE) – CBCS Regulations-2020

DISTRIBUTED DATABASES

No.of Credits: 4 Instruction Hours/Week: 3L+1T

Course Objectives:

- To expose the need for distributed database technology to confront with the deficiencies of the centralized database systems.
- To introduce basic principles and implementation techniques of distributed database systems.
- To familiarize students with the principles and knowledge of parallel databases.

UNIT I

Introduction: What Is a Distributed Database System?, History of Distributed DBMS, Data Delivery Alternatives, Promises of Distributed DBMSs, Design Issues, Distributed DBMS Architectures.

Distributed and Parallel Database Design: Data Fragmentation, Allocation, Combined Approaches, Adaptive Approaches, Data Directory.

Distributed Data Control: View Management, Access Control, Semantic Integrity Control.

UNIT II

Distributed Query Processing: Overview, Data Localization, Join Ordering in Distributed Queries, Distributed Cost Model, Distributed Query Optimization, Adaptive Query Processing.

Distributed Transaction Processing: Background and Terminology, Distributed Concurrency Control, Distributed Concurrency Control Using Snapshot Isolation, Distributed DBMS Reliability, Modern Approaches to Scaling Out Transaction Management.

UNIT III

Data Replication: Consistency of Replicated Databases, Update Management Strategies, Replication Protocols, Group Communication, Replication and Failures.

Database Integration - Multidatabase Systems: Database Integration, Multidatabase Query Processing.

Parallel Database Systems: Objectives, Parallel Architectures, Data Placement, Parallel Query Processing, Load Balancing, Fault-Tolerance, Database Clusters.

UNIT IV

Peer-to-Peer Data Management: Infrastructure, Schema Mapping in P2P Systems, Querying Over P2P Systems, Replica Consistency, Blockchain.

Big Data Processing: Distributed Storage Systems, Big Data Processing Frameworks, Stream Data Management, Graph Analytics Platforms, Data Lakes.

UNIT V

NoSQL, NewSQL, and Polystores: Motivations for NoSQL, Key-Value Stores, Document Stores, Wide Column Stores, Graph DBMSs, Hybrid Data Stores, Polystores.

Web Data Management: Web Graph Management, Web Search, Web Querying, Question Answering Systems, Searching and Querying the Hidden Web, Web Data Integration.

Course Outcomes:
After completion of the course the students will be able to

- Design and implement distributed databases.
- Handle query processing in a distributed database system.
- Comprehend transaction management and analyze various approaches to concurrency control in distributed databases.
- Design and implement various algorithms and techniques for deadlock and recovery in distributed databases.

Text Books:

1. M. Tamer Ozsu and Patrick Valduriez, “Principles of Distributed Database Systems”, Fourth Edition, Springer, 2020.

Reference Books:

1. Stefano Ceri and Giuseppe Pelagatti, Distributed Databases: Principles and Systems, McGraw Hill Education, 2017.
2. Saeed K. Rahimi and Frank S. Haug, Distributed Database Management Systems: A Practical Approach, Wiley.
3. Chhanda Ray, Distributed Database Systems, First Edition, Pearson Education India.
4. Sachin Deshpande, Distributed Databases, Dreamtech Press.
5. David Bell and Jane Grimson, Distributed Database Systems, First Edition, Addison-Wesley, 1992.
6. Hector Garcia-Molina, Jeffrey D. Ullman, Jennifer Widom: Database Systems: The Complete Book, Second Edition, Pearson Education.

CSHN 02

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

B.Tech (Honors in CSE) – CBCS Regulations-2020

ADVANCED OPERATING SYSTEMS

No.of Credits: 4 Instruction Hours/Week: 3L+1T

Course Objectives:

- Familiarize the students with the basics of hardware and software issues in distributed computing systems.
- Understand issues related to Synchronization, mutual exclusion, naming, synchronization, consistency and replication,
- Introduce the concepts of distributed file systems, distributed shared virtual memory fault tolerance and deadlocks in distributed systems.

UNIT I

Distributed systems – Introduction, Hardware concepts, Software concepts and Design issues. Layered protocols, Asynchronous transfer mode networks, Client server model, Remote procedure call, Group communication.

UNIT II

Clock synchronization, Mutual exclusion, Election algorithms, Atomic transactions, Deadlocks in distributed systems.
Threads, System models, Processor allocation, Scheduling in distributed systems.

UNIT III

Fault tolerance, Real-time distributed systems, Distributed file systems – Design, Implementation and Trends.
Distributed shared memory – Introduction and shared memory concept.

UNIT IV

DSM Consistency models, Page-based distributed shared memory.
Case study Amoeba – Introduction, Objects and capabilities, Process management, Memory management, Communication and Servers.

UNIT V

Multimedia operating systems – Introduction, Multimedia files, Video compression, Audio compression, Multimedia process scheduling, Multimedia file system paradigms, File placement, Caching, Disk scheduling for multimedia.

Text Books:

1. Tanenbaum A S, Distributed Operating Systems, Pearson Education, 2005.
2. Tanenbaum A S, Modern Operating Systems, 3rd Edition, Pearson Education, 2008.

Reference Books:

1. Andrew S Tanenbaum Maarten Van Steen, Distributed Systems: Principles and Paradigms, Pearson, 2006.

Course Outcomes:

After completion of the course the students will be able to

- Understand the design principles in distributed operating systems and the architectures for distributed systems
- Implement clock synchronization, concurrency control, deadlock detection, load balancing related to distributed operating systems.
- Efficiently handle the issues of Mutual Exclusion and Deadlock detection and recovery in distributed operating systems.
- Design and implement distributed file systems and Distributed shared virtual memory.

CSHN 04

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

B.Tech (Honors in CSE) – CBCS Regulations-2020

NATURAL LANGUAGE PROCESSING

No.of Credits: 4 Instruction Hours/Week: 3L+1T

Course Objectives:

The course is designed to

- Understand computational properties of natural languages and the commonly used algorithms for processing linguistic information.
- Learn basics of semantic analysis and discourse analysis and drives it to machine translation
- Learn how to process written text from basic of fundamental knowledge of Finite automata, Regular expression and probabilistic model with n-grams.

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UNIT I

Introduction to SLP, Regular Expressions and Automata, Words and Transducers, N-grams, Part-of-Speech Tagging, Hidden Markov and Maximum Entropy Models.

UNIT II

Phonetics, Speech Synthesis, Automatic Speech Recognition, Speech Recognition: Advanced Topics, Computational Phonology.

UNIT III

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

Information Extraction, Question Answering and Summarization, Dialogue and Conversational Agents, Machine Translation.

Course Outcomes:

After completion of the course the students will be able to

- Comprehend and analyze the various elements of speech processing
- Design and develop machine learning techniques in the area of NLP
- Demonstrate the state-of-the-art algorithms and techniques for text-based processing
- Perform POS tagging for a given natural language

.

Text Books:

1. Jurafsky D, Martin J H, *Speech and Language Processing: An Introduction to Natural Language Processing*, Computational Linguistics and Speech Recognition, 2nd edition, Pearson Education, 2013.

Reference Books:

1. Chopra D, Joshi N, Mastering Natural Language Processing with Python, Packt, 2016.
2. Watanabe S, Jen-Tzung Chien J T, Bayesian Speech and Language Processing, Cambridge University Press, 2015.
3. Kurdi M Z, Natural Language Processing and Computational Linguistics: Speech, Morphology and Syntax, Wiley, 2016.
4. Tiwary U S, Siddiqui T, Natural Language Processing & Information Retrieval, Oxford University Press, 2008.
5. Bikel D M, Zitouni I, Multilingual Natural Language Processing Applications: From Theory to Practice, Pearson Education, 2012.
6. Bharati A, Chaitanya V, Sangal R, Natural Language Processing: A Paninian Perspective, PHI, 1995.
7. Steven B, Natural Language Processing with Python, Shroff, 2009.
8. Mariani J, Language and Speech Processing, Wiley, 2013.

CSHN 05

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

B.Tech (Honors in CSE) – CBCS Regulations-2020

SOFTWARE ARCHITECTURE AND DESIGN PATTERNS

No.of Credits: 4 Instruction Hours/Week: 3L+1T

Course Objectives:

The course is designed to

- Impart knowledge on the different architectural styles and architectural patterns for the software
- Understand design patterns and their underlying object oriented concepts
- Focus on the architectural design issues as well as the use of design patterns for different applications

UNIT I

Design Patterns: Origin and History, Architectural to Software Design Patterns, What Is a Design Pattern?, More about Design Patterns.

UML: A Quick Reference - Structure Diagrams, Behavior Diagrams, Model Management Diagram, Class Diagrams, Sequence Diagrams.

Basic Patterns: Interface, Abstract Parent Class, Private Methods, Accessor Methods, Constant Data Manager, Immutable Object, Monitor.

UNIT II

Creational Patterns: Factory Method, Singleton, Abstract Factory, Prototype, Builder.

Collectional Patterns: Composite, Iterator, Flyweight, Visitor.

UNIT III

Structural Patterns: Decorator, Adapter, Chain of Responsibility, Façade, Proxy, Bridge, Virtual Proxy, Counting Proxy, Aggregate Enforcer, Explicit Object Release, Object Cache.

UNIT IV

Behavioral Patterns: Command, Mediator, Memento, Observer, Interpreter, State, Strategy, Null Object, Template Method, Object Authenticator, Common Attribute Registry.

UNIT V

Concurrency Patterns: Critical Section, Consistent Lock Order, Guarded Suspension, Read-Write Lock.

Case Study: A Web Hosting Company – Objective, KPS Hosting Solutions: A Brief Overview, Requirements, Business Objects and Their Association, Framework for Application Processing, Conclusion.

Text Books:

1. Partha Kuchana, Software Architecture Design Patterns in Java, Auerbach Publications – A CRC Press Company, 2004.

Reference Books:

1. Mark Richards, Neal Ford, Fundamentals of Software Architecture: An Engineering Approach, O'Reilly, First Edition, 2020.
2. Kamalmeet Singh, Adrian Ianculescu, Lucian-Paul Torje, Design Patterns and Best Practices in Java: A Comprehensive Guide to Building Smart and Reusable Code in Java, Packt Publishing, First Edition, 2018.
3. Erich Gamma, Design Patterns, Pearson Education.
4. Erich Gamma, Richard Helm, Ralph Johnson, John Vlissides, Design Patterns: Elements of Reusable Object-Oriented Software, Addison-Wesley/Pearson Education, 1995.
5. Steven John Metsker, William C. Wake, Design Patterns in Java, Addison-Wesley/ Pearson Education, 2006.
6. Alan Shalloway, James R. Trott, Design Patterns Explained: A New Perspective on Object-Oriented Design, Pearson Education, 2004.
7. Frank Buschmann, Regine Meunier, Hans Rohnert, Peter Sommerlad, Michael Stal, Pattern-Oriented Software Architecture: A System of Patterns, John Wiley & Sons, 1996.
8. Len Bass, Paul Clements, Rick Kazman, Software Architecture in Practice, Addison-Wesley Professional, Third Edition, 2012.

Course Outcomes:

After completion of the course the students will be able to

- Apply his knowledge to create an architecture for given application.
- Explain the role of analyzing architectures.
- Able to identify different structural patterns.
- Design creational, structural and behavioral patterns.
- Recognize major software architectural styles, design patterns, and frameworks.

CSHN 07

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

B.Tech (Honors in CSE) – CBCS Regulations-2020

DEEP LEARNING

No.of Credits: 4 Instruction Hours/Week: 3L+1T

Course Objectives:

The course is designed to

- Learn some advanced topics such as recurrent neural networks, long short term memory cells and convolutional neural networks.
- Learn deep recurrent and memory networks and deep Turing machines
- Understand different types of deep learning network models.

UNIT I

Introduction to Machine Learning: Learning Algorithms, Capacity, Overfitting and Underfitting, Hyperparameters and Validation Sets, Estimators, Bias and Variance, Maximum Likelihood Estimation, Bayesian Statistics, Supervised Learning Algorithms, Unsupervised Learning Algorithms, Stochastic Gradient Descent, Building a Machine Learning Algorithm, Challenges Motivating Deep Learning.

UNIT II

Review of fundamental learning techniques, Feed forward neural network - Artificial Neural Network, activation function, multi-layer neural network, Training Neural Network: Risk minimization, loss function, back propagation, regularization, model selection, and optimization. Conditional Random Fields: Linear chain, partition function, Markov network, Belief propagation, Training CRFs, Hidden Markov Model, Entropy.

UNIT III

Deep Feedforward Networks: Example: Learning XOR, Gradient-Based Learning, Hidden Units, Architecture Design, Back-Propagation and Other Differentiation Algorithms, Historical Notes.

Regularization for Deep Learning: Parameter Norm Penalties, Norm Penalties as Constrained Optimization, Regularization and Under-Constrained Problems, Dataset Augmentation, Noise Robustness, Semi-Supervised Learning, Multi-Task Learning, Early Stopping, Parameter Tying and Parameter Sharing, Sparse Representations, Bagging and Other Ensemble Methods, Dropout, Adversarial Training, Tangent Distance, Tangent Prop, and Manifold Tangent Classifier.

UNIT IV

Optimization for Training Deep Models: How Learning Differs from Pure Optimization, Challenges in Neural Network Optimization, Basic Algorithms, Parameter Initialization Strategies, Algorithms with Adaptive Learning Rates, Approximate Second-Order Methods, Optimization Strategies and Meta-Algorithms.

Convolutional Networks: The Convolution Operation, Motivation, Pooling, Convolution and Pooling as an Infinitely Strong Prior, Variants of the Basic Convolution Function, Structured Outputs, Data Types, Efficient Convolution Algorithms, Random or Unsupervised Features, The Neuroscientific Basis for Convolutional Networks, Convolutional Networks and the History of Deep Learning.

UNIT V

Sequence Modeling: Recurrent and Recursive Nets, Unfolding Computational Graphs, Recurrent Neural Networks, Bidirectional RNNs, Encoder-Decoder Sequence-to-Sequence Architectures, Deep Recurrent Networks, Recursive Neural Networks, The Challenge of Long-Term Dependencies, Echo State Networks, Leaky Units and Other Strategies for Multiple Time Scales, The Long Short-Term Memory and Other Gated RNNs, Optimization for Long-Term Dependencies, Explicit Memory.

Practical Methodology: Performance Metrics, Default Baseline Models, Determining Whether to Gather More Data, Selecting Hyperparameters, Debugging Strategies, Example: Multi-Digit Number Recognition.

Applications: Large-Scale Deep Learning, Computer Vision, Speech Recognition, Natural Language Processing, Other Applications.

Course Outcomes:

After completion of the course the students will be able to

- Explain different types of deep learning network models
- Apply optimization techniques to improve the performance of deep neural networks.
- Implement tools on Deep Learning techniques.

Text Books:

1. Ian Goodfellow, Yoshua Bengio and Aaron Courville, Deep Learning, MIT Press, 2016.

Reference Books:

1. Christopher M. Bishop, Pattern Recognition and Machine Learning, Springer, 2006.
2. Yegnanarayana, Artificial Neural Networks, B., PHI Learning Pvt. Ltd, 2009.
3. Raúl Rojas, Neural Networks: A Systematic Introduction, Springer, 1996.
4. Golub, G.,H., and Van Loan,C.,F, Matrix Computations, JHU Press,2013.
5. Satish Kumar, Neural Networks: A Classroom Approach, Tata McGraw-Hill Education, 2004.
6. M Tim Jones, Artificial Intelligence - A Systems Approach, Infinity Science Press, 2008.
7. Russel S, Norvig P, Artificial Intelligence: A Modern Approach, 3rd edition, Pearson Education, 2010.

CSHN 08

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

B.Tech (Honors in CSE) – CBCS Regulations-2020

ADVANCED PARALLEL PROCESSING

No.of Credits: 4 Instruction Hours/Week: 3L+1T

Course Objectives:

The course is designed to

- Understand engineering trade-offs involved in designing modern parallel computers
- Develop programming skills to effectively implement parallel architecture

UNIT I

Introduction: Heterogeneous Parallel Computing, Architecture of a Modern GPU, Why More Speed or Parallelism?, Speeding Up Real Applications, Parallel Programming Languages and Models, Overarching Goals.

History of GPU Computing: Evolution of Graphics Pipelines, GPGPU: An Intermediate Step, GPU Computing.

Introduction to Data Parallelism and CUDA C: Data Parallelism, CUDA Program Structure, A Vector Addition Kernel, Device Global Memory and Data Transfer, Kernel Functions and Threading.

UNIT II

Data-Parallel Execution Model: Cuda Thread Organization, Mapping Threads to Multidimensional Data, Matrix-Matrix Multiplication - A More Complex Kernel, Synchronization and Transparent Scalability, Assigning Resources to Blocks, Querying Device Properties, Thread Scheduling and Latency Tolerance.

CUDA Memories: Importance of Memory Access Efficiency, CUDA Device Memory Types, A Strategy for Reducing Global Memory Traffic, A Tiled Matrix-Matrix Multiplication Kernel, Memory as a Limiting Factor to Parallelism.

Performance Considerations: Warps and Thread Execution, Global Memory Bandwidth, Dynamic Partitioning of Execution Resources, Instruction Mix and Thread Granularity.

UNIT III

Parallel Patterns: Convolution – Background, 1D Parallel Convolution - A Basic Algorithm, Constant Memory and Caching, Tiled 1D Convolution with Halo Elements, A Simpler Tiled 1D Convolution - General Caching.

Parallel Patterns: Prefix Sum – Background, A Simple Parallel Scan, Work Efficiency Considerations, A Work-Efficient Parallel Scan, Parallel Scan for Arbitrary-Length Inputs.

Parallel Patterns: Sparse Matrix-Vector Multiplication – Background, Parallel SpMV Using CSR, Padding and Transposition, Using Hybrid to Control Padding, Sorting and Partitioning for Regularization.

UNIT IV

Application Case Study: Molecular Visualization and Analysis – Application Background, A Simple Kernel Implementation, Thread Granularity Adjustment, Memory Coalescing.

Parallel Programming and Computational Thinking: Goals of Parallel Computing, Problem Decomposition, Algorithm Selection, Computational Thinking.

An Introduction to OpenCL™: Background, Data Parallelism Model, Device Architecture, Kernel Functions, Device Management and Kernel Launch, Electrostatic Potential Map in OpenCL.
Parallel Programming with OpenACC: OpenACC versus CUDA C, Execution Model, Memory Model, Basic OpenACC Programs, Future Directions of OpenACC.

UNIT V
Thrust: A Productivity-Oriented Library for CUDA – Background, Motivation, Basic Thrust Features, Generic Programming, Benefits of Abstraction, Programmer Productivity, Best Practices.
Programming a Heterogeneous Computing Cluster: Background, A Running Example, MPI Basics, MPI Point-to-Point Communication Types, Overlapping Computation and Communication, MPI Collective Communication.
CUDA Dynamic Parallelism: Background, Dynamic Parallelism Overview, Important Details, Memory Visibility, A Simple Example, Runtime Limitations, A more Complex Example.

Course Outcomes:
After completion of the course the students will be able to

- Design and implement parallel programs in environments such as CUDA, OpenMP
- Generate parallel programs for matrix, graph and sorting problems using CUDA library
- Learn about different OpenMP programming, MPI programming,
- Develop parallel programs using OpenCL library
- Analyze the functionality of GPU architecture using parallel computing platform CUDA.

Text Books:

1. David B. Kirk and Wen-mei W. Hwu, Programming Massively Parallel Processors: A Hands-on Approach, Morgan Kaufmann/ Elsevier, Second Edition, 2013.

Reference Books:

1. Peter Pacheco, Matthew Malensek, An Introduction to Parallel Programming, Morgan Kaufmann/ Elsevier, Second Edition, 2022.
2. Roman Trobec, Boštjan Slivnik, Patricio Bulić, Borut Robič, Introduction to Parallel Computing: From Algorithms to Programming on State-of-the-Art Platforms, Springer International Publishing, 2018.
3. Bertil Schmidt, Jorge Gonzalez- Dominguez, Christian Hundt, Moritz Schlarb, Parallel Programming: Concepts and Practice, Morgan Kaufmann/ Elsevier, 2017.
4. Gerassimos Barlas, Multicore and GPU Programming: An Integrated Approach, Elsevier Science, 2014.
5. Nicholas Wilt, The CUDA Handbook: A Comprehensive Guide to GPU Programming, Addison-Wesley/ Pearson Education, 2013.
6. Rob Farber, CUDA Application Design and Development, Morgan Kaufmann/ Elsevier, 2011.

7. Geoffrey C. Fox, Roy D. Williams, Guiseppe C. Messina, Parallel Computing Works!, Elsevier Science, 2014.
8. Janusz Kowalik, Tadeusz Puźniakowsk, Using OpenCL: Programming Massively Parallel Computers, IOS Press, 2012.
9. Wen-mei W. Hwu, David B. Kirk and Izzat El Hajj, Programming Massively Parallel Processors: A Hands-on Approach, Morgan Kaufmann, Fourth Edition, 2022.
10. S K Basu, Parallel and Distributed Computing: Architectures and Algorithms, Prentice Hall, 2016.
11. Kai Hwang, Jack J. Dongarra, Geoffrey C. Fox, Distributed and Cloud Computing: From Parallel Processing to the Internet of Things, Morgan Kaufmann/ Elsevier, 2013.

SRI VENKATESWARA UNIVERSITY COLLEGE OF ENGINEERING :: TIRUPATI – 517 502

Department of Computer Science and Engineering

B.Tech (CSE) – Choice Based Credit System – 2020 Regulations

Scheme of Instruction and Examinations

List of subjects for B.Tech (Minor) in Computer Science and Engineering**

Course Code	Course Title	Scheme of Instruction (Hours/Week)				No. of Credits
		L	T	P	Total	
CSMN01	Data Structures	3	1		4	4
CSMN02	Computer Organization	3	1		4	4
CSMN03	Database Management Systems	3	1		4	4
CSMN04	Computer Networks	3	1		4	4
CSMN05	Software Engineering	3	1		4	4
CSMN06	Java and Web Technology	3	1		4	4

- All Courses - 40 marks (Internal) + 60 Marks (Univ. Semester End)

** Students shall register for any 4 subjects (4*4 = 16 credits) from the above listed subjects, choosing one subject each in IV, V, VI and VII semester. Further, they shall acquire 4 credits through two MOOCs (each of 2 credits), which shall be discipline-specific.

CSMN 01

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

B.Tech (Minor in CSE) – CBCS Regulations-2020
(With effect from the academic year 2021-22)

DATA STRUCTURES

No.of Credits: 4 Instruction Hours/Week: 3L+1T

Course Objectives:

- Develop skills to design and analyze linear and nonlinear data structures.
- Develop algorithms for manipulating linked lists, stacks, queues, trees and graphs.
- Develop recursive algorithms as they apply to trees and graphs.
- Strengthen the ability to identify and apply the suitable data structure for the given real world problem.
- Understand the various techniques of sorting and searching.

UNIT I

Introduction: Data types/Objects/Structures, Abstract definition of Data Structures, Overview of linear and nonlinear data structures, Analysis of algorithms, Algorithm specification, Asymptotic notation, Time-Space trade-off, Searching: Linear, Binary and Fibonacci search and their complexity analysis.

Arrays: Definition, Multidimensional arrays, Pointer arrays, Representation of arrays – Row major and Column major orders, Application of arrays – Polynomials, Sparse matrices representation.

UNIT II

Stacks and Queues: Introduction, ADT, Array Representation, Operations and Applications of Stacks - Evaluation of expressions, Code generation for stack machines, Implementation of recursion, Factorial calculation and Towers of Hanoi; Circular Queue, Priority Queue, Double ended queue, Applications of Queues - Simulation, CPU Scheduling; Multiple stacks and queues.

UNIT III

Linked Lists: Single linked lists and chains, Circular linked list, Doubly linked list, Circular doubly linked list, Complexity analysis of the same, Linked representation of Stacks and Queues, Applications of linked lists - Polynomial representation, Sparse matrix multiplication, Dynamic storage management; Generalized list representation, Recursive algorithms for lists, Recursive lists.

UNIT IV

Trees: Basic tree terminologies, Binary Trees – Definition, Properties, ADT, Representations, Operations and Applications; Binary Search Trees, Heap Trees, Threaded binary trees, Height balanced trees – AVL Trees, Red black tree, Splay tree Their operations and complexity analysis.

UNIT V

Sorting Techniques: Insertion sort, Selection sort, Bubble sort, Quick Sort, Radix sort, Merge sort, External sort – Introduction, K-way Merge sort.

Graphs: Basic terminologies, Representations, ADT, Operations on graphs – DFS, BFS, Spanning Trees, Biconnected components, Minimum cost spanning trees.

Course Outcomes:

After completion of the course the students will be able to

- Choose appropriate data structure for the specified problem definition.
- Implement linear and non-linear data structures viz. stacks, queues, linked list, trees, graphs.
- Apply the concept of trees and graph data structures for the real world problems.
- Comprehend the implementation of sorting and searching algorithms.

Text Books:

1. Ellis Horowitz and Sartaj Sahni, "Fundamentals of Data Structures", Computer Science Press.
2. Ellis Horowitz, Sartaj Sahni, Dinesh Mehta, Fundamentals of Data Structures in C++, Universities Press, Second Edition.
3. Debasis Samanta, Classic Data Structures, Second Edition, Prentice Hall of India.

REFERENCES:

1. Aaron M. Tenenbaum Yedidyah Langsam. Moshe J. Augenstein, "Data Structures using C and C++", PHI Learning Private Limited.
2. Jean Paul Tremblay and Paul G Sorenson, "An Introduction to Data Structures with Applications", McGraw Hill.
3. R. Kruse et.al, "Data Structures and Program Design in C", Pearson Education.

CSMN 02

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

B.Tech (Minor in CSE) – CBCS Regulations-2020

COMPUTER ORGANIZATION

No.of Credits: 4 Instruction Hours/Week: 3L+1T

Course Objectives

The course is designed to

- make the students understand the basic structure and operations of various functional units of a digital computer.
- familiarize the students with arithmetic and logic unit and implementation of fixed point and floating-point arithmetic operations.
- Make the students understand how to design processing unit using hardwired control and microprogrammed control approaches.
- familiarize the students with hierarchical memory system.
- expose the students with different ways of communicating with I/O devices and standard I/O interfaces.

UNIT I

Structure of Computers: Introduction, Performance, Memory addressing and Operations, Instructions and Instruction sequencing, Addressing modes, Basic l/0 operations, Pushdown stacks, Subroutines, Encoding of machine instructions, Brief description and functional classification of IA-32 Pentium instruction set.

UNIT II

Basic Processing Unit: Fundamental concepts, Single and Multiple bus organization, Hardwired control, Multiprogrammed control – Microinstructions, Microprogram sequencing, Wide-branch addressing, Microinstructions with next-address field, Prefetching microinstructions.

Arithmetic: Multiplication – Booth algorithm; Integer division, Floating-Point Addition and Subtraction.

UNIT III

The memory System: Basic concepts, RAM and ROM Memories and their internal organization, Cache Memories - Mapping functions, Replacement algorithms; Performance Considerations, Virtual Memories, Secondary Storage.

UNIT IV

Input/ Output Organization: Accessing l/O devices; Interrupts –Enabling and disabling, Handling multiple devices; Direct Memory Access - Bus Arbitration; Buses – Synchronous and Asynchronous; Interface circuits – Parallel port, Serial port

UNIT V

Pipelining: Basic concepts, Data hazards, Instruction hazards, Influence on instruction sets, Data path and control considerations, Superscalar operation.

Processor Families: The ARM family, The Motorola 680x0 and Coldfire families, The IA-32 family.

Course Outcomes:

On successful completion of this course the students will be able to

- Identify the basic structure and functional units of a digital computer.
- Analyze the effect of addressing modes on the execution time of a program.
- Design processing unit using the concepts of hardwired control or microprogrammed control.
- Select appropriate interfacing standards for I/O devices.
- Identify the roles of various functional units of a computer in instruction execution.
- Understand memory hierarchy and its impact on computer cost/performance.
- Understand the advantage of instruction level parallelism and pipelining for high performance processor design.

Text Books

1. Hamacher C, Vranesic Z, and Zaky S, Computer Organization, 5th edition, McGraw-Hill.

Reference Books

1. Heuring V P, and Jordan H F, Computer systems Design and Architecture Addison-Wesley.
2. Carpinelli J D, Computer System Organization and Architecture. Addison-Wesley 2001.
3. Mano M M, Computer system Architecture, 4th edition, Pearson Education Asian 2002.

CSMN 03

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

B.Tech (Minor in CSE) – CBCS Regulations-2020

DATABASE MANAGEMENT SYSTEMS

No.of Credits: 4 Instruction Hours/Week: 3L+1T

Course Objectives:

- To learn data models, conceptualize and depict a database system using ER diagram
- To understand the internal storage structures in a physical DB design
- To demonstrate the fundamental concepts, operation and function of different components of database systems.
- To describe the roles of transaction processing and concurrency control in a modern DBMS.
- To demonstrate key issues in the operation of a DBMS including query processing, security and integrity.
- To design and implement a database application.

UNIT-I

Introduction: Managing Data, File Systems versus a DBMS, Advantages of a DBMS, Storing data in a DBMS, Queries in a DBMS, Transactions, Structure of a DBMS.

Introduction to Data base design: ER diagrams, Beyond ER Design, Entities, Attributes and Entity sets, Relationships and Relationship sets, Additional features of ER Model, Conceptual Design with the ER Model, Conceptual Design for Large enterprises.

Relational Model: Introduction to the Relational Model, Integrity Constraints over Relations, Enforcing Integrity constraints, Querying relational data, Logical data base Design, Introduction to Views Destroying/ altering Tables and Views.

UNIT-II

Relational Algebra and Calculus: Relational Algebra , Relational calculus, Expressive Power of Algebra and calculus.

SQL: Form of Basic SQL Query, UNION, INTERSECT and EXCEPT, Nested Queries, Aggregate Operators, NULL values , Complex Integrity Constraints in SQL, Triggers and Active Databases, Designing Active Databases

UNIT-III

Schema Refinement and Normal Forms: Introduction, Functional Dependencies, Reasoning about FDS, Normal Forms - FIRST, SECOND, THIRD Normal forms, BCNF, Properties of Decompositions, Normalization, Schema Refinement in Data base Design, Multi valued Dependencies , FOURTH Normal Form, Join Dependencies, FIFTH Normal form, Inclusion Dependencies.

Database Application Development: Accessing Databases from Applications, Introduction to JDBC, JDBC Classes and Interfaces, SQLJ, Stored Procedures.

UNIT-IV

Overview of Transaction Management: ACID Properties, Transactions and Schedules, Concurrent Execution of Transactions, Lock-based Concurrency Control, Performance Locking, Transaction Support in SQL, Introduction to Crash Recovery.
Concurrency Control: 2PL, Serializability and Recoverability, Introduction to Lock Management, Lock Conversions, Dealing with Deadlocks, Specialized Locking Techniques, Concurrency Control without Locking

Crash Recovery: Introduction to ARIES, Log, Recovery related Structures, Write-Ahead Log Protocols, Checkpointing, Recovering from a System Crash, Media Recovery, Interaction with Concurrency Control

UNIT-V

Overview of Storage and Indexing: Data on External Storage, File Organization and Indexing, Index data Structures, Comparison of File Organizations, Indexes and Performance Tuning.

Indexing and Hashing: Intuitions for tree indexes, Indexed Sequential Access Method, B+ Trees: A Dynamic Index Structure, Search, Insert, Delete, Duplicates, B+ Trees in Practice, Static Hashing, Extendable Hashing, Linear Hashing, Extendible vs. Linear Hashing.

Parallel and Distributed Databases: Introduction, Architectures for Parallel Databases, Parallel Query Evaluation, Parallelizing Individual Operations, Introduction to Distributed Databases, Distributed DBMS Architectures, Storing Data in Distributed DBMS, Distributed Catalog Management, Distributed Query Processing

Course Outcomes:

Upon successful completion of this course, the student should be able to

- Use relational algebra and relational calculus, to express database queries.
- Use SQL to interact with database management systems.
- Design appropriate database tables, using functional dependencies and normal forms.
- Implement a disk-oriented database storage manager with heap table and indexes.
- Understand, compare, and implement the major concurrency control algorithms.
- Implement database recovery algorithms and verify their correctness.
- Identify trade-offs among database systems techniques and contrast distributed/parallel alternatives for both on-line transaction processing and on-line analytical workloads.

Text Books:

1. Raghu Ramakrishnan and Johannes Gehrke, Database Management Systems, Third Edition, McGraw-Hill, 2014.
2. C. J. Date, A. Kannan and S. Swamynathan, An Introduction to Database Systems, 8th edition, Pearson Education, 2006.

Reference Books:

1. Silberschatz A, Korth H F, and Sudarshan S, Database System Concepts, 6th edition, McGraw-Hill, 2011.
2. Ramez Elmasri and Shamkant B. Navathe, Fundamentals of Database Systems, Fourth Edition, Pearson/Addision wesley, 2007.

3. J D Ullman, H. Garcia-Molina and J. Widom, Database Systems: The Complete Book, Prentice-Hall, 2009.
4. Jeffrey A. Hoffer, Ramesh Venkataraman, Heikki Topi, Modern Database Management, 12th edition, Pearson, 2015.

CSMN 04

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

B.Tech (Minor in CSE) – CBCS Regulations-2020

COMPUTER NETWORKS

No.of Credits: 4 Instruction Hours/Week: 3L+1T

Course Objectives:

The course is designed to

- Provide insight about fundamental concepts, basic taxonomy and terminology of Computer Networks.
- Gain comprehensive knowledge about the principles, protocols, and significance of Layers in OSI and TCP/IP

UNIT I

Introduction to Computer Networks: Networks, Component and Categories, Topologies, Transmission Media, Reference Models: ISO/OSI Model and TCP/IP Model.

Physical Layer: Analog and Digital Signals, Periodic Analog Signals, Transmission Impairments, Data rate limits, Performance, Digital data transmission techniques, Analog data transmission techniques, Multiplexing: FDM, WDM and TDM; Spread Spectrum, Switching: Circuit and Packet.

UNIT II

Data Link Layer and Medium Access Sub Layer: Design Issues, Error Detection and Error Correction, Elementary Data Link Protocols, Sliding Window Protocols, Channel allocation problems, Multiple Access Protocols: Pure ALOHA, Slotted ALOHA, CSMA/CD, CSMA/CA; IEEE 802.3 Ethernet.

UNIT III

The Network Layer: Network layer design issues, Routing Algorithms, Congestion Control Algorithms, Quality of Service, Internetworking, The Network layer in the Internet: IPV4 Addresses, IPV6, Internet Control protocol, OSPF, BGP, IP, ICMPv4, IGMP.

UNIT IV

The Transport Layer: The Transport Service, Elements of Transport Protocols, Congestion Control, Internet Transport Protocols: UDP, TCP; Network Performance Measurement.

UNIT V

The Application Layer: Introduction, Client-Server Programming, Domain Name System (DNS), WWW and HTTP, FTP, E-mail, TELNET, Secure Shell, SNMP, IP Security Architecture, Firewalls.

Text Books:

1. Computer Networks, Andrew S. Tanenbaum, Wetherall, Pearson, 5th edition, 2010.
2. Data communications and Networking, Behrouz A. Forouzan, Mc Graw Hill Education, 5th edition, 2012.

Reference Books:

1. Kurose J F, Ross K W, *Computer Networking – A Top-Down Approach*, 5th edition, Pearson Education, 2010.
2. Peterson L L, Davie B S, *Computer Networks - A Systems Approach*, 5th edition, Morgan Kaufmann, 2011.
3. Forouzan B A, Mosharraf F, *Computer Networks – A Top-Down Approach*, Tata McGraw-Hill, 2012.
4. Olifer N, Olifer V, *Computer Networks – Principles, Technologies, and Protocols for Network Design*, Wiley, 2006.

Course Outcomes

By the end of this course students will be able to:

- Choose the transmission media depending on the requirements.
- Explain the functions of different layer of the OSI Protocol
- Analyze MAC layer protocols and LAN technologies
- Implement routing and congestion control algorithms
- Design new protocols for computer network.
- Configure DNS, DDNS, TELNET, EMAIL, FTP, WWW, HTTP, SNMP, Bluetooth, Firewalls using open source software and tools.

CSMN 05

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

B.Tech (Minor in CSE) – CBCS Regulations-2020

SOFTWARE ENGINEERING

No.of Credits: 4 Instruction Hours/Week: 3L+1T

Course Objectives:

The course is designed to understand

- Software life cycle models.
- Software requirements and SRS document.
- Different software design strategies
- Quality control and how to ensure good quality software.
- Planning and estimation of software projects.
- Maintenance of software and gain knowledge of the overall project activities.

UNIT I

Introduction to Software Engineering: The Nature of Software, The Unique Nature of WebApps, Software Engineering, Software Process, Software Engineering Practice, Software Myths.

Process Models: A Generic Process Model, Process Assessment and Improvement, Prescriptive Process Models, Specialized Process Models, The Unified Process, Personal and Team Process Models, Process Technology, Product and Process.

Agile Development: Agility, Agility and the Cost of Change, Extreme Programming, Agile Process Models

UNIT II

Understanding Requirements: Requirements Engineering, Eliciting Requirements, Developing Use Cases, Building the Requirements Model, Negotiating Requirements, Validating Requirements.

Requirements Modeling: Requirements Analysis, Scenario based Modeling, Class based Modeling, Requirements Modeling Strategies, Flow Oriented Modeling, Patterns for Requirement Modeling, Requirements Modeling for WebApps

Design Concepts: Design Process, Design Concepts, Design Model.

Architectural Design: Software Architecture, Architectural Genres, Architectural Styles, Architectural Design, Alternative Architectural Designs, Architectural Mapping using Data flow.

UNIT III

Component Level Design: Component, Class based Components, Conducting Component level design, Component level Design for WebApps, Designing Traditional Components, Component based Development.

User Interface Design: The Golden Rules, User Interface Analysis and Design, Interface Analysis, Interface Design Steps, WebApp Interface Design, Design Evaluation.

Pattern Based Design: Design Patterns, Pattern based Software Design, Architectural Patterns, Component Level Design Patterns, User Interface Design Patterns.

UNIT IV

Software Quality Concepts: Software Quality, Software Quality Dilemma, Achieving Software Quality.

Software Quality Assurance: Elements of Software Quality Assurance, SQA Goals and Metrics, Formal Approaches to SQA, Statistical SQA, Software Reliability.

Software Testing Strategies: A Strategic Approach to Software Testing, Strategic Issues, Unit Testing and Integration Testing (both Conventional and OO Software), Test Strategies for WebApps, Validation Testing, System Testing, Art of Debugging.

Testing Conventional Applications: Software Testing Fundamentals, Internal and External View of Testing, White-Box Testing, Basis Path Testing, Control Structure Testing, Black-Box Testing, Model based Testing, Testing for Specialized Environments, Patterns for Software Testing.

Computer Aided Software Engineering: CASE and its Scope, CASE Environment, CASE Support in Software Life Cycle, Characteristics of CASE Tools, Towards Second Generation CASE Tool.

UNIT V

Managing Software Projects: Project Management Concepts, Metrics in the Process and Project Domains, Software Measurement, Metrics for Software Quality, Project Planning Process, Software Scope and Feasibility, Software Project Estimation, Decomposition Techniques, Empirical Estimation Models, Estimation for OO Projects, Project Scheduling – Basic Principles, Defining a Task Set and Task Network, Scheduling, Introduction to Risk Management, Software Maintenance, Software Supportability, Software Reengineering, Reverse Engineering, Restructuring, Forward Engineering, Economics of Reengineering.

Text Books:

1. Pressman R S, *Software Engineering: A Practitioner's Approach*, 7th edition, McGraw-Hill, 2010.
2. Sommerville I, *Software Engineering*, 9th edition, Pearson Education, 2011.

Reference Books:

1. Jalote P, *Software Engineering: A Precise Approach*, Wiley, 2010.
2. Braude E J, Bernstein M E, *Software Engineering: Modern Approaches*, 2nd edition, Wiley, 2010.
3. Saleh K A, *Software Engineering*, J Ross Publishing, 2009.
4. Bruegge B, Dutoit A H, *Object-Oriented Software Engineering Using UML, Patterns, and Java*, 3rd edition, Prentice Hall, 2009.
5. Bennett S, McRobb S, Farmer R, *Object-Oriented System Analysis and Design Using UML*, 4nd edition, McGraw-Hill, 2010.
6. Lethbridge T C, Laganiere R, *Object-Oriented Software Engineering*, 2nd edition, McGraw-Hill, 2005.

Course Outcomes

By the end of this course students will be able to

- Define and develop a software project from requirement gathering to implementation.
- Obtain knowledge about principles and practices of software engineering.
- Focus on the fundamentals of modeling a software project.
- Obtain knowledge about estimation and maintenance of software systems

- Comprehend, assess, and calculate the cost of risk involved in a project management
- Implement testing methods at each phase of SDLC

CSMN 06

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

B.Tech (Minor in CSE) – CBCS Regulations-2020

JAVA AND WEB TECHNOLOGY

No.of Credits: 4 Instruction Hours/Week: 3L+1T

Course Objectives:

The course is designed to

- Learn how to extend Java classes with inheritance and dynamic binding.
- Learn how to use exception handling in Java applications.
- Understand how to design applications with threads in Java.
- Learn how to design a graphical user interface (GUI) with Java Swing.
- Understand how to use Java APIs for program development.
- Understand the Web designing using HTML, XML, DHTML and Javascript

UNIT I

Core Java Programming: Introduction to Java programming; Object-oriented programming with Java Classes and Objects, Constructors; Overloading Methods and Constructors, this keyword, Garbage Collection, Type Conversion and Casting, Control Statements, Parameter Passing, Recursion, String Class and String handling methods.

Inheritance: Basics, Using Super, Creating Multilevel hierarchy, Method overriding, Dynamic Method Dispatch, Using Abstract classes, Using final with inheritance, Object class.

UNIT II

Packages: Basics, Finding packages and CLASSPATH, Access Protection, Importing packages.

Interfaces: Definition, Implementing Interfaces, Extending Interfaces, Nested Interfaces, Applying Interfaces, Variables in Interfaces.

Exception handling - Fundamentals, Exception types, Uncaught exceptions, using try and catch, multiple catch clauses, nested try statements, throw, throws and finally, built-in exceptions, creating own exception subclasses.

UNIT III

Stream based I/O (java.io) – The Stream classes-Byte streams and Character streams, Reading console Input and Writing Console Output.

Working with types: Wrapper classes; Autoboxing, Generics.

Multithreading: The Java thread model, Creating threads, Thread priorities, Synchronizing threads, Interthread communication.

Applets; Event Handling; Basics of AWT and Swing; Basic concepts of networking.

UNIT IV

HTML: HTTP and HTML: Berners-Lee's Basics, The Request/Response Procedure, The Benefits of HTML5, Introduction to elements of HTML, Working with Text, List, Tables, Images, Forms, Frames, Hyperlinks, Images and Multimedia.

CSS: Introduction, Importing a Style Sheet, Using IDs, Using Classes, Using Semicolons, CSS Rules, Style Types, CSS Selectors, The CSS Cascade, Measurements, Fonts and

Typography, Managing Text Styles, CSS Colors, Positioning Elements, Pseudo-Classes, Shorthand Rules, The Box Model and Layout, Attribute Selectors, The box-sizing Property, CSS3 Backgrounds, Multiple Backgrounds, CSS3 Borders, Text Effects.

UNIT V

XML - Document type definition, XML Schemas, Document Object Model.
Java Script - Control statements, Functions, Arrays, Objects, Events, Dynamic HTML with Java Script.
Web servers – IIS, Apache and Apache Tomcat Servers.
Database Connectivity with MySQL - JDBC, Servlets.

Course Outcomes:

After completion of the course the students will be able to

- Write GUI programs using swing controls in Java.
- Write multithreaded programs.
- Design and develop dynamic and interactive web sites.
- Handle Java Database Connectivity with MySQL.

Text Books:

1. Herbert Schildt, Java - The Complete Reference, Mcgraw Hill Education, Ninth Edition, 2014.
2. Paul J. Deitel, Harvey M. Deitel, Abbey Deitel, “Internet & World Wide Web How to Program”, Deitel Series, Fifth edition, 2012.
3. Robin Nixon, Learning PHP, MySQL, JavaScript, CSS & HTML5, O’Reilly, Third Edition, 2014.

Reference Books:

1. Paul Dietel, Harvey Dietel, Java How to Program, Pearson Education, Eleventh Edition, 2017.
2. Jennifer Niederst Robbins, Learning Web Design: A Beginner’s Guide to HTML, CSS, Javascript, and Web Graphics, O’Reilly, Fifth Edition, 2018.
3. Jim Keogh, J2EE - The complete Reference, First Edition, McGraw Hill Education, 2017.
4. Robert W. Sebesta, “Programming the World Wide Web”, Pearson, Fourth edition, 2008.
5. David William Barron, “The World of Scripting Languages”, Wiley Publications, 2000.
6. Jon Duckett, Beginning HTML, XHTML, CSS, and JavaScript, Wiley India, 2009.
7. Rob Larsen, Beginning HTML & CSS, John Wiley & Sons, Inc, 2013.
8. M. Srinivasan, Web Technology: Theory and Practice, Pearson, 2012.