HYDERABAD INSTITUTE OF TECHNOLOGY AND MANAGEMENT						
B.TECH. HR-22 COURSE STRUCTURE						
CSE-DATA SCIENCE						
(Applicable for the batch admitted from 2022-23 onwards)						
III-Semester (2 Year)						
S. No.	**Course code**	**Course title**	**Hours Per Week**			**Credits**
			L	**T**	**P**	
1	22BS3MT03	Statistical and Mathematical Foundations	3	1	0	4
2	22PC3CD01	Data Structures and Algorithms*	3	1	2	5
3	22PC3CS02	Database Management Systems*	3	0	2	4
4	22PC3CS03	Operating Systems	3	0	0	3
5	22PC3CS04	Operating Systems-Lab	0	0	2	1
6	22PR3CD01	Evaluation of Internship-I	0	1	0	1
7	22PR3CD02	Student Skill Development Course/Doing Engineering-1	0	1	2	2
		TOTAL	**13**	**3**	**8**	**20**
8	22AC3HS01	Universal Human Values	0	2	0	0
IV-Semester (2 Year)						
S. No.	**Course code**	**Course title**	**Hours Per Week**			**Credits**
			L	**T**	**P**	
1	22ES4CD03	Descriptive and inferential Statistics*	2	0	2	3
2	22PC4CS05	Object Oriented Programming using Java*	3	0	4	5
3	22PC4CS06	Design and Analysis of Algorithms*	3	0	2	4
4	22PC4CS07	Computer Networks*	3	0	2	4
5	22PC4CD02	Introduction to Data Science	2	0	0	2
6	22BS4EG03	English for Employability	1	0	2	2
		TOTAL	**14**	**0**	**12**	**20**
7	22MC4HS06	Constitution of India	0	1	0	0

B. Tech II Year–I Sem	L	T	P	C
Subject Code: 22BS3MT03	3	1	0	4

STATISTICAL AND MATHEMATICAL FOUNDATIONS

(Common to CSC/CSD/CSM/CSO)

Pre-requisite: Basic knowledge of set and relations theory, permutations, combinations, Venn diagrams, measures of central tendency and dispersion.

Course Objectives: To provide the student with

1.The theory of Probability, Probability distributions of single and multiple random variables.
2.The sampling theory, point estimation and interval estimation.
3.Testing of hypothesis and making statistical inferences.

4.The Number Theory basic concepts useful for cryptography etc.

MODULE I

Probability: Sample Space, Events, Counting Sample Points, Probability of an Event, Addition Theorem Conditional Probability, Independence, Multiplications theorem and Bayes' theorem.

Random Variables: Discrete and Continuous random variable. Definitions of Probability Distributions, Probability Mass function, Probability Density function. Definitions of Mathematical expectation, Variance Moment generating function of Discrete and continuous random variables.

MODULE II

Discrete Probability Distributions: Binomial, Poisson distribution and statistical constants of these distributions using moment generating function.
Continuous Probability Distributions Uniform Distribution, Exponential Distribution and statistical constants of these distributions using moment generating function. Normal Distribution and its related applications.

MODULE III

Sampling Distribution: Random Sampling, Some Important Statistics, Sampling Distributions, Sampling Distribution of Means, variance and the Central Limit Theorem.

Estimation and Tests of Significance: Introduction, Statistical Inference, Classical Methods of Estimation.: Estimating the Mean, Standard Error of a Point Estimate, Null & Alternative Hypothesis, Critical region, Type I and Type II errors, level of significance, one tail, two-tail tests. Prediction Intervals: Estimating a Mean and Proportion for single sample, Difference between Two Means, difference between two proportions for two Samples. Tests of significance for large sample: test for single mean, difference of means, single proportion, difference of proportions.

MODULE IV

Bivariate Distribution: Joint Probability distributions - Joint Probability mass function, joint probability density function, Marginal Distribution, Covariance of two random variables.

Correlation and Regression: Karl Pearson coefficient of correlation, Rank correlation, Regression coefficient, Lines of regression.

MODULE V

Greatest Common Divisors and Prime Factorization: Greatest common divisors, The Euclidean algorithm, The fundamental theorem of arithmetic, Factorization of integers and the Fermat numbers.

Congruences: Introduction to congruences, Linear congruences, The Chinese remainder theorem, Systems of linear congruences.

Text Books:

1. Introduction to Probability and Statistics for Engineers and Scientists, Sheldon M. Ross, 6th Edition, Elsevier, 2021
2. Probability and Statistics for Engineers, Richard A Johnson, 8th edition, Pearson Education, 2011.
3. Elementary number theory & its applications, Kenneth H. Rosen, 6th edition, Addison Wesley, ISBN 978 0-321-50031-1

Reference Books:

1. Charles M Grinsted, J Laurie Snell "Introduction to Probability", American Mathematical Society.

2. Jay Devore, "Probability and Statistics for Engineering and the Sciences" Cengage learning.

3. S. C Gupta &V K Kapoor, "Fundamentals of Mathematical Statistics", S Chand

MOOC courses:

1. Probability: http://nptel.ac.in/courses/111105041/

2. Probability and Statistics: http://nptel.ac.in/courses/111105035/

3. Probability: https://nptel.ac.in/courses/111/102/111102111/

E- Books:

1. Fundamentals of Mathematical Statistics (A Modern Approach), 10th Edition

https://1lib.in/book/1196320/1672b

2. Miller & Freund's Probability and Statistics for Engineers ttps://1lib.in/book/2883098/927b28

3. Statistics and Probability for Engineering Applications with Microsoft Excel

https://1lib.in/book/487476/b6daef

4. Charles M Grinsted, J Laurie Snell “Introduction to Probability”, American Mathematical Society

https://1lib.in/book/556778/1a0fc2

Course Outcomes: After learning the contents of this paper the student must be able to

CO1: Compute probabilities using theorems in probability and probability distributions of single and multiple random variables.

CO2: Apply Inferential Statistics to make predictions or judgments about the population from which the sample data is drawn.

CO3: Establish relationships between variables using correlation and regression

CO4: Apply the number theory concepts to cryptography domain.

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – High; 2 – Medium; 1 – Low												
Course Outcomes (COs)	**Program Outcomes (POs)**											
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**
CO1	3	2			1							
CO2	3	2			1							
CO3	3	2			1							
CO4	3	2			1							

B.Tech II Year–I Sem

Subject Code: 22PC3CD01

L	T	P	C
3	1	2	5

Data Structures and Algorithms

Prerequisite: Basic mathematical, analytical and logical capability, problem solving through C.

Course Objectives:

- Introduce Analysis of Algorithm in terms of space and time complexity.
- Exploring basic data structures such as stacks and queues.
- Introduces a variety of data structures such as hash tables, search trees, tries, heaps, graphs.
- Introduces sorting and pattern matching algorithms.

Course Outcomes:

- Understand concepts of ADT and to write an algorithm for a given problem statement, also calculate time and space complexity.
- Ability to develop C programs for computing real-life applications using data structures like linked lists, stacks,queues.
- Understand different types of trees like Red-Black, AVL, Splay trees.
- Ability to implement searching and sorting algorithms, and pattern matching algorithms.

Module I

Introduction: Basics of Data Structures, Abstract data types, Dynamic aspects of operations on data, Characteristics of data structures, Creation and manipulation of data structures, Operations on data structures.

Introduction to Algorithms: asymptotic notations divide & conquer recursion, analyzing recursive algorithms.

Programs:

1. Asymptotic notations to calculate the running time complexity of any algorithm. O Notation (Big-O Notation), Ω Notation (Big-Omega Notation), θ Notation (Theta Notation)
2. Calculate complexity analysis of control structures
3. Calculate complexity analysis of any recursive algorithm

Module II

Linked lists: Types of linked lists – singly, doubly and circularly linked lists, operations on linked lists.

Stacks: Implementation of stacks– array and linked list, operations on stacks, Applications of Stacks, Notations – infix, prefix and postfix, Conversion and evaluation of arithmetic expressions using Stacks.

Queues: Implementation of queues– array and linked list, operations on queues, Types of queues – queue, double ended queue and priority queue.

Programs:

1. Write a Program to Implement Stack Operations using Dynamic Memory Allocation.
2. Write a program to convert expressions infix to postfix using stack.
3. Write a program to evaluate arithmetic expressions using stack
4. Write a program that uses functions to perform the following operations on Singly linkedlist.
   i) Creation ii) Insertion iii) Deletion iv) Traversal
5. Write a program that uses functions to perform the following operations on Circular linkedlist.
   i) Creation ii) Insertion iii) Deletion iv) Traversal
6. Write a program that implement Queue (its operations) using Arrays.
7. Write a program that implement stack (its operations) using Pointers

Module III

Dictionaries: Linear list representation, skip list representation, operations - insertion, deletion and searching.

Hash Table Representation: hash functions, collision resolution-separate chaining, open addressing-linear probing, quadratic probing, double hashing, rehashing, extendible hashing.

Programs:

1. Write a program to implement dictionary linear list representation and its operations
2. Write a Program to Implement Hash Tables with Quadratic Probing
3. Write a Program to Implement Hash Tables with Linear Probing
4. Write a Program to Implement Hash Tables Chaining with Binary Trees
5. Write a Program to Implement Hash Tables Chaining with Doubly Linked Lists

Module- IV

Graph: Basic terminologies and Representation Traversal algorithms Breadth First Search, Depth First Search, Shortest path: Depth first search in directed and undirected graphs. Union-find data structure and applications. Directed acyclic graphs, topological sort.

Trees: Binary Search Trees, Definition, Implementation, Operations- Searching, Insertion and Deletion, AVL Trees, Definition, Height of an AVL Tree, Operations – Insertion, Deletion and Searching,Red –Black, Splay Trees.

Programs:

1. Write a program to implement the Binary Search tree.
   a) Insertion b) Deletion c) Traversal d) Searching element in tree.
2. Write a program to implement the AVL tree.
   a) Insertion b) Deletion c) Traversal d) Searching element in tree.
3. Write a program to implement the Red-Black tree.
   a) Insertion b) Deletion
4. Write a program to implement the Splay tree.
   a) Insertion b) Deletion
5. Write a program to implement graph traversal methods
   a) Breadth First Search, b) Depth First Search

Module V

Sorting: objective and Properties of different sorting Algorithms Insertion Sort, Bubble sort, Selection Sort, Merge sort, Quick Sort, Heap sort, Radix sort, Bucket sort. Performance and comparison among all the methods

Pattern Matching and Tries: Pattern matching algorithms-Brute force, The Boyer –Moore algorithm, Naive algorithm, The Knuth-Morris-Pratt algorithm; Tries- Standard Tries, Compressed Tries, Suffix tries.

Programs:

1. Write a program to implement merge sort using divide and conquer technique
2. Write a program to implement bubble sort.
3. Write a program to implement brute-force method of string matching.
4. Write a Program to perform string matching using Naive String Matching
5. Write a program to implement Standard Trie
6. Write a program to implement Compressed Trie
7. Write a program to implement Suffix Trie

TEXT BOOKS:

1. Fundamentals of Data Structures in C, 2nd Edition, E. Horowitz, S. Sahni and Susan Anderson Freed, *Universities Press.*
2. Data Structures using C – A. S. Tanenbaum, Y. Langsam, and M.J. Augenstein, PHI/Pearson Education.
3. AV Aho. J. Hopcroft, JD Ullman, Data Structures and Algorithms, Addison-Wesley,1983.

REFERENCE BOOKS:

1. Data Structures : A Pseudocode Approach with C, 2nd Edition, R. F. Gilberg and B.A. Forouzan, Cengage Learning.
2. Fundamentals of Computer Algorithms by Horwitz and Sahni,Galgotia.
3. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C", 2nd Edition, Pearson Education, 2011.

WEB RESOURCES:

https://www.javatpoint.com /c-programming-language-tutorial

https://www.tutorialspoint.com/cprogramming/index.htm

Course Outcomes:

O-PO/PSO Mapping Chart
(3/2/1 indicates strength of correlation)
3 – High; 2 – Medium; 1 – Low

Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes*		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	2											2		
CO2	3	2	1										1		
CO3	3	2	1		2								1		
CO4	3	2	1		2								1		

HR22

B. Tech II Year–III Sem	**L**	**T**	**P**	**C**
SubjectCode:22PC3CS02	**3**	**0**	**2**	**4**

Database Management Systems

Prerequisite: Basics of computer programming language, Data structures.

Course Objectives:

1. To enable students, define and describe basic concepts of Relational database managements and applications.
2. To provide students the theoretical concepts of data models and database design and normal forms.
3. To make students familiarize with relational model, relational algebra, transaction control and concurrency control.
4. To master the basics of SQL, PL/SQL and design queries.
5. To introduce storage structures and access techniques.

Course Outcomes:

1. Describe fundamentals of RDBMS, database design and normal forms.
2. Design SQL & PL/SQL for retrieval and management of data.
3. Understand basics of transaction processing and concurrency control.
4. Summarize database storage structures and access techniques.

Module- I

Database System Applications: A Historical Perspective, File Systems versus a RDBMS, the Data Model, Levels of Abstraction in a RDBMS, Data Independence, Structure of a RDBMS

Introduction to Database Design: Database Design and ER Diagrams, Entities, Attributes, and Entity Sets, Relationships and Relationship Sets, Super key, candidate key, Participating constraints, Weak entity, Additional Features of the ER Model, Conceptual Design with the ER Model.

Programs:

1. E-R Model:

Analyze any problem carefully and come up with the entities in it. Identify what data has to be persisted in the database. This contains the entities, attributes etc.

Identify the primary keys for all the entities. Identify the other keys like candidate keys, partial keys, if any.

2. Concept Design with E-R Model

Relate the entities appropriately .Apply cardinalities for each relationship. Identify strong entities and weak entities (if any).Indicate the type of relationships (total / partial). Try to incorporate generalization, aggregation, specialization etc where ever required.

3. Installation of Mysql / SQL for practicing commands

Module- II

SQL: Introduction To SQl , Query Languages, Basic SQL Query. Introduction to views, destroying/altering tables and views. Joins.

Relational Algebra and Calculus: Selection and Projection, Set operations, Joins, Division, More examples on Algebra queries, Tuple relational Calculus, Domain Relational Calculus.

Programs:

1. Practicing DDL commands
2. Practicing DML commands
3. Querying (using ANY, ALL, IN, Exists, NOT EXISTS, UNION, INTERSECT, Constraints etc.)
4. Views, joins.

Module- III

Advanced SQL: SQL Functions, Aggregate Operators, Group by & having clause, Sub queries, Nested Queries, triggers and active data bases, cursors, procedures.

Schema Refinement: Problems caused by redundancy, decompositions, problems related to decomposition, reasoning about functional dependencies, 1NF, 2NF, 3NF, 3.5NF, lossless join decomposition, multi-valued dependencies, 4NF & 5NF.

Programs:

1. Queries using Aggregate functions, Group by & Having.
2. Apply Normalization(1NF, 2NF, 3NF, 4NF & 5NF)
3. Triggers (Creation of insert trigger, delete trigger, update trigger)
4. Procedures
5. Usage of Cursors

Module -IV

Transaction Management: The ACID Properties, Transactions and Schedules, Concurrent Execution of Transactions, 2PL, Serializability, Time stamp based protocol, validation based Protocol. Implementation of isolation, Multiple granularity,

Recoverability: Recoverability, Introduction to Lock Management, Lock Conversions, Dealing with Deadlocks, shadow paging.

Programs:

1. Practicing DCL commands
2. Practicing TCL commands

Module -V

Storage and Indexing: Data on External Storage, File Organization and Indexing, Cluster Indexes, Primary and Secondary Indexes, Index data Structures, Hash Based Indexing, Tree base Indexing.

Tree Structured Indexing: Intuitions for tree Indexes, Indexed Sequential Access Methods (ISAM), B+ Trees.

Programs:

1. Apply indexing methods (primary, secondary, hashing, spars & dense indexing)
   Example: An organization contains several employees in each department. Suppose we use a clustering index, where all employees which belong to the same Dept_ID are considered within a single cluster, and index pointers point to the cluster as a whole. Here Dept_Id is a non-unique key.
2. Write PL/SQL program for B-tree
3. Write PL/SQL program for B+tress

Text Books:

1. Database Management Systems, Raghuram Krishnan, Johannes Gehrke, Tata Mc Graw Hill 3rd Edition, 2007.
2. Abraham Silberschatz, Henry F. Korth, S. Sudarshan, "Database System Concepts", McGraw-Hill, 6 th Edition, 2017.

Reference Books:

1. RamezElmasri, Shamakant B. Navathe, "Fundamental Database Systems", Pearson Education, 6th Edition, 2014.
2. Database System Concepts, Silberschatz, Korth, Mc Graw hill, V edition.
3. Database Systems design, Implementation, and Management, Peter Rob & Carlos Coronel 7th Edition.

Software's Required:

Programs are to be developed using My SQL / SQL / PL/SQL.

CO-PO/PSO Mapping:

Course Outcomes (COs)	**Program Outcomes (POs)**												**Program Specific Outcomes***	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	2		3											
CO2	2		3		3									
CO3	3	2	2											
CO4	2		2											

HR22

B.Tech II Year–III Sem	**L**	**T**	**P**	**C**
Subject Code: 22PC3CS03	**3**	**0**	**0**	**3**

Operating Systems

Course Objective:

1. To understand the components, operations of the operating system
2. To interpret the scheduling policies and memory management issues
3. To understand the process concurrency and synchronization
4. To understand the concept of file management

Course Outcomes:

At the end of the course student will be able to

1. Understand the structure of Operating System and its architecture
2. Apply the scheduling strategies for real time implementations
3. Illustrate synchronization problems, deadlock and its techniques
4. Apply Memory Management Techniques

Module -I

Operating System Introduction: Operating System and Function, Evolution of Operating System, Type of Operating System: Batch, Interactive, Multiprocessing, Time Sharing and Real Time System, Operating System Components,

Operating System Structure: Monolithic, Layered, Micro-Kernel, Client-Server, Virtual Machine, Operating System Services: System calls, Shell commands, Shell programming, Examples of O.S,UNIX, Linux, MS-Windows, Handheld OS.

Module - II

Evolution of Operating Systems - Simple Batch, Multi programmed, timeshared, Personal Computer, Parallel, Distributed Systems, Real-Time Systems, Special -Purpose Systems, Operating System services, User OS Interface, System Calls, Types of System Calls, System Programs, Operating System.

Processes – Process Concept, Process Scheduling, Operations on Processes, Inter-process Communication; Process Control Block, Threads, Process *Scheduling-Scheduling Queues*, Schedulers, Context Switch, Preemptive Scheduling, Dispatcher, Scheduling Criteria.

Module- III

CPU Scheduling- Scheduling algorithms, *Multiple-Processor Scheduling*, *Real-Time Scheduling*, Threads- Overview, Multithreading models, threading issues.

Process Coordination – Process Synchronization, *Theoretical Section Problem, Peterson's solution*, Synchronization Hardware, Semaphores, and Classic Problems of Synchronization, Monitors, Case Studies: Linux, Windows.

Module -IV

Deadlocks - System Model, *Deadlock Characterization, Methods for Handling Deadlocks*, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection and Recovery from Deadlock.

Memory Management: Memory address, Swapping and Managing Free Memory Space, Resident Monitor, Multiprogramming with Fixed Partition, Multiprogramming With Variable Partition, Multiple Base Register,

Module- V

Virtual Memory Management: Paging, Segmentation, Paged Segmentation, Demand Paging, Performance, Page Replacement Algorithms, Allocation of Frames, Thrashing, *Page Replacement, Page Replacement Algorithms,* Allocation of Frames, Thrashing.

TEXT BOOKS:

1. Operating System Principles , Abraham Silberchatz, Peter B. Galvin, Greg Gagne, 8th Edition, Wiley Student Edition
2. Operating Systems – Internals and Design Principles, W. Stallings, 6th Edition, Pearson.

REFERENCE BOOKS:

1. Modern Operating Systems, Andrew S Tanenbaum, 3rd Edition, PHI
2. Operating Systems A concept-based Approach, 2nd Edition, D.M.Dhamdhere, TMH.
3. Principles of Operating Systems, B.L.Stuart, Cengage learning, India Edition.

CO-PO &PSO Mapping:

Course Name - Course Outcomes / Program Outcomes	1	2	3	4	5	6	7	8	9	10	11	12	PSO 1	PSO 2	PSO 3
CO1	M	L													
CO2	H	H			M										
CO3	M	H													
CO4	M	L			L										

HR22

B. Tech II Year–III Sem	L	T	P	C
Subject Code: 22PC3CS17	0	0	2	1

Operating Systems Lab

Prerequisites:

A course on "Programming for Problem Solving".
A course on "Computer Organization and Architecture".

Course Objectives:

1. To provide an understanding of the design aspects of operating system concepts through Simulation.
2. Introduce basic Unix commands, system call interface for process management, inter process communication and I/O in Unix.

Course Outcomes:

1. Simulate and implement operating system concepts such as scheduling, deadlock management, file management and memory management.
2. Able to implement C programs using Unix system calls

List of Experiments

1. Write C programs to simulate the following CPU Scheduling algorithms

a) FCFS b) SJF Round Robin d) priority

2. Write a C program to simulate Bankers Algorithm for Deadlock Avoidance and Prevention.

3. Write a C program to implement the Producer – Consumer problem using semaphores.

4. Write a C program to simulate the concept of Dining-philosophers problem.

5. Write C programs to simulate the following memory management techniques

a) Paging b) Segmentation

6. Write C programs to illustrate the following IPC mechanisms

a) Pipes b) FIFOs c) Message Queues d) Shared Memory

7. Write a C program to simulate the following contiguous memory allocation Techniques

a) Worst fit b) Best fit c) First fit

8. Simulate all File Organization Techniques

a) Single level directory b) Two level directory

9. Write a C program to simulate the following contiguous memory allocation Techniques

a) Worst fit b) Best fit c) First fit.

10. Implementation of the following Page Replacement Algorithms

a) FIFO b) LRU c) LFU

TEXT BOOKS:

3. Operating System Principles , Abraham Silberchatz, Peter B. Galvin, Greg Gagne, 8th Edition, Wiley Student Edition
4. Operating Systems – Internals and Design Principles, W. Stallings, 6th Edition, Pearson.

REFERENCE BOOKS:

1. Modern Operating Systems, Andrew S Tanenbaum, 3rd Edition, PHI

2. Operating Systems A concept-based Approach, 2nd Edition, D.M.Dhamdhere, TMH.

3. Principles of Operating Systems, B.L.Stuart, Cengage learning, India Edition.

CO-PO &PSO Mapping:

Course Name - Course Outcomes / Program Outcomes	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**PSO 1**	**PSO 2**	**PSO 3**
CO1	M	L													
CO2	H	H			M										
CO3	M	H													
CO4	M	L			L										

B.Tech II Year–III Sem	L	T	P	C
Subject Code: 22AC3HS01	0	2	0	0

Universal Human Values (UHV)

(Common to ECE, EEE, ME, CSE, CSD, CSO, CSC, CSM branches)

Course Objectives:

1. To help students distinguish between values and skills, and understand the need, basic guidelines, content and process of value education.
2. To help students initiate a process of dialog within themselves to know what they 'really want to be' in their life and profession
3. To help students understand the meaning of happiness and prosperity for a human being.
4. To facilitate the students to understand harmony at all the levels of human living, and live accordingly.
5. To facilitate the students in applying the understanding of harmony in existence in their profession and lead an ethical life

Course Outcome: On completion of this course, the students will be able to

CO1: Explore on the basic aspiration of Human being and its fulfilment

CO2: Distinguish the difference between the Self and the Body

CO3: Explore the value of harmony in family, society and nature

CO4: Understanding of gender related issues and gender relationship.

Module I

Self- Exploration on UHV Basic Guidelines: Content and Process for Value Education Understanding the need, basic guidelines, Self- Exploration–what is it? - its content and process; 'Natural Acceptance' and Experiential Validation- as the mechanism for self-exploration.

Continuous Happiness and Prosperity:A look at basic Human Aspirations, Right understanding, Relationship and Physical Facilities- the basic requirements for fulfilment of aspirations of every human being withtheir correct priority, Understanding Happiness and Prosperity.

Module 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' - Sukh and Suvidha, Understanding the Body as an instrument of 'I'

Understanding Harmony in self: Understanding the characteristics and activities of 'I' and harmony in 'I', Understanding the harmony of I with the Body: Sanyam and Swasthya; correct appraisal of Physical needs, meaning of Prosperity in detail

Module III

Understanding Harmony in the Family: Harmony and Values in Relationships in the Family- the basic unit of human interaction, Trust (Vishwas) and Respect (Samman) as the foundational values of relationship, Understanding the meaning of Vishwas & Samman; Difference between intention and competence,

Understanding Harmony in the Society: Understanding the harmony in the society: Samadhan, Samridhi, Abhay, Sah-astitva as comprehensive Human Goals, Visualizing Undivided Society (Akhand Samaj), Universal Order (SarvabhaumVyawastha).

Module IV

Understanding Harmony in the Nature and Existence: Whole existence as Co-existence Understanding the harmony in the Nature, Interconnectedness and mutual fulfilment among the four orders of nature- recyclability and self-regulation in nature

Understanding Harmony in the Existence: Understanding Existence as Co-existence (Sah-astitva) of mutually interacting units in all- pervasive space, Holistic perception of harmony at all levels of existence.

Module V

Exploring Attitudes towards gender: Understanding gender and Basic Gender Concepts/terminology- exploring attitude towards gender-construction of gender- socialization: Making Women, making Men.

Gender relationship and Culture: Gender roles and relationship matrix, sex selection and consequences, declining sex ratio, Gender Issues- Gender sensitive language, Just Relationships: Being together as equals.

Text Books:

1. R R Gaur, R Sangal, G P Bagaria, 2009, A Foundation Course in Human Values and Professional Ethics.
2. Towards a World of Equals: a bilingual Textbook on Gender. A Suneetha, and others… Telugu Academy, Telangana Gov. 2015

References:

1. Ivan Illich, 1974, Energy & Equity, The Trinity Press, Worcester, and Harper Collins, USA
2. E.F. Schumacher, 1973, Small is Beautiful: a study of economics as if people mattered,Blond & Briggs, Britain.
3. Sussan George, 1976, How the Other Half Dies, Penguin Press. Reprinted 1986, 1991
4. Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 1972,Limits to Growth – Club of Rome's report, Universe Books.
5. A Nagraj, 1998, Jeevan Vidya Ek Parichay, Divya Path Sansthan, Amarkantak.

MOOC Course: NPTEL -Exploring Human Values: Visions of Happiness and PerfectSociety - Web course

CO-PO MAPPING:

CO-PO Mapping Chart (3/2/1 indicates strength of correlation) 3 – High; 2 – Medium; 1 – Low												
Course Outcomes (COs)	**Program Outcomes (POs)**											
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**
CO1								3				
CO2								3				
CO3								3				
CO4								3				

B. Tech II Year–II Sem	L	T	P	C
Subject Code: 22ES4CD03	2	0	2	3

Descriptive and Inferential Statistics

(Common to CSC, CSD, CSM)

Pre-requisite:

Course Objectives: To provide the student with

MODULE I

Introduction to Statistics: Definition, Descriptive statistics, Inferential statistics, Data collection, population and samples, Types of data: qualitative and quantitative data, measurement scale, Describing Categorical data.

MODULE II

Data Visualization: Frequency tables, line graphs, bar graphs, frequency polygons, relative frequency graphs, pie charts, grouped data and histograms, scatter and profile plots

MODULE III

Descriptive Statistics: Measures of central tendency: Mean median and Mode. Measures of dispersion: Range, variance, standard deviation, percentiles, quartiles, interquartile range.

MODULE IV

Bi Variate data:

Relative frequencies, association between bivariate, covariance, correlation, descriptive methods in regression: fitting a straight line and second-degree polynomial by least square methods.

MODULE V

Hypothesis Testing:

Tests of Significance (Large Samples): test for single mean, difference of means, single proportion, difference of proportions.
Tests Of Significance (Small Samples): t-Test for single mean, difference of means, paired t-test, F-test, Chi-square test for goodness of fit and independence of attributes.

Text Books:

1.Introduction to Probability and Statistics for Engineers and Scientists, Sheldon M. Ross, 6th Edition, Elsevier, 2021

2.Probability and Statistics for Engineers, Richard A Johnson, 8th edition, Pearson Education, 2011.

Reference Books:

1. Charles M Grinsted, J Laurie Snell “Introduction to Probability”, American Mathematical Society.

2. Jay Devore, “Probability and Statistics for Engineering and the Sciences” Cengage learning.

3. S. C Gupta &V K Kapoor, “Fundamentals of Applied Statistics”, S Chand

MOOC Courses:

1. Probability: http://nptel.ac.in/courses/111105041/

2. Probability and Statistics: http://nptel.ac.in/courses/111105035/

3. Probability: https://nptel.ac.in/courses/111/102/111102111/

E- Books:

1.Probability and Statistics for Engineers by Richard A Johnson

https://1lib.in/book/2883098/927b28

3.Introduction to Probability by Charles M Grinsted, J Laurie Snell

https://1lib.in/book/556778/1a0fc2

4.Probability and Statistics for Engineering and the Sciences by Jay Devore

https://1lib.in/book/2820497/b2072c

Course Outcomes: After learning the contents of this paper the student must be able to

CO1:

CO2:

CO3:

CO4:

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – High; 2 – Medium; 1 – Low												
Course Outcomes (COs)	**Program Outcomes (POs)**											
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**
CO1												
CO2												
CO3												
CO4												

	L	T	P	C
B. Tech II Year–III Sem				
Subject Code: 22PC3CS05	**3**	**1**	**2**	**5**

Object Oriented Programming Using Java

Prerequisites: Programming in c.

Course Objectives:

1. Understand fundamental concepts and object oriented concepts in java
2. Implementing the concept of packages and exception handling in Java.
3. Implement the concept of multithreading and interprocess communication in java.
4. Develop GUI applications.

Course Outcomes:

1. Solve the given problem using OOPS technique.
2. Explain the concept of Package and Exception Handling.
3. Implement Multi threading and Inter process communication in java
4. Develop GUI based applications using applet, awt, Event handling and swing.

Module- I

History and Evolution of java: Java's lineage, Java and internet, Byte code, Java buzzwords,Evolution of java.

Object oriented programming - data, types, variables, Arrays, operators, control statements, type conversion and casting, Introduction to classes, objects, methods, constructor, this and static keywords , garbage collection, overloading methods, parameter passing, access control, Command line arguments,exploring String class
Inheritance: member access and inheritance, Multilevel Inheritance, super and final keywords, method overriding, dynamic method dispatch, abstract classes and methods.

Programs:

1. A. Develop a java Program to find the roots of Quadratic equation.
B. Develop a java Program to find the Fibonacci sequence.

2. A. Develop a java program to demonstrate the concept of method overloading.
B. Develop a java program to demonstrate the concept of method overriding.

3. A. Develop a java program to demonstrate the concept of multi level inheritance.
B. Develop a Java program to create an abstract class named Shape that contains two integers and an empty method named print Area (). Provide three classes named Rectangle, Triangle, and Circle such that each one of the classes extends the class Shape. Each one of the classes contains only the method print Area () that prints the area of the given shape.

Module- II

Packages and Interfaces: Defining, Creating and Accessing a Package, understanding CLASSPATH, importing packages, Differences between classes and interfaces, defining an interface, implementing interface, applying interfaces, variables in interface and extending interfaces.
Exception handling: Concepts of exception handling and its benefits, usage of try, catch, throw, throws and finally, built in exceptions, creating own exceptions.

Programs:

1.A. Develop a java program to demonstrate the significance of multiple catch.

B. Develop a java program to demonstrate throws clause.

2. Develop a Java program using packages to demonstrate access control modifiers.

Module- III

Multithreading: Differences between multi-threading and multi programming, thread life cycle, creating threads using thread class and Runnable interface, thread priorities, synchronization , interthread communication.
I/O Streams: Stream classes, Byte and character streams, File class, reading and writing files,reading and writing from console, serialization.

Programs:

1. Develop a Java program that implements a multithread application that has three threads. First thread generates random integer every 1 second and if the value is even, second thread computes the square of the number and prints. If the value is odd, the third thread will print thevalue of cube of the number.
2. Develop a Java program that correctly implements producer consumer problem using the concept of inter thread communication.

3.A. Develop a java program that copies the content of one file to another.

B. Develop a java Program to accept data from keyboard & develop it into a file.

Module- IV

Applets: Concepts of Applets, differences between applets and applications, life cycle of anapplet, creating applets, passing parameters to applets.
AWT: class hierarchy, user interface components- labels, buttons, scrollbars, text components, checkbox, checkbox groups, choices, lists panels – scroll pane, dialogs, menu bar, Layout Managers- Flow Layout, Border Layout, Grid Layout, Card Layout, Grid Bag Layout.
Event Handling: Events, Event sources, Event classes, Event Listeners, Delegation event model, handling mouse and keyboard events, Adapter classes.

Programs:

1.A. Develop an applet in Java that receives an integer in one text field, and computes its factorial value and returns it in another text field, when the button named “Compute” is clicked.

B. Develop a java program for passing parameters to applets

2. Develop a Java program to demonstrate Mouse Listener, Mouse Motion Listener
3. Develop a Java program that simulates a traffic light. The program lets the user select one of three lights: red, yellow, or green with radio buttons. On selecting a button, an appropriate message with “Stop” or “Ready” or “Go” should appear above the buttons in selected color.Initially, there is no message shown.

Module –V

Swings: Introduction, limitations of AWT, MVC architecture, components, containers, exploring swing- J Applet, J Frame and J Component, Image Icon, J Label, J Text field, J Button, J Checkbox, J List, J Radio button, J Combo Box, J Tabbed Pane, J Scroll Pane. **The Collections Framework (java.util)-** Collections overview, Collection Interfaces, Generics The Collection classes- Array List, Linked List, Hash Set, Tree Set, Priority Queue, Array Deque. Accessing a Collection via an iterator, Using an Iterator, The For-Each alternative, Map Interfaces and Classes, Comparators, Collection algorithms, Arrays, The Legacy Classes and Interfaces- Dictionary, Hash table, Properties, Stack, Vector More Utilityclasses, String Tokenizer, Date, Calendar, Random, Scanner.

Programs:

1. Develop a java Program to design a calculator for implementing basic functions like +,*,-, / using grid layout.
2. Develop an applet that moves the character up, down, left and right when the appropriatearrows are pressed.

Text Books:

1. The Complete Reference JAVA 2, Author: Herbert Schield , ninth edition Publishers: TataMec-Hill
2. Understanding Object-Oriented Programming with Java, updated edition, T. Budd, PearsonEducation.

Reference Books:

1. An Introduction to JAVA Programming (Chapter 6) Author: Y.Daniel Liang , Publishers:Tata Mec-Hill.
2. Programming with JAVA (2nd Edition) Author: E.Balagurusamy Publishers: Tata Mec-Hill.
3. Internet and Java Programming, R.KrishnaMurthu and S.Prabhu, New Age Publishers

CO-PO/PSO Mapping:

Course Outcomes(COs)	Program Outcomes (POs)												Program Specific Outcomes*		
	PO 1	PO 2	PO 3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO3
CO1	2														1
CO2	2														1
CO3	2														1
CO4	3	1	1	1	3										3

B.Tech II Year – IV Sem	L	T	P	C
Subject Code: 22PC4CS06	3	0	2	4

Design and Analysis of Algorithms

Prerequisites:

Data Structure, Discrete Mathematics

Course Objectives

1. To analyze the performance of algorithms.
2. To choose the appropriate data structure & algorithm design method for specific application
3. To understand how the choice of data structure & algorithm design method impact the performance of program
4. To design efficient algorithms for different problems

Course Outcomes:

At the end of the Course the Students will be able to

1. Describe computational solution to well-known problems like searching, sorting etc
2. Estimate the computational complexity of different algorithms.
3. Apply different designing methods for development of algorithms to realistic problems through greedy, dynamic programming, back tracking.
4. Devise an algorithm using appropriate design strategies for problem solving

Module - I

Introduction: Algorithm, Pseudo code for expressing algorithms, Performance Analysis-Space complexity, Time complexity, Asymptotic Notation- Big oh notation, Omega notation, Theta notation and Little oh notation, Probabilistic analysis, Amortized Complexity.

Divide and conquer: General method, applications-Binary search, Quick sort, Merge sort, Strassen's matrix multiplication

Programs:

1. Sort a given set of elements using the quick sort method and determine the time required to sort the elements. Repeat the experiment for different values of n, the number of elements in the 1st to be sorted and plot a graph of the time taken versus n. The elements can be read from a file or can be generated using the random number generator.
2. Implement merge sort algorithm to sort a given set of elements and determine the time required to sort the elements. Repeat the experiment for different values of n, the number of elements in the list to be sorted and plot a graph of the time taken versus n. The elements can be read from a file or can be generated using the random number generator.

Module –II

Searching and Traversal Techniques: Efficient non-recursive binary tree traversal algorithms, disjoint set operations, union and find algorithms, spanning trees, Graph traversals-Breadth First Search and Depth First Search ,AND/OR Graphs, game tree, connected components and biconnected components.

Programs:

1. Write a program, from a given vertex in a weighted connected graph, find shortest
    i. paths to other vertices using Dijkstra's algorithm.
2. Write a C program to implement the Stack using arrays. Write Push(),Pop(), and
    i. Display() methods to demonstrate its working.

Module – III

Backtracking: General method, applications-n-queen problem, sum of subsets problem, graph coloring, Hamiltonian cycles.
Greedy method: General method, applications-Job sequencing with deadlines, 0/1 knapsack problem, Minimum cost spanning trees: Single source shortest path problem.

Programs:

1. Design and implement in Java to find all Hamiltonian Cycles in a connected undirected Graph G of n vertices using backtracking principle.
2. Find Minimum Cost Spanning Tree of a given connected undirected graph using Prim's algorithm

Module – IV

Dynamic Programming: General method, applications- 0/1 knapsack problem, All pairs shortest path problem: Travelling sales person problem, Reliability design.

Programs:

1. Implement a C Program to implement the 0/1 Knapsack problem using (a) Dynamic Programming method (b) Greedy method.
2. Write C programs to (a) Implement All-Pairs Shortest Paths problem using Floyd's algorithm. (b) Implement Travelling Sales Person problem using Dynamic programming

Module – V

Branch and Bound:

General method, applications - Travelling sales person problem, 0/1 knapsack problem - LC Branch and Bound solution, FIFO Branch and Bound solution.
NP-Hard and NP-Complete problems: Basic concepts, non deterministic algorithms,NP - Hard and NP Complete classes, NP-hard problems.

Programs

1. Design an algorithm and implement a program to find a subset of a given set S = {Sl, S2,.,Sn} of n positive integers whose SUM is equal to a given positive integer d. For example, if S ={1, 2, 5, 6, 8} and d= 9, there are two solutions {1,2,6}and {1,8}. Display a suitable message, if the given problem instance doesn't have a solution.

Text Books:

1. Fundamentals of Computer Algorithms,2nd Edition, Ellis Horowitz, Satraj Sahni and S. Rajasekharam, Universities Press,2008.
2. Foundations of Algorithms,4th edition,R.Neapolitan and K.Naimipour,Jones and Barlett Learning.

Reference Books:

1. Introduction to Algorithms, third edition, T.H.Cormen,C.E.Leiserson, R.L.Rivest and C.Stein, PHI Pvt. Ltd./ Pearson Education.
2. Algorithm Design: Foundations, Analysis and Internet examples, M.T.Goodrich and R.Tomassia, John Wiley
3. Introduction to the Design and Analysis of Algorithms, A. Levitin,Pearson Educa- tion.
4. Design and Analysis of Algorithms,Aho, Ullman and Hopcroft,Pearson Educa- tion,2004

CO-PO/PSO Mapping:

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1				3	2								3	3	
CO2				1	2								3	3	
CO3				3	2								3	3	
CO4				3	2								3	3	

B. Tech II Year–IV Sem **L T P C**

Subject Code: 22PC4CS07 **3 0 2 4**

Computer Networks

Course Objectives:

1. To understand the concept of layering in networks.
2. To know the functions of protocols of each layer of TCP/IP protocol suite.
3. To visualize the end-to-end flow of information.
4. To understand the components required to build different types of networks.
5. To learn concepts related to network addressing and routing.

Course Outcomes:

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

1. Identify the devices and protocols to design a network and implement it.
2. Build network applications using the right set of protocols and estimate their performances.
3. Apply addressing principles such as subnetting and VLSM for efficient routing.
4. Explain media access and communication techniques.

Module – I

Building network – Network Edge and Core – Layered Architecture – OSI Model – Internet Architecture (TCP/IP) Networking Devices: Hubs, Bridges, Switches, Routers, and Gateways – Performance Metrics – Introduction to Sockets – Application Layer protocols – HTTP – FTP Email Protocols – DNS.

Programs:

1.Implement the data link layer framing methods such as character, character-stuffing and bit stuffing.

2. Do the following using NS2 Simulator
   - i. NS2 Simulator-Introduction
   - ii. Simulate to Find the Number of Packets Dropped
   - iii. Simulate to Find the Number of Packets Dropped by TCP/UDP
   - iv. Simulate to Find the Number of Packets Dropped due to Congestion
   - v. Simulate to Compare Data Rate& Throughput.
   - vi. Simulate to Plot Congestion for Different Source/Destination
   - vii. Simulate to Determine the Performance with respect to Transmission of Packets

Module - II

Transport Layer functions – Multiplexing and Demultiplexing – User Datagram Protocol – UDP Applications – Transmission Control Protocol – Flow Control – Retransmission Strategies – Congestion Control.

Programs:
1. Write a program to compute CRC code for the polynomials CRC-12, CRC-16 and CRC

CCIP

2. Develop a simple data link layer that performs the flow control using the sliding window protocol, and loss recovery using the Go-Back-N mechanism.
3. Write a program for congestion control using Leaky bucket algorithm.

Module – III

Network Layer: Switching concepts – Internet Protocol – IPV4 Packet Format – IP Addressing – Subnetting – Classless Inter Domain Routing (CIDR) – Variable Length Subnet Mask (VLSM) – DHCP – ARP – Network Address Translation (NAT) – ICMP – Concept of SDN.

Programs:
1.Take an example subnet of hosts and obtain a broadcast tree for the subnet.

2. Write a program for frame sorting technique used in buffers.

Module - IV
Routing Principles – Distance Vector Routing – Link State Routing – RIP – OSPF – BGP – IPV6 – Introduction to Quality of Service (QoS).

Programs:
1.Implement Dijsktra's algorithm to compute the shortest path through a network

2.Implement distance vector routing algorithm for obtaining routing tables at each node.

Module - V:
Data Link Layer – Framing – Flow control – Error control – Media Access Control – Ethernet Basics – CSMA/CD – Virtual LAN – Wireless LAN (802.11) – Physical layer – Signals – Bandwidth and Data Rate – Encoding – Multiplexing – Shift Keying – Transmission Media.

Programs:
1. Wireshark i. Packet Capture Using Wire shark ii. Starting Wire shark iii. Viewing

Captured Traffic

Analysis and Statistics & Filters.

2. Develop a simple data link layer that performs the flow control using the sliding window

protocol,

and loss recovery using the Go-Back-N mechanism.

Text Books:

1. James F. Kurose, Keith W. Ross, "Computer Networking: A Top-Down Approach", Seventh Edition, Pearson Education, 2017.

2. Larry L. Peterson, Bruce S. Davie, “Computer Networks: A Systems Approach”, Fifth Edition, Morgan Kaufmann Publishers Inc., 2011.

References Books:

1. William Stallings, “Data and Computer Communications”, Tenth Edition, Pearson Education, 2014.
2. Ying-Dar Lin, Ren-Hung Hwang, Fred Baker, “Computer Networks: An Open Source Approach”, McGraw Hill, 2012.

CO and PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	√	√	√		√							
CO2	√	√	√		√							
CO3	√	√	√	√	√				√			√
CO4	√	√	√	√	√							

B.Tech II Year–II Sem

Subject Code: 22PC4CD02

L	T	P	C
2	0	0	2

Introduction to Data Science

Course Objectives:

1. Learn concepts, techniques and tools they need to deal with various facets of data science practice, including data collection and integration
2. Understand the basic types of data and basic statistics
3. Identify the importance of data reduction and data visualization techniques

Course Outcomes:

After completion of the course, the student should be able to

1. Classify basic terms of Statistical Inference means.
2. Identify probability distributions commonly used as foundations for statistical modeling. Fit a
model to data
3. Describe the data using various statistical measures and perform data reduction and apply visualization techniques.
4. Utilize R elements for data handling

Module - I

Introduction: Definition of Data Science- Big Data and Data Science hype – and getting past the hype - Datafication - Current landscape of perspectives - Statistical Inference - Populations and samples - Statistical modeling, probability distributions, fitting a model – Over fitting. **Basics of R:** Introduction, R- Environment Setup, Programming with R, Basic Data Types.

Module - II

Data Types & Statistical Description

Types of Data: Attributes and Measurement, What is an Attribute? The Type of an Attribute, The Different Types of Attributes, Describing Attributes by the Number of Values, Asymmetric Attributes, Binary Attribute, Nominal Attributes, Ordinal Attributes, Numeric Attributes, Discrete versus Continuous Attributes.

Basic Statistical Descriptions of Data: Measuring the Central Tendency: Mean, Median, and Mode, Measuring the Dispersion of Data: Range, Quartiles, Variance, Standard Deviation, and Inter- quartile Range, Graphic Displays of Basic Statistical Descriptions of Data.

Module - III

Vectors: Creating and Naming Vectors, Vector Arithmetic, Vector sub setting,

Matrices: Creating and Naming Matrices, Matrix Sub setting, Arrays, Class.

Factors and Data Frames: Introduction to Factors: Factor Levels, Summarizing a Factor, Ordered Factors, Comparing Ordered Factors, Introduction to Data Frame, subsetting of Data Frames, Extending Data Frames, Sorting Data Frames.

Lists: Introduction, creating a List: Creating a Named List, Accessing List Elements, Manipulating List Elements, Merging Lists, Converting Lists to Vectors

Module - IV

Conditionals and Control Flow: Relational Operators, Relational Operators and Vectors, Logical Operators, Logical Operators and Vectors, Conditional Statements.

Iterative Programming in R: Introduction, While Loop, For Loop, Looping Over List. Functions in R: Introduction, writing a Function in R, Nested Functions, Function Scoping, Recursion, Loading an R Package, Mathematical Functions in R.

Module - V

Data Reduction: Overview of Data Reduction Strategies, Wavelet Transforms, Principal Components Analysis, Attribute Subset Selection,

Regression and Log-Linear Models: Parametric Data Reduction, Histograms, Clustering, Sampling, Data Cube Aggregation.

Data Visualization: Pixel-Oriented Visualization Techniques, Geometric Projection Visualization Techniques, Icon-Based Visualization Techniques, Hierarchical Visualization Techniques, Visualizing Complex Data and Relations.

TEXT BOOKS:

1. Doing Data Science, Straight Talk from The Frontline. Cathy O'Neil and Rachel Schutt, O'Reilly, 2014

2. Jiawei Han, Micheline Kamber and Jian Pei. Data Mining: Concepts and Techniques, 3rd

ed.
The Morgan Kaufmann Series in Data Management Systems.
3. K G Srinivas, G M Siddesh, “Statistical programming in R”, Oxford Publications.

REFERENCE BOOKS:

1. Introduction to Data Mining, Pang-Ning Tan, Vipin Kumar, Michael Steinbanch, Pearson Education.
2. Brain S. Everitt, “A Handbook of Statistical Analysis Using R”, Second Edition, 4 LLC, 2014.
3. Dalgaard, Peter, “Introductory statistics with R”, Springer Science & Business Media, 2008.
4. Paul Teetor, “R Cookbook”, O’Reilly, 2011.

CO-PO &PSO Mapping:

Course Name - Course Outcomes / Program Outcomes	1	2	3	4	5	6	7	8	9	10	11	12	PSO 1	PSO 2	PSO 3
CO1			M		H										
CO2				M	H										
CO3					H										
CO4				H											

B.Tech II Year II Sem	L	T	P	C
Subject Code: 22BS4EG03	1	0	2	2

English for Employability

(Common to ECE, EEE, ME, CSE, CSD, CSO, CSC, CSM branches)

Course Objectives:

1. To improve the communication skills, body language, facial expression and gesture.
2. To be able to understand the concept of employability skills (Quantum dexterity) and enhancing ones' behavior in the personal, professional and social forum.
3. To evaluate the LSRW (listening, speaking, reading and writing) through assessment.
4. To learn the basic grammar for improving spoken and written communication.
5. To become problem solver, analyze and apply critical and analytical skills.
6. To Identify the Employability skills, assigning tasks (Group Discussion, JAM, Role play etc.,) for day today evaluation.

Course Outcomes: After undergoing this course, the student will be able to;

1. **Understand** the explicit and implicit of importance of employability skills.
2. **Demonstrate** life skills like team work, learning skills, problem solving, attitude, adaptability and flexibility.
3. **Apply** critical and analytical skills to bring out the solution on problem/case study.
4. **Recognize** the need of appropriate words, Phrases & functional grammar and apply them in both spoken and written communication.

Module I: Wings of Fire

"Orientation" an extract from **Wings of fire-**An Autobiography of Abdul Kalam by Arun Tiwari.

Grammar

Vocabulary- Omission of Articles, Collective Nouns, Prepositions, Collocations.

Reading- Observation Passage, Survey Passage

Writing-Narrative & Descriptive writing.

Module II : **5 Points Someone**

The Gift an extract from **5 Points Someone** by Chetan Bhagat

Grammar -

Vocabulary- Advanced Collocations, Proverbs, Idioms, One word Substitute

Reading – Complex passage, Reading Comparison,

Writing- Usage of Idioms and Proverbs in Passage

Module III: Wise Leaders Wanted & Shift Your Perspective: Connect to Your Noble Purpose

"Wise Leaders Wanted & Shift Your Perspective: Connect to Your Noble Purpose" an extract from **From Smart to Wise: Acting and Leading with Wisdom** Kaipa, Prasad, and Navi Radjou.

Grammar

Vocabulary- Technical vocabulary, Auxiliaries and Modals,
Reading- Technical Comprehension,
Writing- Creative Resume.

Module IV: Variation Under Nature
"Variation Under Nature" an extract from **Origin of Species** by Charles Darwin
Grammar
Vocabulary- Coherence-Cohesive devices, Figures of speech
Writing- Story writing, Picture composition, Review of movie/match/book.
Reading- Inferring Reading, Reciting and Reviewing (SQ3R)

Module V: Let's Build a Company: A Start-up Story Minus the Bullshit
Let's Build a Company: A Start-up Story Minus the Bullshit by Harpreet Grover and Vibhore Goyal
Grammar
Vocabulary- Topic/Situation based Vocabulary, Tongue Twisters.
Reading- Critical Reading of known/unknown passages
Writing- Common Errors in Tenses, Description of hobbies, Future plans,
Reporting Speech: Direct & Indirect Speech, Email Writing, Formal letter writing (Enquiry, Apology, Leave, Request) Notice Writing, Information Transfer, Technical report writing

ACTIVITY IN LABS

Activity 1:
Narration (Historical places, events, Picture narration, Memorable incidents of life)
Self Intro, Daily Routine, Likes & Dislikes, Vocabulary, Triangular Activity (Person based-S-P), Imperatives & JAM
Targeted Skills- Listening- Speaking- Audio-Video clips

Activity 2: Quantum of Dexterity (QOD)
Ability (Personal, Behavioural & Professional) Request/Permission/Order, Survival kit, Career Objective Professional, Hidden Talents (Personal), Character Traits (Behavioural)
Targeted Skills- Reading-Writing – Concluding an open-ended Story, Creative Writing.

Activity 3: Critical & Analytical Skills

SWOC- (Social & Cultural, Political, Economic, Legal Impact, Technical, Nuances of Pronunciation, Voice Modulation, Neutralizing Mother Tongue Interference, Tongue Twisters for practice,
Targeted Skills- Writing SWOC, Self-Introduction, Exposure to a structured talk.

Activity 4: Flick Flow/Extempore

Mind Mapping, Wh- questions, Steps of Presentation, Use of Visual Aids, Individual/Group Presentation for practice.
Targeted Skills- Speaking Skills

Activity 5: On Job Training

Formal & Informal communication, Resume E-mail Etiquette, Telephonic & Interview

Etiquette, Situation based- Santa's Bag, topic/case study-based Group Discussion, Kicks me! (Job Consultancy/Role Play)
Targeted Skills- Listening-Writing- Speaking

Text Books

1. Azad, Abdul Kalam, Wings of Fire. Generic pub. 2009.
2. Kaipa, Prasad, and Navi Radjou. *From Smart to Wise: Acting and Leading with Wisdom*. Jossey-Bass, 2013.
3. Grover, Harpreet S., and Vibhore Goyal. *Let's Build a Company: A Start-up Story Minus the Bullshit*. Penguin Books, 2020.
4. Wren & Martin High School English Grammar & Composition. New Delhi: S. Chand. 1999.

References

1. Adair, John. Effective Communication. London: Pan Macmillan Ltd., 2003.
2. Writing Skills Practice Book for EFL - English Teaching Forum Writing Skills Practice Book for EFL. Beginning/Intermediate Level.
3. Patricia Wilcox Peterson. *Ajmani*, J. C. Good English: Getting it Right. New Delhi: Rupa Publications, 2012.
4. Amos, Julie-Ann. Handling Tough Job Interviews. Mumbai: Jaico Publishing, 2004.
5. Murphy, R. *Intermediate English Grammar* English Grammar & Composition by S.C. Gupta. New Delhi: Cambridge, 2006

CO-PO MAPPING:

CO-PO Mapping Chart **(3/2/1 indicates strength of correlation) 3 – High; 2 – Medium; 1 – Low**												
Course Outcome s (COs)	**Program Outcomes (POs)**											
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**
CO1									**2**			
CO2									**2**	**2**		
CO3		**3**								**3**		
CO4										**3**		**3**

B.Tech II Year II Sem	L	T	P	C
Subject Code: 22MC4HS06	2	0	0	0

Constitution of India (CoI)

(Common to ECE, EEE, ME, CSE, CSD, CSO, CSC, CSM branches)

The Constitution of India is the supreme law of India. Parliament of India cannot make any law which violates the Fundamental Rights enumerated under the Part III of the Constitution. The Parliament of India has been empowered to amend the Constitution under Article 368; however, it cannot use this power to change the "basic structure" of the constitution, which has been ruled and explained by the Supreme Court of India in its historical judgments. The Constitution of India reflects the idea of "Constitutionalism" – a modern and progressive concept historically developed by the thinkers of "liberalism" – an ideology which has been recognized as one of the most popular political ideology and result of historical struggles against arbitrary use of sovereign power by state. The historic revolutions in France, England, America and particularly European Renaissance and Reformation movement have resulted into progressive legal reforms in the form of "constitutionalism" in many countries. The Constitution of India was made by borrowing models and principles from many countries including United Kingdom and America.

The Constitution of India is not only a legal document but it also reflects social, political and economic perspectives of the Indian Society. It reflects India's legacy of "diversity". It has been said that Indian constitution reflects ideals of its freedom movement; however, few critics have argued that it does not truly incorporate our own ancient legal heritage and cultural values. No law can be "static" and therefore the Constitution of India has also been amended more than one hundred times. These amendments reflect political, social and economic developments since the year 1950. The Indian judiciary and particularly the Supreme Court of India has played an historic role as the guardian of people. It has been protecting not only basic ideals of the Constitution but also strengthened the same through progressive interpretations of the text of the Constitution. The judicial activism of the Supreme Court of India and its historic contributions has been recognized throughout the world and it gradually made it "as one of the strongest court in the world".

Course content

1. Meaning of the constitution law and constitutionalism
2. Historical perspective of the Constitution of India
3. Salient features and characteristics of the Constitution of India
4. Scheme of the fundamental rights
5. The scheme of the Fundamental Duties and its legal status
6. The Directive Principles of State Policy – Its importance and implementation

7. Federal structure and distribution of legislative and financial powers between the Union and the States
8. Parliamentary Form of Government in India – The constitution powers and status of the President of India
9. Amendment of the Constitutional Powers and Procedure
10. The historical perspectives of the constitutional amendments in India
11. Emergency Provisions: National Emergency, President Rule, Financial Emergency
12. Local Self Government – Constitutional Scheme in India
13. Scheme of the Fundamental Right to Equality
14. Scheme of the Fundamental Right to certain Freedom under Article 19
15. Scope of the Right to Life and Personal Liberty under Article 21