



CHOICE BASED CREDIT SYSTEM (CBCS)
SCHEME OF TEACHING AND EXAMINATION FOR B.E. DEGREE COURSE
(Effective from the academic year 2020-21)

III Semester B.E. Information Science and Engineering (Subjects and Syllabus as per AICTE-Model Curriculum for UG Course in Engg. & Tech.- Jan. 2018)						Teaching Hours /Week		Examination				
Sl No.	Course Code		Course Title	Teaching Department	Board of Exam	Credits	L	P	CIE	SEE	Total Marks	Exam Hours
01	BS	MA3CS1/MA3IS1	Statistics and Probability	MA	MA	4	4	-	50	50	100	3
02	PC	IS3TH2	Discrete Mathematical Structures	ISE	ISE	3	3	-	50	50	100	3
03	PC	IS3TH3	UNIX and SHELL Programming	ISE	ISE	3	3	-	50	50	100	3
04	PC	IS3TH4	Data Structures and its Applications	ISE	ISE	3	3	-	50	50	100	3
05	PC	IS3TH5	Object Oriented Programming	ISE	ISE	3	3	-	50	50	100	3
06	PC/MA	IS3TH6/MA3DP6	Digital Design and Computer Organization/ Fundamental Mathematics	ISE/MA	ISE/MA	3	3	-	50	50	100	3
07	PC	IS3LB1	UNIX and SHELL Programming Laboratory	ISE	ISE	1.5	-	3	50	50	100	3
08	PC	IS3LB2	Data Structures Laboratory	ISE	ISE	1.5	-	3	50	50	100	3
09	PC	IS3LB3	Object Oriented Programming Laboratory	ISE	ISE	1.5	-	3	50	50	100	3
10	HS	SK3DP1	Skill Development-I	HS	HS	1	-	2	50	-	50	-
Total						24.5	19	11	500	450	950	-
L-Lecture Hours, P-Practical Hours, CIE-Continuous Internal Evaluation, SEE-Semester End Examination												

Note:

- DM3TH6: Fundamental Mathematics - for Lateral Entry students only.
- There is no SEE for Skill Development-I course. However, all the students should maintain a minimum 85% of attendance and 40% of CIE to get pass in the subject.



Syllabus for the Academic Year: 2021 – 2022

Department: Mathematics

Semester: 3

Subject Name: Statistics and Probability

Subject Code: MA3CS1/ MA3IS1

L-P-C: 4-0-4

Course Objectives:

Sl. No.	Descriptions
1	Make use of correlation and regression analysis to fit a suitable mathematical model for the statistical data.
2	Apply discrete and continuous probability distributions for single and two variable in analyzing the probability models arising in engineering field.
3	Understand the concepts of the stochastic process of a statistic and estimation of parameters arising in engineering field.
4	Study the queuing models and sampling distributions.

UNIT	Description	Hours
I	Statistical Methods: Correlation and regression- Karl Pearson's coefficient of Correlation, problems. Regression analysis- lines of regression (without proof) problems. Curve Fitting: Curve fitting by the method of least square- Fitting of the curves of Linear, Polynomial and exponential function of the form $y=abx$.	10
II	Probability Distributions: Review of basic probability theory. Random variables (Discrete and Continuous), Probability of mass/density functions. Uniform distribution, Binomial distribution, Poisson's distribution, Exponential distribution and Normal distribution (without derivations) and problems.	10
III	Sampling and Statistical Inference: Sampling distributions, Concepts of hypothesis, standard error and confidence interval, Type-1 and Type-2 errors, Level of significance, One tailed and two tailed tests. Problems on sampling distribution of means, test of significance of sample mean, Student's t – distribution, Chi-square test for goodness of fit.	12
IV	Markov Chain: Probability Vector, Stochastic Matrix, Regular Stochastic Matrix, definition of Markov Chain, Transition Probabilities and Transition probability Matrix, Higher Transition Probabilities, state transition diagram, stationary distribution of regular Markov chains, problems. Queuing theory: Introduction, Concepts and M/G/1 and M/M/1 queuing systems, problems.	10
V	Joint probability distributions: Discrete random variable, Mathematical expectations, Covariance and Correlation. Analysis of variance: Definition and properties, one way classification, verification within and between treatments.	10



Syllabus for the Academic Year – 2021 - 2022

Department: Information Science and Engineering

Semester: 3

Subject Name: Discrete Mathematical Structures

Subject Code: IS3TH2

L-P-C: 3-0-3

Course Objectives:

Sl. No.	Description
1	Introduce the fundamental discrete mathematics concepts.
2	Provide theoretical foundations of computer science to perceive other courses in the programme.
3	Illustrate the applications of discrete structures: logic, relations, functions, counting and graph theory.
4	Apply different mathematical proof techniques to solve the problems.

UNIT	Description	Hours
I	Fundamentals of Logic: Basic connectivity and truth tables, Logical Equivalence: The Laws of Logic, Logical implication: Rule of Inference. Coding Theory: Elements of coding theory, Hamming Matric, The parity check and generator matrices.	08
II	Relations: Properties of Relations, Zero-one matrices and directed graphs, Partial orders and Hasse Diagrams, Equivalence relations and partitions. (No proof of theorems) Functions: Function definition, Types of Functions- One to One, On to and one to one correspondence. Sterling number of second kind. Function composition and inverse functions. The Pigeonhole principle (No proof of theorems).	08
III	Fundamental Principles of Counting: The rules of Sum and product- Permutations and Combinations, Binomial Theorem, Combinations with repetitions. (No proof of theorems). Properties of Integers: The well ordering principle: Mathematical Induction, Recursive definitions (No proof of theorems).	08
IV	The principles of Inclusion and Exclusion: The principles of Inclusion and Exclusion, Generalization of Principle. Derangements, Rook Polynomials, Arrangements with forbidden positions. Recurrence Relations: First order linear recurrence relations. Formulation and Examples. Second order linear Homogeneous Recurrence Relations with constant coefficients-Distinct real roots, Repeated real roots.	08
V	Introduction to Graph Theory: Definitions and Examples: Directed and undirected graphs, Walk, Trail, Path. Subgraphs, Complements, and Graph Isomorphism, Vertex Degree: Euler Trails and Circuits, Planar Graphs, Hamilton Paths and Cycles, Graph Coloring and Chromatic Polynomials. (No proof of theorems) Trees: Definitions, Properties and Examples: Tree, Spanning Tree, Rooted Tree, Binary Tree. (No proof of theorems)	08



Text Book:

Sl. No.	Title	Author(s)	Edition, Publisher, Year, ISBN
1	Discrete and Combinatorial Mathematics	Ralph P. Grimaldi and B V Ramana	5th Edition – 2017, Pearson Education, Asia, ISBN 978-0321385024.

Reference Books:

Sl. No.	Title	Author(s)	Edition, Publisher, Year, ISBN
1	Discrete Mathematics and its applications	Kenneth H Rosen	8th Edition, McGraw Hill 2007. ISBN-978-1259676512
2	Discrete Mathematical Structures with Applications to Computer Science	J.P. Tremblay and R. Manohar	1st Edition, McGraw Hill Education, 2017, ISBN: 978-0074631133

Course Outcomes:

Sl. No.	Description
1	Understand the basic concepts of Discrete Mathematical structures.
2	Formulate and solve abstract mathematical problems.
3	Apply the knowledge of mathematics in the field of computer science.
4	Design solutions for complex problem using different concepts of discrete mathematical structure.

Syllabus for the Academic Year – 2021 - 2022

Department: Information Science and Engineering

Semester: 3

Subject Name: UNIX and SHELL PROGRAMMING

Subject Code: IS3TH3

L-P-C: 3-0-3

Course Objectives:

Sl. No.	Description
1	Provide introduction to UNIX Operating System and its File System.
2	Gain an understanding of important aspects related to the Shell and the process.
3	Develop the ability to formulate regular expressions and use them for pattern matching.
4	Learn a comprehensive introduction to Shell Programming, Services and utilities.



UNIT	Description	Hours
I	<p>Getting Started and the UNIX Architecture & Command Usage and Basic File Attributes.</p> <p>The UNIX Operating System, The UNIX Architecture, Features of UNIX, Locating Commands, Internal and External Commands, The File System: The File, The Parent – Child Relationship, The HOME variable, Absolute Pathnames and Relative Pathnames, The UNIX File System, ls -l: Listing File Attributes, The -d Option, Listing Directory Attributes, File Ownership, File Permissions, chmod: Changing File Permissions, Directory Permissions, Changing File Ownership.</p>	08
II	<p>More File Attributes continued and Shell</p> <p>File Systems and Inodes, Hard Links, Symbolic Links and ln, the Directory, umask: Default File and Directory Permission, Modification and Access Times, find: Locating Files, The Shell's Interpretive Cycle, Pattern Matching –The Wild-cards, Escaping and Quoting , Redirection :The Three Standard Files, /dev/null and /dev/tty: Two Special Files, Pipes, tee : Creating a Tree, Command Substitution , Shell Variables,</p>	08
III	<p>Process and Simple Filters</p> <p>Process Basics, ps: Process Status, System Processes (-e or -a), Mechanism of Process Creation, Internal and External Commands , Running Jobs in Background, nice : Job Execution with Low Priority, Killing Processes with Signals, Job Control, at and batch: Execute Later , cron :Running Jobs Periodically ,time :Timing Processes. The Sample Database, pr: Paginating Files, head: Displaying the Beginning of a File, tail: Displaying the End of a File, cut: Slitting a File Vertically paste: Pasting Files, sort: Ordering a File, uniq: Locate Repeated and Non repeated Lines, tr: Translating Characters,</p>	08
IV	<p>Filters using Regular Expression and Essential Shell Programming</p> <p>grep: Searching for a pattern, Basic Regular Expression (BRE) – Introduction, Extended Regular Expression (ERE) and egrep, Shell Scripts, read: Making Scripts Interactive, Using Command Line Arguments, exit and Exit Status of Command, The Logical operators && and - Conditional Execution, The if , case Conditional, Using test to evaluate expression, The case Conditional, expr: Computation and string Handling, \$0: Calling a Script by Different Names, While: Looping, for : Looping within a List, set and Shift: Manipulating the Positional Parameters, The HERE Document(<<), trap, Debugging Shell Scripts with set -x.</p>	08
V	<p>Advanced SHELL Programming:</p> <p>Shells and Sub-Shells, () and { } : sub-shell or Current Shell?, export: Exporting shell variables, Running a script in the Current Shell: the . Command, let: Computation – A second Look (Korn and Bash), Arrays (Korn and Bash), String Handling (Korn and Bash), Conditional parameter substitution, Merging Streams, Shell Functions, eval: Evaluating Twice, The exec statement</p>	08



Text Book:

Sl. No.	Title	Author(s)	Edition, Publisher, Year, ISBN
1	Unix Concepts and Applications	Sumitabha Das	4th Edition, Tata McGraw Hill, 2012.

Reference Books:

Sl. No.	Title	Author(s)	Edition, Publisher, Year, ISBN
1	UNIX and Shell Programming	Behrouz A. Forouzan, Richard F. Gilberg	Cengage Learning – India Edition, 2009.
2	Linux Command Line and Shell Scripting Bible	Richard Blum , Christine Bresnahan	2nd Edition, Wiley, 2014.

Course Outcomes:

Sl. No.	Description
1	Classify and use the various Unix commands.
2	Use simple filters and regular expressions for file processing
3	Demonstrate the importance of shell in programming via shell scripts.
4	Write advanced shell scripts to solve the problems

Syllabus for the Academic Year – 2021 - 2022

Department: Information Science and Engineering

Semester: 3

Subject Name: Data Structures and its Applications

Subject Code: IS3TH4

L-P-C: 3-0-3

Course Objectives:

Sl. No.	Description
1	Understand record structure and representation in memory.
2	Learn linked representation of data structures.
3	Understand stacks and queues and its applications.
4	Understand non-linear data structures.



UNIT	Description	Hours
I	Introduction: Basic terminology; Elementary Data Organization, Data structures, Data Structures Operations, Arrays, Records and Pointers: Introduction, Linear arrays, Representation of linear arrays in memory, Traversing linear arrays, Inserting and deleting, Multidimensional arrays, Pointers: pointer arrays, Records: Record Structures, Representation of records in memory; parallel arrays, Unions.	08
II	Linked Lists: Introduction, Linked lists, Representation of linked list in memory, Traversing a linked list, Searching a linked list, Memory allocation; Garbage collection, Insertion into a linked list, Deletion form a linked list, Header linked lists, Two-way lists.	08
III	Stacks, Queues, Recursion: Introduction, Stacks, Array representation of stacks, Linked representation of stacks, Arithmetic expressions: Polish notation, Recursion, Towers of Hanoi, Implementation of recursive procedures by stacks, Queues, Linked representation of queues, Dequeues, Priority queues.	08
IV	Trees: Introduction, Binary trees, Representing binary trees in memory, Traversing binary trees, Traversal algorithms using stacks, Header nodes: Threads, Binary search trees, Searching and inserting in binary search trees, Deleting in a binary search trees, General trees.	08
V	Sorting and searching: Introduction, Bubble sort, Insertion sort, Selection sort, Linear search, Binary search, Graphs and their applications: Graph theory terminology, Sequential representation of graphs; adjacency matrix; path matrix, Warshall's algorithm; Shortest paths, Traversing a graph.	08

Text Book:

Sl. No.	Title	Author(s)	Edition, Publisher, Year, ISBN
1	Data Structures (Revised First Edition) Schaum's Outline Series Paperback – 1 February 2014	Seymour Lipschutz	McGraw Hill Education, 2014,ISBN-13: 978-1259029967

Reference Books:

Sl. No.	Title	Author(s)	Edition, Publisher, Year, ISBN
1	Data Structure using C	Aaron M. Tenenbaum, Yedidyah Langsam and Moshe J. Augenstein	1st Edition, Pearson publication, 2019, ISBN-13: 9789332543546.
2	Data Structures: A Pseudocode Approach with C	Richard F. Gilberg and Behrouz A. Forouzan	Cengage Publication, 2007, ISBN-13: 9788131503140



Course Outcomes:

Sl. No.	Description
1	Define the basic concepts of data structures and their operations.
2	Explain the working principle of linear and non-linear data structures.
3	Develop the code snippet for the implementation of data structures.
4	Apply concepts of linear and non-linear data structures to solve a problem.

Syllabus for the Academic Year – 2021 - 2022

Department: Information Science and Engineering

Semester: 3

Subject Name: Object Oriented Programming

Subject Code: IS3TH5

L-P-C: 3-0-3

Course Objectives:

Sl. No.	Description
1	Understand the fundamentals of object-oriented programming in Java, which includes defining classes, Objects, invoking methods.
2	Understand the principles of inheritance, packages and interfaces.
3	Understand fundamentals of exception handling mechanisms and Enumerated Data Types.
4	Write Object oriented programs to solve real world problems.

UNIT	Description	Hours
I	Introduction to Object oriented programming: Fundamentals of Object Oriented Programming -Introduction, Object-Oriented Paradigm, Basic Concepts of Object-Oriented Programming, Benefits of OOP, Applications of OOP. An Overview of Java -First Simple Java program: Entering the Program, Compiling the Program, A Closer Look at the First Sample Program, A Second short program, Java is a Strongly Typed Language. Introducing Classes: Class Fundamentals: The General Form of a Class, A Simple Class, Declaring Objects: A Closer Look at new, Assigning Object Reference Variables, Introducing Methods: Adding a Method to the Box Class, Returning a Value, Adding a Method That Takes Parameters: Parameterized Constructors, Constructors, The this Keyword: Instance Variable Hiding, Garbage Collection, The finalize() Method; A Stack Class.	08
II	Classes and Methods: A Closer Look at Methods and Classes: Overloading Methods: Overloading Constructors, Using Object as parameter, A Closer Look at Argument Passing, Returning Object, Introducing Access Control, Understanding Static, Introducing Final, Arrays Revisited, Introducing Nested and Inner Classes. Exploring the String Class, Using Command-Line Arguments.	08



III	Inheritance: Inheritance: Inheritance Basics: Member Access and Inheritance, A More Practical Example, A Superclass Variable Can Reference a Subclass Object, Using Super: Using super to Call Superclass Constructors, A Second Use for super, Creating Multi-Level Hierarchy, when Constructors are Executed, Method Overriding, Dynamic Method Dispatch: Why Overridden Methods?, Applying Method Overriding, Using Abstract Classes, Using Final with Inheritance: Using final to Prevent Overriding, Using final to Prevent Inheritance, The Object Class.	08
IV	Packages and Interface: Packages: Defining a Package, Finding Packages and CLASSPATH, A Short Package Example, Access protection: An Access Example, Importing Packages, Interfaces: Defining an Interface, Implementing Interfaces, Nested Interfaces, Applying Interfaces, Variables in Interfaces, Interfaces Can Be Extended, Default Interface Methods: Default Interface Methods, A More Practical Example, Multiple Inheritance Issues, Use Static Methods in an Interface.	08
V	Exception Handling and Enumerations: Exception Handling Fundamentals, Exception Types, Uncaught Exceptions, Using try and catch: Displaying a Description of an Exception, Multiple Catch Clauses, Nested try Statements, throw, throws, finally, Java's built-in Exceptions, Creating your own Exception Subclasses. Chained Exceptions. Three Recently Added Exception Features. Enumerations: Enumeration Fundamentals, The values() and valueOf() Methods ,Java Enumerations Are Class Types, Enumerations Inherit Enum, Another Enumeration Example	08

Text Books:

Sl. No.	Title	Author(s)	Edition, Publisher, Year, ISBN
1	Java - The Complete Reference	Herbert Schildt	11th Edition, Tata McGraw Hill, 2019, ISBN: 978-1-26-044024-9
2	Programming With Java	E Balagurusamy	6th Edition, Tata McGraw Hill, 2019, ISBN: 978-93-5316-234-4

Reference Books:

Sl. No.	Title	Author(s)	Edition, Publisher, Year, ISBN
1	Introduction to JAVA Programming	Y. Daniel Liang	10th Edition, Pearson Education, 2015, ISBN-13:9780133761313



Course Outcomes:

Sl. No.	Description
1	Describe the fundamentals of object oriented programming.
2	Identify classes, objects, members of a class and relationships among them needed for a specific problem.
3	Design and implement object oriented solutions involving multiple objects, packages & Interfaces.
4	Develop reliable programs by using exception handling mechanisms and create own data types using Enumeration.

Syllabus for the Academic Year – 2021 – 2022

Department: Information Science and Engineering

Semester: 3

Subject Name: Digital Design and Computer Organization

Subject Code: IS3TH6

L-P-C: 3-0-3

Course Objectives:

Sl. No.	Description
1	Learn and analyze basic Digital design principles, logic circuit design.
2	Simulate digital circuits using Verilog coding.
3	Understand various data transfer techniques in digital computer.
4	Analyze processor performance improvement using instruction level parallelism.

UNIT	Description	Hours
I	Sum-of-Products Method, Truth Table to Karnaugh Map, Pairs, Quads, and Octets, Karnaugh Simplifications, Don't-care Conditions, Product-of-sums Method, Product-of-sums Simplification. HDL Implementation Models. Multiplexers, Demultiplexers, 1-of-16 Decoder, BCD-to-decimal Decoders, Seven-Segment Decoders, Encoders, Parity Generators and Checkers, Magnitude Comparator, HDL Implementation of Data Processing Circuits.	08
II	Flip-Flops and RS,D,JK,T Flip-Flop, Master-Slave Flip-Flops, Edge-Triggered Flip-Flops, Various Representations of Flip-Flops, Registers, Counters, Design of Synchronous Counters. HDL Implementation of Flip-Flops, Registers, Counters.	08
III	A Top-Level View of Computer Function and Interconnection : Computer Components, Computer Function, Interconnection Structures, Bus Interconnection, PCI Cache Memory: Computer Memory System Overview, Cache Memory Principles, Elements of Cache Design Pentium 4 Cache Organization ARM Cache Organization Internal and External Memory: Semiconductor Main Memory ,Error Correction, Advanced DRAM Organization, Magnetic Disk, RAID, Optical Memory, Magnetic Tape	08



IV	Computer Arithmetic: The Arithmetic and Logic Unit (ALU), Integer Representation, Integer Arithmetic, Floating-Point Representation, Floating-Point Arithmetic. Input/Output: External Devices, I/O Modules, Programmed I/O, Interrupt-Driven I/O, Direct Memory Access, I/O Channels and Processors, The External Interface: FireWire and InfiniBand	08
V	Instruction Sets Characteristics and Functions: Machine Instruction Characteristics, Types of Operands, Intel x86 and ARM Data Types, Types of Operations Intel x86 and ARM Operation Types. Instruction Sets Addressing Modes and Formats: Addressing, x86 and ARM Addressing Modes, Instruction Formats,x86 and ARM Instruction Formats, Assembly Language Processor Structure and Function: Processor Organization, Register Organization, The Instruction Cycle Instruction Pipelining, The x86 Processor Family, The ARM Processor	08

Text Books:

Sl. No.	Title	Author(s)	Edition, Publisher, Year, ISBN
1	Digital Principles and Applications	Malvino and Leach	8th Edition, McGraw Hill Education,2014 ISBN-13 : 978-9339203405
2	Computer Organization And Architecture Designing For Performance	William Stallings	11th Edition, Pearson, 2019, ISBN 9780134997193.

Reference Books:

Sl. No.	Title	Author(s)	Edition, Publisher, Year, ISBN
1	Logic and Computer Design Fundamentals	M. Morris Mano Charles Kime	4th Edition, Pearson,2014 ISBN 13: 978-1-292-02468-4.
2	Digital Principles and Design	Donald D. Givone	1st Edition, McGraw-Hill Publishers, 2017, ISBN-13: 9780070529069.

Course Outcomes:

Sl. No.	Description
1	Design digital circuits using basic gates and combinatorial logic.
2	Evaluate flip flops, counters and registers and Simulate simple digital circuits using Verilog code.
3	Design memory organization, Arithmetic and Logical unit and understand I/O unit.
4	Apply and Implement fundamental coding schemes.



Syllabus for the Academic Year – 2021 – 2022

Department: Mathematics

Semester: 3

Subject Name: Fundamental Mathematics

Subject Code: MA3DP6

L-P-C: 3-0-3

Course Objectives:

Sl. No.	Description
1	Develop mathematical skill so that student are able to apply mathematical method and principals in solving problem from engineering field.
2	Introduce the concept of differential calculus.
3	Introduce concept of Integral Calculus.
4	Study the concept of probability.

UNIT	Description	Hours
I	Probability: Introduction, Sample space and events. Axioms of probability. Addition and multiplication theorems, Conditional probability-illustrative examples. Baye's theorem-problems.	08
II	Differential Calculus: List of standard derivatives including hyperbolic functions, rules of differentiation. Polar curves: Polar coordinates, angle between radius vector and tangent, angle between two polar curves – Problems.	08
III	Series: Taylor's and Maclaurin's series expansions of one variable. Integral Calculus: List of standard integrals, integration by parts. Definite integrals – problems. Statement of reduction formulae for $\int_0^{\frac{\pi}{2}} \sin nx \, dx$, $\int_0^{\frac{\pi}{2}} \cos nx \, dx$ and $\int_0^{\frac{\pi}{2}} \sin mx \cos nx \, dx$, simple problems. Multiple integrals-Simple problems.	07
IV	Differential equations: Introduction to first order ordinary differential equations. Variables separable, Linear equation. Exact differential equation - Problems. Ordinary differential equations with constant coefficients: Homogeneous differential equations, non-homogeneous differential equations – Particular integral for functions of the type $f(x) = e^{ax}$, $\sin(ax)$, $\cos(ax)$, x^n and simple problems.	08
V	Vector calculus and Partial differentiation: Del operator, gradient-directional derivative, divergence, curl - problems. Introduction to Partial differentiation - Illustrative examples.	09



Syllabus for the Academic Year – 2021 - 2022

Department: Information Science and Engineering

Semester: 3

Subject Name: UNIX and SHELL Programming Laboratory

Subject Code: IS3LB1

L-P-C: 0-3-1.5

Course Objectives:

Sl. No.	Description
1	Provide introduction to UNIX Operating System and its File System
2	Gain an understanding of important aspects related to the SHELL and the process
3	Develop the ability to formulate regular expressions and use them for pattern matching.
4	Provide a comprehensive introduction to SHELL programming, services and utilities.

	Description
1	Write a Shell script that accepts two file names as arguments, checks if the permissions for these files are identical and if the permissions are identical, outputs the common permissions, otherwise outputs each file name followed by its permissions.
2	Write a Shell script that takes a valid directory name as an argument and recursively descends all the subdirectories, finds the maximum length of any file in that hierarchy and writes this maximum value to the standard output.
3	Write a Shell script that accepts valid log-in names as arguments and prints their corresponding home directories. If no arguments are specified, print a suitable error message.
4	Write a Shell script to that accepts path names and creates all the components in that path name as directories. For example, if the script name is mpe, then the command mpe a/b/c/d should create directories a, a/b, a/b/c and a/b/c/d.
5	Write a Shell script to find and display all the links to a file specified as the first argument to the script. The second argument, which is optional, can be used to specify the directory in which the search is to begin. If this second argument is not present, the search is to begin in current working directory. In either case, the starting directory as well as all its subdirectories at all levels must be searched. The script need not include any error checking
6	Write a Shell script that reports the logging in of a specified user within one minute after he/she log in. The script automatically terminated if specified user does not log in during a specified period of time.
7	Write a Shell script that determine the period for which a specified user is working on system.
8	Write a Shell script that accept a list of filenames as its argument, count and report occurrence of each word that is present in the first argument file on other argument files.
9	Write a Shell script that deletes all lines containing a specific word in one or more file supplied as argument to it.
10	Write a Shell script that accepts file names specified as arguments and creates a shell script that contains this file as well as the code to recreate these files. Thus if the script generated by your script is executed, it would recreate the original



files.

Course Outcomes:

Sl. No.	Description
1	Describe the architecture and features of UNIX Operating System and distinguish it from other Operating System
2	Demonstrate UNIX commands for file handling and process control.
3	Demonstrate Regular expressions for pattern matching and apply them to various filters for a specific task.
4	Analyze a given problem and apply requisite facets of SHELL programming in order to devise a SHELL script to solve the problem.

Syllabus for the Academic Year – 2021 – 2022

Department: Information Science and Engineering

Semester: 3

Subject Name: Data Structures Laboratory

Subject Code: IS3LB2

L-P-C: 0-3-1.5

Course Objectives:

Sl. No.	Course Objectives
1	Develop skills to design and analyze simple linear and nonlinear data structures.
2	Strengthen the ability to identify and apply suitable data structure for the given real world problem.
3	Gain knowledge in practical applications of data structures.

Design and develop C programs on the following concepts:



Lab Cycles	Description
I	Structures, Pointers and memory representation of records: <ol style="list-style-type: none">1. Write a C program to implement record structure of an employee.2. Write C program to implement file operations using structures.3. Write C program to implement complex number operations using structures.
II	Stacks, Queues and Linked lists: <ol style="list-style-type: none">4. Write C program to implement stack operations.5. Write C program to implement Tower of Hanoi using recursion.6. Write C program to find factorial of a given number using recursion.7. Write C program to implement Fibonacci series using recursion.8. Write C program to convert a number from decimal to binary using recursion.9. Write C program to reverse a given array of elements using recursion.10. Write C program to implement simple queue operations.11. Write C program to implement circular queue operations.12. Write C program to implement priority queue operation.13. Write C program to implement linked list operation to perform the following operation:<ol style="list-style-type: none">a. Insert a new node at the beginning of list.b. Inserting a new node at the end of the list.c. Deleting a node from the beginning of the list.d. Deleting a node at the end of list.e. Searching a node in the list.14. Write a C program to implement doubly list operations to perform the following operation:<ol style="list-style-type: none">a. Insert a new node at the beginning of list.b. Inserting a new node at the end of the list.c. Deleting a node from the beginning of the list.d. Deleting a node at the end of list.Searching a node in the list.15. Write a C program to perform linked implementation of Stack.16. Write a C program to perform linked implementation of Queues.17. Write a C Program to check whether two given lists are containing the same data.18. Write a C program to find the largest element in a given doubly linked list.
Cycle III	Trees, Sorting and Searching: <ol style="list-style-type: none">19. Write a C program to implement binary search tree operations.20. Write C program to search an element in an array using binary search.21. Write C program to arrange the list of numbers in ascending order using bubble sort.22. Write C program to arrange the list of numbers in ascending order using insertion sort.



	<p>23. Write C programs for implementing the following graph traversal algorithms:</p> <ul style="list-style-type: none">a. Depth First Traversalb. Breadth First Traversal <p>24. Write a C program to count the number of nodes in the binary search tree.</p> <p>25. Write a C program to sort a given list of strings.</p>
--	---

Pattern for practical exam conduction:

In Semester End Practical Examination, students are allowed to pick one program from the lot of 3 cycles.

Course Outcomes:

Sl. No.	Descriptions
1	Use pointers, structures and unions in program development.
2	Apply data structures like stacks and queues to solve problems in Computer field.
3	Implement the concept of linked lists in solving problems.
4	Design and implement solutions based on advanced data structures.

Syllabus for the Academic Year – 2021 – 2022

Department: Information Science and Engineering

Semester: 3

Subject Name: Object Oriented Programming Laboratory

Subject Code: IS3LB3

L-P-C: 0-3-1.5

Course Objectives:

Sl. No.	Description
1	Learn fundamentals of object oriented programming in Java and Understand various concepts of JAVA.
2	To strengthen problem solving ability by using the characteristics of an object-oriented approach.
3	Understand the principles of Polymorphism, Inheritance, Packages and Interfaces, Exception Handling and Enumeration.

	Description
1	<p>Design a class named Triangle to represent a triangle. The class contains: Three double instance variables named side1, side2 and side3 that specify the three sides of the triangle. The default values are 1 for all the sides. A no-arg constructor that creates a default triangle.</p> <ul style="list-style-type: none">a. A constructor that creates a triangle with the specified sides.b. A get method to return the value of the instance variables.c. A set method to set a new value of the instance variables.



	<p>d. A method named <code>getArea()</code> that returns the area of this triangle.</p> <p>e. A method named <code>getPerimeter()</code> that returns the perimeter.</p> <p>Write a test program that creates two <code>Triangle</code> objects. Assign sides 4, 5 and 6 to the first object and 1.5, 2.5 and 3.5 to the second object. Display the properties of both objects and find their areas and perimeters. (Hint: To find square root of a number use <code>Math.sqrt</code> function). Note: Modify the program so that inputs can also be read from Standard Input Device, the keyboard.</p>
2	Consider the trunk calls of a telephone exchange. A trunk call can be ordinary, urgent or lightning. The charges depend on the duration and the type of the call. Write a program using the concept of polymorphism in Java to calculate the charges
3	Write a Java Program to create an abstract class named <code>shape</code> that contains two integers and an empty method named <code>printArea</code> . Provide three classes named <code>Rectangle</code> , <code>Triangle</code> and <code>Circle</code> subclass that each one of the classes extends the Class <code>Shape</code> . Each one of the classes contains only the method <code>printArea()</code> that prints the area of <code>Shape</code> . Note: Read the input from the keyboard using <code>Scanner</code> Class.
4	Design a simple Java program to demonstrate different combinations of access control modifiers for: same package subclass, same package non-subclass, different package subclass, different package non-subclass. Note: Justify the result with the Access Protection table.
5	Write a program in Java to create a <code>Player</code> class. Inherit the classes <code>Cricket_Player</code> , <code>Football_Player</code> and <code>Hockey_Player</code> from <code>Player</code> class.
6	Write a Java Program for the implementation of Multiple inheritance using interfaces to calculate the area of a rectangle and triangle.
7	Write a program to make a package <code>Balance</code> in which has <code>Account</code> class with <code>Display_Balance</code> method in it. Import <code>Balance</code> package in another program to access <code>Display_Balance</code> method of <code>Account</code> class.
8	Write a Java program which has: a. An interface for Stack Operations that defines <code>push()</code> and <code>pop()</code> methods. b. A class that implements the Stack Interface and creates a dynamic length Stack and does the stack operations that demonstrate the runtime binding.
9	On a single track two vehicles are running. As vehicles are going in same direction there is no problem. If the vehicles are running in different direction there is a chance of collision. To avoid collisions write a Java program using exception handling. You are free to make necessary assumptions.
10	Write a JAVA program to create an enumeration <code>Day of Week</code> with seven values <code>SUNDAY</code> through <code>SATURDAY</code> . Add a method <code>isWorkday()</code> to the <code>DayofWeek</code> class that returns true if the value on which it is called is <code>MONDAY</code> through <code>FRIDAY</code> .

Course Outcomes:

Sl. No.	Description
1	Understand the basic concepts of Procedure-Oriented Programming and Object-Oriented Programming.
2	Identify classes, objects, members of a class and relationships among them needed for a specific problem.
3	Demonstrate Write Java application programs using OOP principles and proper program structuring.
4	Demonstrate the concepts of Polymorphism, Inheritance, Packages and Interfaces, Exception Handling and Enumeration.



SRI SIDDHARTHA INSTITUTE OF TECHNOLOGY- TUMAKURU
(A constituent College of Siddhartha Academy of Higher Education, Tumakuru)





CHOICE BASED CREDIT SYSTEM (CBCS)
SCHEME OF TEACHING AND EXAMINATION FOR B.E. DEGREE COURSE
(Effective from the academic year 2020-21)

IV Semester B.E. Information Science and Engineering (Subjects and Syllabus as per AICTE-Model Curriculum for UG Course in Engg. & Tech.- Jan. 2018)						Teaching Hours /Week		Examination				
Sl No.	Course Code		Course Title	Teaching Department	Board of Exam	Credits	L	P	CIE	SEE	Total Marks	Exam Hours
01	BS	MA4CS1/ MA4IS1	Combinatorics and Linear Algebra	MA	MA	3	3	-	50	50	100	3
02	PC	IS4TH2	Operating Systems	ISE	ISE	3	3	-	50	50	100	3
03	PC	IS4TH3	Algorithm Design and Analysis	ISE	ISE	3	3	-	50	50	100	3
04	PC	IS4TH4	Computer Networks-1	ISE	ISE	3	3	-	50	50	100	3
05	PC	IS4TH5	Python for Data Processing	ISE	ISE	3	3	-	50	50	100	3
06	PC	IS4TH6	Microprocessor and Embedded System	ISE	ISE	3	3	-	50	50	100	3
07	PC	IS4LB1	Algorithms Laboratory	ISE	ISE	1.5	-	3	50	50	100	3
08	PC	IS4LB2	Data Processing Laboratory	ISE	ISE	1.5	-	3	50	50	100	3
09	PC	IS4LB3	Microprocessor and Microcontroller Laboratory	ISE	ISE	1.5	-	3	50	50	100	3
10	HS	SK4DP1	Skill Development-I	HS	HS	1	-	2	50	-	50	-
Total						23.5	18	11	500	450	950	-
L-Lecture Hours, P-Practical Hours, CIE-Continuous Internal Evaluation, SEE-Semester End Examination												

Note:

- There is no SEE for Skill Development-II course. However, all the students should maintain a minimum 85% of attendance and 40% of CIE to get pass in the subject.



Syllabus for the Academic Year: 2021-22

Department: Mathematics

Semester: 4

Subject Name: Combinatorics and Linear Algebra

Subject Code: MA4CS1/MA4IS1

L-P-C: 3-0-3

Course Objectives:

Sl. No	Descriptions
1	Provide the students with a foundation in linear algebra, Numerical methods and Combinatorics.
2	Understand concepts of Matrices to linear systems and Vectors spaces.
3	The concepts of Eigen values, Eigen vectors and functions to linear algebra.
4	Apply the concepts of inner products to matrix decomposition.

Prerequisite: Concept of solution of Simultaneous equations.

UNIT	Description	Hours
I	Numerical solution of ordinary differential equations of first order and first degree: Taylor's series method, Modified Euler's method, Runge- Kutta method of fourth order, Milne's and Adams-Bashforth Predictor and Corrector methods (No derivation of formulae) problems. Numerical Integration: Simpson's $1/3^{rd}$, $3/8^{th}$ rule, Weddle's rule, (without proof), problems.	08
II	Generating functions: Introductory examples. Definition and examples, Calculational Techniques, Partition of Integers, Exponential generating function, problems.	07
III	Vector spaces: Solution of system of equations by LU decomposition method. Vector space, Subspaces, Linear Combinations, Linear Spans, row space and column space of a Matrix, Linear Dependence and Independence (all statements only).	09
IV	Basis and Dimensions: Basis and Dimensions of Vector space and problems. Linear transformation: Introduction, Linear Mappings, Kernel and Image of a linear transformations, Matrix representation of linear transformations, Range space, Null space, Nullity, Rank-Nullity Theorem, Singular and Nonsingular linear transformations (all	08



SRI SIDDHARTHA INSTITUTE OF TECHNOLOGY- TUMAKURU
(A constituent College of Siddhartha Academy of Higher Education, Tumakuru)



V	Inner Product spaces: Inner product, norms of a vector, angle between vectors. Orthogonal vectors, orthogonal and orthonormal basis, projections of a vector. Gram-Schmidt orthogonalization process, QR-factorization (all statements only), problems.	08
----------	--	-----------

Text Books:

Sl No	Title	Author(s)	Edition, Publisher, Year, ISBN
1	Discrete and Combinatorial Mathematics	Ralph P. Grimaldi	5th Edition, 2006, Pearson Education, ISBN-13: 978-81-7758-424-0.
2	Linear Algebra and its Applications	David C. Lay,	3rd Edition, 2002, Pearson Education India, ISBN-13: 978-81-7758-333-5.

Reference Books:

Sl No	Title	Author(s)	Edition, Publisher, Year, ISBN
1	Higher Engineering Mathematics	B.S.Grewal	43rd Edition Khanna Publications, 2015. ISBN:9788174091956
2	Linear Algebra and its Applications	Gilbert Strang	4th Edition, 2006, Cengage Learning India Edition, ISBN: 81-315-0172-8

Course Outcomes:

Sl. No	Descriptions
1	Understand the concept of linear algebra, Numerical methods and Combinatorics.
2	Apply Numerical methods and Generating functions in engineering field.
3	Analyze consistency, vector spaces, basis, dimensions and linear transformations.



SRI SIDDHARTHA INSTITUTE OF TECHNOLOGY- TUMAKURU
(A constituent College of Siddhartha Academy of Higher Education, Tumakuru)



4	Apply various types of transformations and orthogonal projection in Engineering field.
---	--

Mapping Course Outcomes with Program Outcomes:

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

Syllabus for the Academic Year - 2021 - 2022

Department: Information Science and Engineering

Semester: 4

Subject Name: Operating Systems

Subject Code: IS4TH2

L-P-C: 3-0-3

Course Objectives:

Sl. No.	Course Objectives
1	Know the functionalities of Operating Systems.
2	Understand how the processes are managed by the Operating Systems.
3	Learn how the memory is managed by operating system.
4	Know how Operating System handles mass storage, files System and its protection.

UNIT	Description	Hours
I	Introduction to Operating Systems and System Structures: What operating systems do; Computer System architecture; Operating System structure; Kernel Data Structures; Computing Environment, Operating System Structures: System calls; Types of system calls; System programs; Operating System structure; Virtual machines.	08
II	Process Management: Process concept; Process scheduling; Operations on processes; Inter process communication. Threads concept; Multi Thread Programming: Overview; Multithreading models; Threading issues. Process Scheduling basic concepts; Scheduling criteria; Scheduling algorithms. Case study.	08



SRI SIDDHARTHA INSTITUTE OF TECHNOLOGY- TUMAKURU
(A constituent College of Siddhartha Academy of Higher Education, Tumakuru)



III	Process Synchronization: Introduction; The Critical section problem; Peterson's solution; mutex lock: Semaphores; Classical problems of synchronization; Monitors. Process deadlocks: System model; Deadlock characterization; Methods for handling deadlocks; Deadlock prevention and avoidance; Deadlock detection and recovery from deadlock. Case study.	08
IV	Memory Management: Introduction; Swapping; Contiguous memory allocation; Segmentation; Paging; Structure of page table;. Virtual Memory concept; Demand paging; Copy-on write; Page replacement; Allocation of frames; Thrashing. Case study.	08
V	Secondary Storage Structures: Mass storage structures; Disk structure; Disk attachment; Disk scheduling; Disk management; Swap space management. File concept; Access methods; Directory structure; File protection. Implementing File System: File system structure; File system implementation; Directory implementation; Allocation methods; Free space management. Protection: Goals of protection, Principles of protection, Domain of protection, Access matrix, Implementation of access matrix, Access control, Revocation of access rights.	08

Text Book:

Sl. No.	Title	Author(s)	Edition, Publisher, Year, ISBN
1	Operating System Principles	Peter Baer Galvin, Greg Gagne	9 th Edition, Wiley-India, 2013 ISBN: 9788126554270, 8126554274.

Reference Books:

Sl. No.	Title	Author(s)	Edition, Publisher, Year, ISBN
1	Operating Systems Internals and Design Principles	William Stallings	9th Edition Pearson education India March 2018.
2	Modern Operating Systems	Andrew Tanenbaum	4th Edition, Pearson PLC, March 2014.

Course Outcomes:

Sl. No.	Descriptions
1	Explain the functionalities of operating systems.
2	Apply appropriate process management techniques to solve machine-critical problems in multi-process environment.



SRI SIDDHARTHA INSTITUTE OF TECHNOLOGY- TUMAKURU
(A constituent College of Siddhartha Academy of Higher Education, Tumakuru)



3	Select suitable techniques for efficient memory management.
4	Outline the concepts of file and storage management.



SRI SIDDHARTHA INSTITUTE OF TECHNOLOGY- TUMAKURU
(A constituent College of Siddhartha Academy of Higher Education, Tumakuru)



Syllabus for the Academic Year – 2021 - 2022

Department: Information Science and Engineering

Semester: 4

Subject Name: Algorithm Design and Analysis

Subject Code: IS4TH3

L-P-C: 3-0-3



SRI SIDDHARTHA INSTITUTE OF TECHNOLOGY- TUMAKURU
(A constituent College of Siddhartha Academy of Higher Education, Tumakuru)



Course Objectives:

Sl. No.	Description
1	Learn how to design recursive and non-recursive algorithms.
2	Know different Algorithm Design Techniques for effective problem solving.
3	Learn how to analyze the algorithm with respect to space and time complexity.
4	Understand basic efficiency classes and asymptotic notations to express the complexity.

UNIT	Description	Hours
I	Introduction, Fundamentals of the Analysis of Algorithm Efficiency, Brute Force: Algorithm Definition, Fundamentals of algorithmic problem solving, Analysis Framework, Formal Definitions of Asymptotic Notations, Basic efficiency classes, Mathematical analysis of Non-Recursive and recursive Algorithms with Examples. Brute Force: Selection Sort, String Matching, Exhaustive Search.	08
II	Divide and Conquer: Merge Sort, Quick Sort, Finding the Maximum and Minimum. Decrease and Conquer: Insertion Sort, Topological Sorting.	08
III	Transform and Conquer: Heaps and Heap Sort and Balanced Search Trees. Space and Time Tradeoffs: Input Enhancement in String Matching- Horspool's algorithm, Hashing: Hash table, Hash functions, Collision handling by open addressing and chaining.	08
IV	Greedy Technique: Prim's algorithm, Kruskal's algorithm, Dijkstra's algorithm and Huffman trees and codes. Dynamic Programming: Floyd's Algorithms, Knapsack Problem and Memory Functions.	08
V	Back tracking: n-Queen's Problem, Subset-Sum Problem, Branch and Bound: Assignment Problem, Knapsack Problem, and Traveling Salesman Problem.	08

Text Books:

Sl. No.	Title	Author(s)	Edition, Publisher, Year, ISBN
1	Introduction to the Design & Analysis of Algorithms	AnanyLevitin	3 rd Edition, Pearson Education, 2012, ISBN-13: 978-0-13-231681-1
2	Computer Algorithms/C++	Ellis Horowitz, Satraj Sahni and Rajasekaran	2 nd Edition, 2014, Universities Press, ISBN-13:978-8173716119



SRI SIDDHARTHA INSTITUTE OF TECHNOLOGY- TUMAKURU
(A constituent College of Siddhartha Academy of Higher Education, Tumakuru)



Reference Books:

Sl. No.	Title	Author(s)	Edition, Publisher, Year, ISBN
1	Introduction to Algorithms	Cormen T.H, Leiserson C.E. & Rivest R.L	3 rd Edition, PHI, 2009, ISBN-13: 978-0262033848
2	Fundamental of algorithms	Gilles Brassard & Paul Bratley	2 nd Edition, PHI 1999, ISBN-13:978-120311312

Course Outcomes:

Sl. No.	Description
1	Understand the basic concepts of design and analysis of algorithms.
2	Demonstrate various algorithm design techniques to solve a given problem.
3	Design/Develop an algorithm using algorithm design technique and analyze its complexity to rank order of growth.
4	Apply the appropriate algorithm design technique to solve the given problem instance.

Syllabus for the Academic Year - 2021 - 2022

Department: Information Science and Engineering

Semester: 4

Subject Name: Computer Networks-1

Subject Code: IS4TH4

L-P-C: 3-0-3

Course Objectives:

Sl. No.	Description
1	Explain the basics of data communication and various types of computer networks.
2	Comprehend the types of transmission techniques for exchange of data between two or more networks.
3	Illustrate switching and TCP/IP protocol suite.
4	Learn Medium Access Control protocols for reliable and noisy channels.



SRI SIDDHARTHA INSTITUTE OF TECHNOLOGY- TUMAKURU
(A constituent College of Siddhartha Academy of Higher Education, Tumakuru)



UNIT	Description	Hours
I	<p>Data Communications and Network Models Introduction: Data communications: Components, Data Representation, Data Flow, Networks: Network Criteria, Physical structure, Network Types, Local Area Network ,Wide Area Network, switching, The Internet, Standards and Administration: Internet Standards, Internet Administration. Network models: Protocol Layering: Scenarios, Principles of layering, Logical Connection, TCP/IP Protocol Suite: Layered architecture, Layers in the TCP/IP Protocol Suite, Description of each layer, Encapsulation and Decapsulation, Addressing, Multiplexing and Demultiplexing, The OSI Model, OSI versus TCP/IP.</p>	08
II	<p>Physical Layer and Media Data and Signals: Analog and digital Data, Analog and Digital Signals, Periodic and Non-periodic, Digital Signals,: Bit rate , Bit Length, Digital Signal as a composite Analog signal, Transmission of Digital Signals. Transmission impairment: Attenuation, Distortion, Noise. Data rate limits: Noiseless Channel-Nyquist Bit Rate, Noisy Channels-Shannon Capacity, Using both limits. Performance: Bandwidth, Throughput, Latency, Bandwidth Delay Product, Jitter. Digital Transmission: Digital-to-Digital conversion; Analog-to-Digital conversion; Transmission modes.</p>	08
III	<p>Physical Layer and Media Contd... Analog Transmission: Digital - to - Analog conversion; Analog - to - Analog conversion. Bandwidth Utilization: Multiplexing; Spread spectrum. Transmission media: Guided media, unguided media Switching: Three Methods of Switching, Switching and TCP/IP Layer, Circuit switched networks, Packet Switching: Data gram networks Virtual-circuit networks, Structure of a switch.</p>	08
IV	<p>Data Link layer Introduction, Link-Layer Addressing, Error Detection and Correction: Introduction, Block coding; Cyclic Codes: Cyclic Redundancy Check, Polynomials, Cyclic Code Encoder using Polynomials, Cyclic Code Analysis, Advantages of Cyclic Codes, Other Cyclic Codes, Hardware Implementation, Checksum, Forward Error Correction, Data Link Control: DLC Services, Data-Link Layer Protocols, HDLC, Point-to-Point Protocol, Media Access Control: Random Access, Controlled Access, Channelization.</p>	08
V	<p>Data Link layer Contd... Wired LANs: Ethernet, Ethernet Protocol, Standard Ethernet, Fast Ethernet, Gigabit Ethernet. Wireless LAN's: Introduction, IEEE 802.11 Project, Bluetooth. - Architecture, Bluetooth Layers, Connecting Devices and Virtual LANs: Connecting Devices, Virtual LANs, ATM: Design goals, problems, architecture</p>	08



SRI SIDDHARTHA INSTITUTE OF TECHNOLOGY- TUMAKURU
(A constituent College of Siddhartha Academy of Higher Education, Tumakuru)



Text Books:

Sl. No.	Title	Author(s)	Edition, Publisher, Year, ISBN
1	Data Communications and Networking,	Behrouz A. Forouzan	5 th Edition, Tata McGraw Hill, July 2017, ISBN 978-1259064753
2	TCP/IP Protocol Suite	Behrouz A. Forouzan	4 th Edition, McGraw-Hill, July 2017, Indian Edition ISBN-13 : 978-0070706521

Reference Books:

Sl. No.	Title	Author(s)	Edition, Publisher, Year, ISBN
1	Data and Computer Communication	William Stallings	9 th Edition, Pearson Education, 2011, ISBN-13: 9780131392052
2	Computer and Communication Networks	Nader F. Mir	Pearson Education, 2007, 978-81-317-1543-7
3	Computer Networks	Andrew S. Tanenbaum	4 th Edition, Pearson Education, 2008, ISBN: 978-01-306-6102-9
4	Communication Network – Fundamental Concepts and Key Architectures	Alberto Leon-Garcia and Indra, Widjaja	2 nd Edition, Tata McGraw-Hill, 2004, ISBN: 978-0-07-059501-9

Course Outcomes:

Sl. No.	Description
1	Explain the structure of layered approach and its standards in computer networks.
2	Demonstrate the different data formats, transmission and conversions
3	Identify the errors in data communication and apply appropriate methods for correction
4	Solve problems to improve the performance of computer networks



Syllabus for the Academic Year – 2021 - 2022

Department: Information Science and Engineering

Semester: 4

Subject Name: Python for Data Processing

Subject Code: IS4TH5

L-P-C: 3-0-3

Course Objectives:

Sl. No.	Description
1	Acquire the programming skills in core python.
2	Understand the functionalities available in Python libraries.
3	Familiar with rich data structures of Python to work with structured data in fast, easy and expressive way.
4	Learn data cleaning and preparation tools for data analysis.

UNIT	Description	Hours
I	Python Language Basics, IPython, and Jupyter Notebooks: The Python Interpreter, IPython Basics: Running the IPython Shell, Running the Jupyter Notebook, Tab Completion, Introspection, The %run Command, Executing Code from the Clipboard, Terminal Keyboard Shortcuts, About Magic Commands, MatplotlibIntegration, Python Language Basics: Language Semantics, Scalar Types, Control Flow.	08
II	Built-in Data Structures, Functions, and Files: Data Structures and Sequences: Tuple, List, Built-in Sequence Functions, dict, set, List, Set, and Dict Comprehensions,Functions: Namespaces, Scope, and Local Functions, Returning Multiple Values, Functions Are Objects, Anonymous (Lambda) Functions, Currying: Partial Argument Application, Generators, Errors and Exception Handling,Files and the Operating System: Bytes and Unicode with Files.	08
III	NumPy Basics: Arrays and Vectorized Computation: The NumPy ndarray: A Multidimensional Array Object: Creating ndarrays, Data Types for ndarrays, Arithmetic with NumPy Arrays, Basic Indexing and Slicing, Boolean Indexing, Fancy Indexing, Transposing Arrays and Swapping Axes, Universal Functions: Fast Element-Wise Array Functions, Array-Oriented Programming with Arrays: Expressing Conditional Logic as Array Operations, Mathematical and Statistical Methods, Methods for Boolean Arrays, Sorting, Unique and Other Set Logic, File Input and Output with Arrays, Linear Algebra, Pseudorandom Number Generation, Example: Random Walks: Simulating Many Random Walks at Once.	08



SRI SIDDHARTHA INSTITUTE OF TECHNOLOGY- TUMAKURU
(A constituent College of Siddhartha Academy of Higher Education, Tumakuru)



IV	Getting started with pandas: Introduction to pandas Data Structures: Series, Data Frame, Index Objects, Essential Functionality: Reindexing, Dropping Entries from an Axis, Indexing, Selection, and Filtering, Integer Indexes, Arithmetic and Data Alignment, Function Application and Mapping, Sorting and Ranking, Axis Indexes with Duplicate Labels, Summarizing and Computing Descriptive Statistics: Correlation and Covariance, Unique Values, Value Counts, and Membership.	08
V	Data Loading, Storage, and File Formats, Data Cleaning and Preparation: Reading and Writing Data in Text Format: Reading Text Files in Pieces, Writing Data to Text Format, Working with Delimited Formats, Binary Data Formats: Using HDF5 Format, Reading Microsoft Excel Files Interacting with Web APIs, Interacting with Databases, Handling Missing Data, Data Transformation, String Manipulation.	08

Text Books:

Sl. No.	Title	Author(s)	Edition, Publisher, Year, ISBN
1	Python for Data Analysis	Wes McKinney	2nd Edition, O'Reilly Media, ISBN: 978-1-491-95766-0, 2018

Reference Books:

Sl. No.	Title	Author(s)	Edition, Publisher, Year, ISBN
1	Data Analytics using Python	Bharti Motwani	Wiley Publications, June 2020, ISBN-13: 978-8126502950,

Course Outcomes:

Sl. No.	Description
1	Develop programs to solve real world problems using Python Data structures and reusable functions.
2	Apply major tools to work with numerical and tabular array data.
3	Make use of functions to load and store the data from different sources.
4	Utilize the set of tools to manipulate data into the right form for data analysis.



SRI SIDDHARTHA INSTITUTE OF TECHNOLOGY- TUMAKURU
(A constituent College of Siddhartha Academy of Higher Education, Tumakuru)



Syllabus for the Academic Year – 2021 - 2022

Department: Information Science and Engineering

Semester: 4

Subject Name: Microprocessor and Embedded System

Subject Code: IS4TH6

L-P-C: 3-0-3

Course Objectives:

Sl. No.	Description
1	Understand the architecture of Microprocessor and Microcontroller.
2	Develop the ability to write programs in assembly and in C for microcontroller based system.
3	Learn interfacing the external devices with microcontroller.
4	Understand the concepts of embedded system and identify the sensors.

UNIT	Description	Hours
I	ARM Embedded Systems: The RISC design philosophy, The ARM Design Philosophy, Embedded System Hardware, Embedded System Software, ARM Processor Fundamentals: Registers, Current Program Status Register, Pipeline, Exceptions, Interrupts, and the Vector Table, Core Extension.	08
II	Introduction to the ARM Instruction Set: Data Processing Instructions, Branch Instructions, Load-Store Instructions, Software Interrupt Instructions, Program Status Register Instructions, Loading Constants, Conditional Execution, Simple Programming exercises.	08
III	LPC2148 ARM based microcontroller, Interfacing LPC2148 with peripherals: General description, Salient features of LPC 2148, Architectural overview, Memory mapping, Register Description, Functional pin diagram, Features of different blocks. Description of General purpose Input/output ports(GPIO) and pin control block, Simple Application Programming: LEDs , 7 segment display, 4X4 key pad, Stepper motor, DAC and UART interfacing design and their programming using C.	08
IV	Sensors and Transducers: Introduction, basic operating principles of sensors and their features. Types of sensors: Temperature sensor (Thermistor), Light sensor (Photodiode and LDR), Moisture/rain sensor, Motion sensors (IR sensors), Gas and chemical sensor, Proximity Sensor.	08



SRI SIDDHARTHA INSTITUTE OF TECHNOLOGY- TUMAKURU
(A constituent College of Siddhartha Academy of Higher Education, Tumakuru)



v	Embedded System Components: Embedded v/s General computing system, Classification of Embedded systems, Major applications and purpose of embedded systems. Core of an Embedded System, Memory, Communication Interface, Embedded Firmware.	08
----------	--	-----------



SRI SIDDHARTHA INSTITUTE OF TECHNOLOGY- TUMAKURU
(A constituent College of Siddhartha Academy of Higher Education, Tumakuru)



Text Books:

Sl. No.	Title	Author(s)	Edition, Publisher, Year, ISBN
1	ARM system developers' guide	Andrew N Sloss, Dominic Symes and Chris Wright, Elsevier	Morgan Kaufman publishers, 2008, ISBN-13: 978-1558608740.
2	Embedded Systems	Shibhu K V	2nd Edition, McGraw Hill Education, 2017 ISBN-13 : 978-9339219680

Reference Books:

Sl No	Title	Author(s)	Edition, Publisher, Year, ISBN
1	Introduction to Sensors	John Vetelino, AravindReghu	1st edition, CRC Press; August 2010, ISBN-13 : 978-1439808528
2	Pantech Solutions (https://www.pantechsolutions.net/.../user-manual-arm7-lpc2148-development-kit)		

Course Outcomes:

Sl. No.	Description
1	Describe the architectures of ARM7 processor and embedded system.
2	Write assembly/C programs for a given problem.
3	Design I/O interfaces with LPC2148 Microcontroller.
4	Implement the sensors according the real time scenario.



Syllabus for the Academic Year – 2021 - 2022

Department: Information Science and Engineering

Semester: 4

Subject Name: Algorithms Laboratory

Subject Code: IS4LB1

L-P-C: 0-3-1.5

Course Objectives:

Sl. No.	Description
1	Understand different algorithms for searching, sorting and graph problems and analyze the same.
2	Learn how to analyze the performance of algorithms practically.
3	Understand various Algorithm Design Techniques.

Note: Implement the following using C / C++ / Java Programming Language.

Lab Cycles	Description
I	<p>Brute Force:</p> <ol style="list-style-type: none">String matching.Sort a given set of elements using Selection sort.Solving Travelling salesman problem. <p>Divide and Conquer:</p> <ol style="list-style-type: none">Sort a given set of elements using Merge sort.Sort a given set of elements using Quick Sort.Finding the Maximum and Minimum element in an array of 'n' integers. <p>Decrease and Conquer:</p> <ol style="list-style-type: none">Print the vertices of the directed acyclic graph in topological order using:<ol style="list-style-type: none">Source Removal MethodDFS Method
II	<p>Decrease and Conquer:</p> <ol style="list-style-type: none">Sort a given set of elements using Insertion Sort. <p>Transform and Conquer:</p> <ol style="list-style-type: none">Create a heap tree for a given list of N elements using:<ol style="list-style-type: none">Top-Down approach.Bottom-up approach.And sort the elements using Heap Sort technique. <p>Space and Time Tradeoffs:</p> <ol style="list-style-type: none">Implement Horspool algorithm for String Matching. <p>Greedy Technique:</p>



SRI SIDDHARTHA INSTITUTE OF TECHNOLOGY- TUMAKURU
(A constituent College of Siddhartha Academy of Higher Education, Tumakuru)



	11. Find Minimum Cost Spanning Tree of a given undirected graph using Prim’s algorithm. 12. Find Minimum Cost Spanning Tree of a given undirected graph using Kruskal’s algorithm. 13. From a given vertex in a weighted connected graph, find the shortest paths to other vertices using Dijkstra's algorithm.
III	Dynamic Programming: 14. Solve Knapsack problem and print the solution vector. 15. Find all pair shortest path using Floyd’s Algorithm. Back Tracking: 16. Implement N Queen's algorithm. 17. Find a subset of a given set S of N positive integers whose sum is equal to a given positive integer D. Branch and Bound: 18. Solve Knapsack problem and print the solution vector 19. Solve Job Assignment Problem and print the solution. 20. Solving Travelling Salesman problem and print the solution.

Course Outcomes:

Sl. No.	Description
1	Identify the algorithm design technique for the given problem.
2	Design/Develop a solution for the given problem using a high level language.
3	Analyze the performance of various algorithms.
4	Compare the performance of different algorithms for same problem.

Syllabus for the Academic Year – 2021- 2022

Department: Information Science and Engineering

Semester: 4

Subject Name: Data Processing Laboratory

Subject Code: IS4LB2

L-P-C: 0-3-1.5

Course Objectives:

Sl. No	Description
1	Learn the basics of python programming language.
2	Understand the usage of built-in functions and file operations.
3	Acquire the knowledge of modules available in NumPy package.
4	Familiar with data structures and data manipulation tools available in pandas library.



Note: Implement the following using Python Programming Language:

Lab Cycles	Description
I	<p>Basics of Python Programming:</p> <ol style="list-style-type: none"> Write a program to demonstrate different number datatypes in python. Write a program to create, concatenate and print a string and accessing substring from a given string. Write a program to create, append and remove lists in python. Write a program to demonstrate working with tuples in python. Write a program to demonstrate working with dictionaries in python. Write a program to convert temperature to and from Celsius to Fahrenheit. Write a program to construct the following pattern using nested for loop. * ** *** **** ***** ***** ***** **** *** ** * Write a program to find factorial of a number using recursion. Write a program to define a module to find Fibonacci Numbers and import the module to another program. Write a script named copyfile.py. This script should prompt the user for the names of two text files. The contents of the first the second file.
II	<p>Basics of Python Programming and numpy Library:</p> <ol style="list-style-type: none"> Write a program that inputs a text file. The program should print all of the unique words in the file in alphabetical order. Write a Python class to reverse a string word by word. Python program to remove Duplicates elements from a List. Write a program to double a given number and add two numbers using lambda ()? Demonstrate a python code to print try, except and finally block statements. Using a numpy module create an array and check the following: a) type of an array b) axis of an array c) shape of an array d) type of elements in an array. Using a numpy module create array and check the following: 1. List with type float 2. 3*4 array with all zeros 3. From tuple 4. Random values Using a numpy module create array and check the following: 1. Reshape 3X4 array to 2X2X3 array 2. Sequence of integers from 0 to 30 with steps of 5 3. Flatten array 4. Constant value array of complex type.



SRI SIDDHARTHA INSTITUTE OF TECHNOLOGY- TUMAKURU
(A constituent College of Siddhartha Academy of Higher Education, Tumakuru)



- | | |
|--|---|
| | <p>19. Write a program to concatenate the dataframes with two different objects.</p> <p>20. Write a python code to read a csv file using pandas module and print the first and last five lines of a file.</p> |
|--|---|



numpy and Pandas Library:

- 21. Write a program to generate an infinite number of even numbers (Use generator).
- 22. Write a program to get a list of even numbers from a given list of numbers. (Use only comprehensions).
- 23. Write a program to sort words in a file and put them in another file. The output file should have only lower case words, so any upper case words from source must be lowered.(Handle exceptions).
- 24. Write a Python program to read a list of numbers and sort the list in a non-decreasing order without using any built in functions. Separate function should be written to sort the list wherein the name of the list is passed as the parameter.
- 25. Write a Pandas program to create and display a DataFrame from a specified dictionary data which has the index labels.

Sample DataFrame:

```
exam_data = {'name': ['Anastasia', 'Dima', 'Katherine', 'James', 'Emily', 'Michael', 'Matthew', 'Laura', 'Kevin', 'Jonas'],  
'score': [12.5, 9, 16.5, np.nan, 9, 20, 14.5, np.nan, 8, 19],  
'attempts': [1, 3, 2, 3, 2, 3, 1, 1, 2, 1],  
'qualify': ['yes', 'no', 'yes', 'no', 'no', 'yes', 'yes', 'no', 'no', 'yes']  
labels = ['a', 'b', 'c', 'd', 'e', 'f', 'g', 'h', 'i', 'j']
```

- 26. Write a Pandas program to select the specified columns and rows from a given DataFrame.

Select 'name' and 'score' columns in rows 1, 3, 5, 6 from the following data frame.

Sample DataFrame:

```
exam_data = {'name': ['Anastasia', 'Dima', 'Katherine', 'James', 'Emily', 'Michael', 'Matthew', 'Laura', 'Kevin', 'Jonas'],  
'score': [12.5, 9, 16.5, np.nan, 9, 20, 14.5, np.nan, 8, 19],  
'attempts': [1, 3, 2, 3, 2, 3, 1, 1, 2, 1],  
'qualify': ['yes', 'no', 'yes', 'no', 'no', 'yes', 'yes', 'no', 'no', 'yes']  
labels = ['a', 'b', 'c', 'd', 'e', 'f', 'g', 'h', 'i', 'j']
```

- 27. Write a Pandas program to rename columns of a given DataFrame.

Sample data:

Original DataFrame

	col1	col2	col3
0	1	4	7
1	2	5	8
2	3	6	9

New DataFrame after renaming columns:

	Column1	Column2	Column3
0	1	4	7
1	2	5	8
2	3	6	9

III



28. Write a Pandas program to drop a list of rows from a specified DataFrame.

Sample data:

Original DataFrame:

	col1	col2	col3
0	1	4	7
1	4	5	8
2	3	6	9
3	4	7	0
4	5	8	1

New DataFrame after removing 2nd & 4th rows:

	col1	col2	col3
0	1	4	7
1	4	5	8
3	4	7	0

29. Write a Pandas program to reset index in a given DataFrame. Sample data:

Original DataFrame:

	Attempts	name	qualify	score
0	1	Anastasia	yes	12.5
1	3	Dima	no	9.0
2	2	Katherine	yes	16.5
3	3	James	no	NaN
4	2	Emily	no	9.0
5	3	Michael	yes	20.0
6	1	Matthew	yes	14.5
7	1	Laura	no	NaN
8	2	Kevin	no	8.0
9	1	Jonas	yes	19.0

After removing first and second rows:

	attempts	name	qualify	score
2	2	Katherine	yes	16.5
3	3	James	no	NaN
4	2	Emily	no	9.0
5	3	Michael	yes	20.0
6	1	Matthew	yes	14.5
7	1	Laura	no	NaN
8	2	Kevin	no	8.0
9	1	Jonas	yes	19.0



SRI SIDDHARTHA INSTITUTE OF TECHNOLOGY- TUMAKURU
(A constituent College of Siddhartha Academy of Higher Education, Tumakuru)



Reset the Index:

	index	attempts	name	qualify	score
0	2	2	Katherine	yes	16.5
1	3	3	James	no	NaN
2	4	2	Emily	no	9.0
3	5	3	Michael	yes	20.0
4	6	1	Matthew	yes	14.5
5	7	1	Laura	no	NaN
6	8	2	Kevin	no	8.0
7	9	1	Jonas	yes	19.0

30. a) Write a Pandas program to detect missing values of a given DataFrame. Display True or False.

b) Write a Pandas program to replace NaNs with median or mean of the specified columns in a given DataFrame.

Test Data:

	ord_no	purch_amt	ord_date	customer_id	salesman_id
0	70001.0	150.50	2012-10-05	3002	5002.0
1	NaN	270.65	2012-09-10	3001	5003.0
2	70002.0	65.26	NaN	3001	5001.0
3	70004.0	110.50	2012-08-17	3003	NaN
4	NaN	948.50	2012-09-10	3002	5002.0
5	70005.0	2400.60	2012-07-27	3001	5001.0
6	NaN	5760.00	2012-09-10	3001	5001.0
7	70010.0	1983.43	2012-10-10	3004	NaN
8	70003.0	2480.40	2012-10-10	3003	5003.0
9	70012.0	250.45	2012-06-27	3002	5002.0
10	NaN	75.29	2012-08-17	3001	5003.0
11	70013.0	3045.60	2012-04-25	3001	NaN

Course Outcomes:

Sl. No.	Description
1	Develop programs for the given problem statement in the real world.
2	Implement the programs on object oriented concepts.
3	Demonstrate the usage of NumPy module for numerical data analysis.
4	Apply data manipulation tools available in pandas for data cleaning and analysis.

Pattern for practical exam conduction:

In Semester End Practical Examination, students are allowed to pick one program from the lot of 3 cycles.



Syllabus for the Academic Year – 2021 - 2022

Department: Information Science and Engineering

Semester: 4

Subject Name: Microprocessor and Microcontroller Laboratory

Subject Code: IS4LB3

L-P-C: 0-3-1.5

Course Objectives:

Sl. No.	Course Objectives
1	Able to learn coding knowledge on ARM assembly language programming.
2	Familiar with practical aspects on connectivity of interfacing devices using Microcontroller-LPC2148.
3	To implement few basic application programs using Aurdino Uno board.

Lab Cycles	Description
I	Develop and execute the following using ARM Assembly 1) To perform arithmetic operations on a set of integers of different sizes. 2) To perform data handling operations using Logical, Shift, Rotate and Compare instructions. 3) To perform block move and block exchange operations. 4) Searching and sorting of a set of elements using different techniques.
II	Develop and execute the following using C 5) Program to interface LEDs and to blink the LEDs in a specified fashion. 6) Program to realize decimal up / down counter using 7 segments Display 7) Program to interface and rotate stepper motor in clockwise/anticlockwise direction 8) Program to interface DAC and generate waveforms 9) Program to interface UART to display text messages
III	Develop and execute the following using the Genuino Aurdino Uno 10) Build a Motion detector using a PIR sensor and display appropriate messages 11) Controlling the LED with a push button – turn on /turn off LED photo resistors LDR) – switch on the LED when light level goes below a particular threshold. Plot the light intensity in the room at various time intervals 12) Rain Indicator using a Rain sensor and a water source



SRI SIDDHARTHA INSTITUTE OF TECHNOLOGY- TUMAKURU
(A constituent College of Siddhartha Academy of Higher Education, Tumakuru)



Pattern for practical exam conduction:

In Semester End Practical Examination, students are allowed to pick one experiment from the lot of 1 to 12.

Course Outcomes:

Sl. No.	Descriptions
1	Write and execute assembly programs to manipulate the data in the memory using ARM processor.
2	Implement and execute interfacing programs in C to control the functioning of peripheral circuits using ARM based microcontroller LPC2148.
3	Develop and execute simple applications programs using Aurdino Uno board and few sensors
4	Apply the knowledge to build projects for real world applications.