

Semester 3

- a. **Course Name:** Discrete Mathematics
- b. **Course Code:** 03019103BS01
- c. **Prerequisite:** Basic set theory and elementary programming logic
- d. **Course Learning Objective:**

CLOBJ 1	Understand the properties of functions, relations, and lattice structures including Hasse diagrams.
CLOBJ 2	Develop proficiency in propositional logic, propositional equivalences, and various proof techniques.
CLOBJ 3	Apply number theory concepts, modular arithmetic, and base conversion algorithms in cryptography.
CLOBJ 4	Analyze Boolean functions and logic circuits for computational design and minimization.
CLOBJ 5	Apply mathematical structures and logic to solve problems related to Computer Engineering.

- e. **Course Learning Outcomes:**

CLO 1	Apply set theory, relations and functions to model computational problems.
CLO 2	Use induction, recursion and counting techniques to analyze algorithms.
CLO 3	Construct valid logical arguments and mathematical proofs.
CLO 4	Identify and apply algebraic and Boolean structures in computing systems.
CLO 5	Analyze graphs and trees to solve problems related to connectivity and optimization.

- f. **Teaching & Examination Scheme:**

Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				MSE	CE	P	Theory	P	
3	0	0	3	20	20	-	60	-	100

L- Lectures; T- Tutorial; P- Practical; C- Credit; MSE- Mid-Semester Evaluation, CE- Continuous Evaluation, ESE- End Semester Examination

- g. **Course Content:**

Sr. No.	Content	Weightage	Teaching Hours
1	Sets, Relations and Functions Sets and Operations on Sets Finite and Infinite Sets Countable and Uncountable Sets Cantor's Diagonal Argument Power Set Theorem Cartesian Products Relations: Reflexive, Symmetric, Transitive	20%	9

	Equivalence Relations and Partial Order Relations Functions: One–One, Onto and Bijective Schroeder–Bernstein Theorem (statement and intuition)		
2	Mathematical Induction, Recursion and Counting Techniques Principle of Mathematical Induction Well Ordering Principle Recursive Definitions Recurrence Relations (linear recurrences, basic solutions) Division Algorithm Prime Numbers Euclidean Algorithm for GCD Fundamental Theorem of Arithmetic Counting Techniques: Inclusion–Exclusion Principle Pigeonhole Principle Permutations and Combinations	20%	9
3	Propositional Logic and Proof Techniques Propositional Logic: Syntax and Semantics Truth Tables and Logical Connectives Validity and Satisfiability Logical Equivalence and Laws of Logic Rules of Inference Predicate Logic and Quantifiers Proof Techniques: Direct Proof Proof by Contradiction Proof by Contraposition Proof of Necessity and Sufficiency Logic in Program Reasoning: Preconditions and Postconditions Introduction to Loop Invariants	20%	9
4	Algebraic Structures and Boolean Algebra Algebraic Structures with One Binary Operation: Semigroups Monoids Groups (basic properties) Subgroups and Normal Subgroups Cyclic and Permutation Groups (introductory) Congruence Relations Lattices: Definition, Properties, Hasse Diagrams Boolean Algebra and Boolean Rings Identities and Principle of Duality Boolean Functions Disjunctive Normal Form (DNF) Conjunctive Normal Form (CNF)	18%	8
5	Graph Theory and Trees Graphs: Definitions and Properties Degree, Paths, Cycles, Connectivity Subgraphs and Graph Isomorphism Eulerian and Hamiltonian Graphs Graph Coloring:	22%	10

Vertex Coloring Edge Coloring Map Coloring Planar Graphs and Perfect Graphs Trees and Rooted Trees Weighted Trees Prefix Codes (Huffman Coding) Graph Algorithms: Breadth First Search (BFS) Depth First Search (DFS) Shortest Path Concepts		
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h. Text Book and Reference Book:

1. Discrete Mathematics and its Applications (TextBook)
By Kenneth H. Rosen | Tata McGraw – Hill
2. Discrete Mathematical Structure and It's Application to Computer Science (TextBook)
By J.P. Tremblay and R. Manohar | TataMcgraw-Hill | TMG
3. Graph Theory with Applications to Engineering and Computer Science (TextBook)
By Narsingh Deo | PHI
4. Elements of Discrete Mathematics A Computer Oriented Approach
By C. L. Liu and D P Mohapatra | Tata McGraw – Hill | 3
5. Discrete Mathematics with Applications
By Susanna S. Epp | Wadsworth Publishing Co. Inc. | 4

- a. **Course Name:** Data Structure and Algorithms
- b. **Course Code:** 03010503PC01
- c. **Prerequisite:** Computer Programming and Basic Syntaxes
- d. **Rationale:** Data structure is a subject of primary importance in Information and Communication Technology. Organizing or structuring data is important for implementation of efficient algorithms and program development. Efficient problem solving needs the application of appropriate data structure during program development.
- e. **Course Learning Outcomes:**

CLO 1	Apply basic data structure operations on arrays, structures, and unions to solve computational problems.
CLO 2	Implement stack operations using static and dynamic arrays and apply stacks to solve expression evaluation and notation conversion problems.
CLO 3	Analyze memory management issues including garbage collection in linked list implementations.
CLO 4	Implement and compare sorting algorithms including selection sort, insertion sort, bubble sort, quick sort, and merge sort.
CLO 5	Construct and perform operations on AVL trees to maintain height-balanced binary search trees.

f. Teaching & Examination Scheme:

Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				MSE	CE	P	Theory	P	
3	0	0	3	20	20	-	60	-	100

L- Lectures; T- Tutorial; P- Practical; C- Credit; MSE- Mid-Semester Evaluation, CE- Continuous Evaluation, ESE- End Semester Examination

g. Text Book and Reference Book:

1. Fundamentals of Data Structures in C, 2ND eDITION, E.Horowitz, S.,Sahni and Susan Anderson- Freed, Universities Press (TextBook)
2. Seymour Lipschutz, Data Structures Schaum's Outlines, Revised 1st Ed, McGraw Hill, 2014.

h. Course Content:

Sr. No.	Content	Weightage	Teaching Hours
1	Introduction: Data Structures, Classifications (Primitive & Non-Primitive), Data structure Operations, Review of Arrays, Structures, Self-Referential Structures, and Unions. Pointers and Dynamic Memory Allocation Functions.	10%	6

	Representation of Linear Arrays in Memory, dynamically allocated arrays. Performance analysis of an algorithm and space and time complexities		
2	Stacks, Recursion and Queue: Stacks: Definition, Stack Operations, Array Representation of Stacks, Stacks using Dynamic Arrays, Stack Applications: Polish notation, Infix to postfix conversion, evaluation of postfix expression. Recursion -Factorial, GCD, Fibonacci Sequence, Tower of Hanoi, Queues: Definition, Array Representation, Queue Operations, Circular Queues, Circular queues using Dynamic arrays, Deque, Priority Queues and its Application	15%	8
3	Linked Lists: Definition, Representation of linked lists in Memory, Memory allocation; Garbage Collection. Linked list operations: Traversing, Searching, Insertion, and Deletion In Singly Linked List, Doubly Linked lists, Circular linked lists. Implementation of Stacks and Queues using Linked List.	10%	5
4	Searching and Sorting: Searching: Linear Search, Binary Search, and Interpolation Search. Sorts: Selection Sort, Insertion Sort, Bubble Sort, Quick Sort, Merge Sort.	10%	5
5	Trees: Terminology, Binary Trees, Properties of Binary trees, Array and linked Representation of Binary Trees, Binary Tree Traversals - In Order, Post Order, Pre Order; Binary Search Trees – Definition, Insertion, Deletion, Traversal, Searching, Height of tree, Evaluation of Expression, Balanced Binary Tree and its operations.	15%	9
6	Red Black Trees and AVL Trees: AVL tree Construction, Operations on AVL Trees, Introduction to Red Black Tree, and Operations on Red Black Trees.	10%	4
7	Hashing: Hash Table organizations, Hashing Functions, Static and Dynamic Hashing	15%	3
8	Graphs: Definitions, Terminologies, Matrix and Adjacency List Representation of Graphs, Elementary Graph operations, Traversal methods: Breadth First Search and Depth First Search.	15%	5

- a. **Course Name:** Data Structure and Algorithms Laboratory
- b. **Course Code:** 03010503PC02
- c. **Prerequisite:** Basic knowledge of Data Structures.
- d. **Rationale:** This course provides a broad introduction to Data Structures The various Data structures and its analysis of working design and development.
- e. **Course Learning Outcomes:**

CLO 1	Use different types of data structures, operations and algorithms
CLO 2	Apply searching and sorting operations on files
CLO 3	Use stack, Queue, Lists, Trees and Graphs in problem solving
CLO 4	Implement all data structures in a high-level language for problem solving.

f. Teaching & Examination Scheme:

Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				MSE	CE	P	Theory	P	
-	-	4	2	-	-	20	-	30	50

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g. List of Experiment:

Sr. No.	Experiment List
1.	Implement Stack and its operations like (creation push pop traverse peek search) using linear data structure
2.	Implement Infix to Postfix Expression Conversion using Stack
3.	Implement Postfix evaluation using Stack.
4.	Implement Towers of Hanoi using Stack.
5.	Implement queue and its operations like enqueue, dequeue, traverse, search.
6.	Implement Single Linked lists and its operations(creation insertion deletion traversal search reverse)
7.	Implement Double Linked lists and its operations(creation insertion deletion traversal search reverse)
8.	Implement Circular Linked lists and its operations(creation insertion deletion traversal search reverse)
9.	Implement Linear Search, binary search and interpolation search.
10.	Implement Bubble sort, selection sort, Insertion sort, quick sort , merge sort.
11.	Implement Binary search Tree and its operations (creation, insertion, deletion).
12.	Implement Traversals Preorder, Inorder, Postorder on BST.
13.	Implement Graphs and represent using adjacency list and adjacency matrix and implement basic operations with traversals (BFS and DFS).
14.	Implement Stack and its operations like (creation push pop traverse peek search) using linear data structure

- a. **Course Name:** Functional Communication Skills
- b. **Course Code:** 03010003HM01
- c. **Prerequisite:** Knowledge of Advanced Communication and Interpersonal Skills
- d. **Rationale:** This course develops workplace-oriented communication skills by bridging academic language competence with professional communication requirements.
- e. **Course Learning Objectives:**

CLOBJ 1	Develop grammatical accuracy and logical reasoning skills through sentence correction, para jumble, and statement–assumption analysis.
CLOBJ 2	Strengthen advanced reading and analytical skills to interpret complex texts, infer meaning, and evaluate authorial intent.
CLOBJ 3	Apply professional writing skills in creating resumes, cover letters, emails, and reports suitable for workplace communication.
CLOBJ 4	Enhance digital and verbal communication skills through LinkedIn profile building, JAM activities, and telephone/video call etiquette.
CLOBJ 5	Improve clarity, coherence, and professionalism in oral and written communication through structured practice and workplace-oriented tasks.

f. Course Learning Outcomes:

CLO 1	Identify grammatical, usage, and style errors; logically reorder sentences; and differentiate facts from assumptions in workplace problem scenarios.
CLO 2	Understand the usage of grammatical rules, cohesion markers, professional writing formats, and communication etiquette to produce accurate workplace communication.
CLO 3	Apply principles of professional communication to ensure clarity, coherence, time management, and etiquette in both written and spoken workplace contexts.
CLO 4	Analyse effective verbal, digital, and virtual communication skills through JAM participation, LinkedIn profile optimization, and telephone/video call interactions.
CLO 5	Create ATS-friendly resumes, customized cover letters, professional emails, structured reports, optimized LinkedIn profiles.

g. Teaching & Examination Scheme:

Teaching Scheme Hrs/Week			Credit	Examination Scheme					Total
Lec.	Tut.	Lab		Internal			External		
				T	CE	P	T	P	
1	0	2	2	40	-	20	60	30	150

Lec.- Lecture; **Tut.-** Tutorial; **T-** Theory; **P-** Practical; **CE-** Continuous Evaluation.

h. Course Content:

Lecture

Sr.	Content	Weightage	Teaching Hrs.	CO	BT
1	Sentence Correction <ul style="list-style-type: none"> Error identification (grammar, usage, style) Common workplace errors Contextual grammar usage 	10%	2	1	1,2
2	Para Jumbles & Sentence Reordering <ul style="list-style-type: none"> Logical sequencing Cohesion markers Theme identification 	8%	1	1	1,2
3	Statement and Assumptions <ul style="list-style-type: none"> Fact vs assumption Logical reasoning basics Workplace problem scenarios 	10%	1	1	1,2
4	Reading Comprehension (Level of Difficulty <ul style="list-style-type: none"> Advanced) Inferential questions Author's tone & intent Vocabulary in context 	12%	2	2	3
5	Resume and Cover Letter Writing <ul style="list-style-type: none"> Resume formats Achievement-based bullet points Customizing cover letters 	14%	2	3,5	6
6	Building a Professional LinkedIn Profile <ul style="list-style-type: none"> Professional headline Summary writing Digital networking ethics 	8%	1	4	4,6
7	Just a Minute (JAM) <ul style="list-style-type: none"> Idea organization Fluency techniques Time management in speech 	8%	1	4,5	3,4
8	Telephone and Video Call Etiquette <ul style="list-style-type: none"> Opening & closing calls Voice modulation Virtual meeting etiquette 	8%	1	4,5	2,3,4
9	Email Writing <ul style="list-style-type: none"> Format Professional tone Subject lines Email etiquette 	10%	2	3,5	2,3
10	Report Writing Report Writing <ul style="list-style-type: none"> Types of reports Structure & formatting Use of visuals & data 	12%	2	3,5	2,3
		100%	15		

Lab (Practical)

Sr.	Content	Weightage	Teaching Hrs.	CO	BT
1	Sentence Correction <ul style="list-style-type: none"> • Grammar & usage error identification • Context-based sentence correction worksheets • Common workplace error correction • Peer editing activities 	10%	4	1	1,2
2	Para Jumbles and Reordering of Sentence <ul style="list-style-type: none"> • Identifying topic sentences • Logical sequencing exercises • Use of cohesion markers • Timed para-jumble practice 	8%	2	1	1,2
3	Reading Comprehension (Level of Difficulty - Advanced) <ul style="list-style-type: none"> • Inferential and analytical questions • Identifying author's tone & intent • Vocabulary-in-context activities • Group discussion on passages 	10%	2	1	1,2
4	Resume and Cover Letter Writing <ul style="list-style-type: none"> • Resume formats (chronological, functional) • Achievement-based bullet writing • ATS-friendly resume drafting • Customized cover letter writing 	12%	4	2	3
5	Statement and Assumptions <ul style="list-style-type: none"> • Identification of implicit assumptions through guided exercises • Application of assumption-testing techniques (possibility test) • Analysis of case-based and real-life reasoning scenarios • Timed practice drills with discussion of common errors 	14%	4	3,5	6
6	Building a Professional LinkedIn Profile <ul style="list-style-type: none"> • Writing professional headlines • Summary and About section drafting • Profile optimization task • Digital networking ethics 	8%	2	4	4,6
7	Just a Minute (JAM) <ul style="list-style-type: none"> • Topic-based JAM speaking practice • Fluency and coherence drills • Time-management techniques • Individual feedback sessions 	8%	2	4,5	3,4
8	Telephone and Video Call Etiquette <ul style="list-style-type: none"> • Professional call role-plays • Voice modulation exercises • Mock video meeting practice • Virtual etiquette evaluation 	8%	2	4,5	2,3,4

9	Report Writing <ul style="list-style-type: none"> • Types of reports (incident, progress, proposal) • Structure and formatting practice • Use of visuals and data • Writing and reviewing short reports 	10%	4	3,5	2,3
10	Email Writing <ul style="list-style-type: none"> • Professional email drafting • Subject-line writing activities • Tone and etiquette correction • Peer review and rewriting 	12%	4	3,5	2,3
		100%	30		

i. Reference Books:

- Bovee, Courtland L., and John V. Thill. *Business Communication Today*. Pearson Education, 2019.
- Guffey, Mary Ellen, and Dana Loewy. *Essentials of Business Communication*. Cengage Learning, 2018.
- Hewings, Martin. *Advanced Grammar in Use*. Cambridge University Press, 2013.
- McCarthy, Michael, and Felicity O'Dell. *English Vocabulary in Use: Advanced*. Cambridge University Press, 2017.
- Mitra, Barun K. *Personality Development and Soft Skills*. Oxford University Press, 2011.
- Raman, Meenakshi, and Sangeeta Sharma. *Technical Communication: Principles and Practice*. Oxford University Press, 2018.

Semester 4

a. Course Name: PYTHON PROGRAMMING

b. Course Code: 03014602PC01

c. Prerequisite: Basic understanding of programming logic and computer fundamentals.

d. Rationale: The course aims to introduce the fundamentals of Python programming while enabling students to understand its syntax, control structures, and data structures. It further explores object-oriented and modular programming concepts, along with file handling, exceptions, and built-in functions. The course also focuses on developing problem-solving skills through algorithmic thinking using Python.

e. Course Learning Outcomes:

CLO 1	Explain the structure, syntax, and semantics of Python programming language.
CLO 2	Apply control structures and functions to solve real-world problems.
CLO 3	Analyze and use built-in data types and data structures effectively.
CLO 4	Describe the principles of object-oriented programming in Python.
CLO 5	Demonstrate proficiency in handling files, exceptions, and modules.

f. Teaching & Examination Scheme:

Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				MSE	CE	P	Theory	P	
3	0	2	4	20	20	20	60	30	150

L- Lectures; T- Tutorial; P- Practical; C- Credit; MSE- Mid-Semester Evaluation, CE- Continuous Evaluation, ESE- End Semester Examination

g. Course Content:

Sr. No.	Content	Weightage	Teaching Hours
1	Introduction to Python History and features of Python; Installation and execution environment; Python syntax and semantics; Variables, identifiers, keywords; Data types and type conversions; Input/output functions; Operators and expressions	15	7
2	Control Structures and Functions Conditional statements: if, if-else, if-elif-else; Looping structures: while, for, break, continue, pass; Functions: definition, calling, return statement; Function arguments, recursion; Lambda functions, map(), filter(), reduce()	21	10
3	Strings, Lists, Tuples, and Dictionaries String operations and methods; Lists: indexing, slicing, methods; Tuples: creation, operations, immutability; Sets and frozensets; Dictionaries: key-value access, methods; Comprehensions: list, set, and dictionary	18	9

Sr. No.	Content	Weightage	Teaching Hours
4	Object-Oriented Programming in Python Introduction to OOP; Classes and objects; <code>__init__()</code> method and self parameter; Encapsulation, inheritance, and polymorphism; Special methods and operator overloading; Class vs instance variables and methods	23	11
5	File Handling, Modules, and Exception Handling File operations: open, read, write, append, with; Working with text and binary files; Exception handling: try, except, finally, raise; Built-in exceptions; Importing and creating modules; Python standard libraries (os, sys, math, datetime)	23	11

h. Text Book and Reference Book:

1.	Python Programming (TextBook) By by Reema Thareja Oxford University Press
2.	Core Python Programming - Second Edition (TextBook) By Wesley J. Chun Prentice Hall
3.	PyFlo - A Free, Interactive Guide to Python Programming BY Benjamin Dicken
4.	Python Programming: An Introduction to Computer Science By John Zelle Course Technology Cengage Learning Publications 2nd, Pub. Year 2013
5.	Python Programming for Absolute Beginners By Michel Dawson Course Technology Cengage Learning Publications 3rd, Pub. Year 2013

i. List of experiment

1.	Install Python and set up different IDEs. Basics of Python Programming <ol style="list-style-type: none"> Write a program to print "Hello, World!". Write a program to demonstrate the use of variables and data types. Write a program to perform basic arithmetic operations. Write a program to illustrate type casting between int, float, string.
2.	Input/Output and Operators <ol style="list-style-type: none"> Write a program to take input from the user and display it. Write a program to create a calculator for +, -, *, /, % operations. Write a program to demonstrate comparison and logical operators. Write a program to illustrate use of assignment and compound assignment operators.
3.	Conditional Statements <ol style="list-style-type: none"> Write a program to check whether a number is even or odd. Write a program to find the largest of three numbers. Write a program to check whether a year is a leap year. Write a program to display grades using if-elif-else.
4.	Loops (for, while) <ol style="list-style-type: none"> Write a program to print numbers from 1 to 10 using a loop. Write a program to display multiplication table of a number. Write a program to sum of digits of a number using while loop. Write a program to display factorial of a number using for loop.

5.	Functions and Recursion <ol style="list-style-type: none"> 1. Write a function to add two numbers. 2. Write a program to find factorial using Recursive function. 3. Write a program to create a function to check prime number. 4. Write a program to calculate the square a number using lambda function.
6.	Strings and String Operations <ol style="list-style-type: none"> 1. Write a program to count the number of vowels in a string. 2. Write a program to reverse a string using slicing and loop. 3. Write a program to check whether a string is palindrome. 4. Write a program to convert string to uppercase/lowercase.
7.	Lists and Tuples <ol style="list-style-type: none"> 1. Write a program to create a list and perform append, insert, delete. 2. Write a program to find max, min, and sort elements in a list. 3. Write a program to slice and iterate through a tuple. 4. Write a program to convert list to tuple and vice versa.
8.	Dictionaries and Sets <ol style="list-style-type: none"> 1. Write a program to create a dictionary to store student details. 2. Write a program to add, update, delete dictionary keys. 3. Write a program to create a set and perform union, intersection. 4. Write a program to check for duplicate elements using set.
9.	File Handling <ol style="list-style-type: none"> 1. Write a program to create a text file and write content into it. 2. Write a program to read content from a text file. 3. Write a program to count the number of lines, words, and characters in a file. 4. Write a program to copy the contents from one file to another.
10.	Exception Handling and Modules <ol style="list-style-type: none"> 1. Write a program to handle the divide-by-zero exception. 2. Write a program to illustrate try-except-else-finally blocks. 3. Write a program to import and use the built-in math module. 4. Write a program to create a user-defined module and use it.

a. **Course Name:** Probability, Statistics and Numerical Methods

b. **Course Code:** 303191251

c. **Prerequisite:** Basic concepts of Statistics and Probability

d. **Rationale:** The course provides systematic knowledge of probability, numerical and statistical methods

e. **Course Learning Objective**

CLOBJ 1	Understand the fundamental concepts of probability theory, random variables, probability distributions, and statistical measures.
CLOBJ 2	Apply statistical methods and hypothesis testing techniques for analyzing engineering and scientific data.
CLOBJ 3	Develop numerical solutions for interpolation, differentiation, and integration problems using standard numerical methods.
CLOBJ 4	Analyze and solve systems of linear equations using iterative numerical techniques.
CLOBJ 5	Apply numerical methods for solving ordinary differential equations arising in engineering and mathematical applications.
CLOBJ 6	Interpret computational and statistical results for problem solving and decision making in real-world applications.

f. **Course Learning Outcomes:**

CLO 1	Analyse correlation and regression between two variables and fit a curve to the given set of values.
CLO 2	Calculate probabilities and analyse random variables to determine expectation and variance
CLO 3	Evaluate hypotheses by conducting significance tests for proportions, means, standard deviations, and variances using large sample tests, chi-square tests, and other appropriate statistical methods.
CLO 4	Apply numerical methods such as Gauss-Jacobi, Gauss Seidel, bisection method, Newton-Raphson method, and Regula-Falsi method to solve systems of linear equations and algebraic/transcendental equations
CLO 5	Interpolate data using finite differences and various interpolation techniques including Newton's forward/backward difference formulae, and Lagrange's formulae for unequal intervals
CLO 6	Utilize numerical integration techniques such as the trapezoidal rule, Simpson's rules, and Gaussian quadrature formulae, as well as numerical methods including Taylor's series, Euler's method, Modified

g. **Teaching & Examination Scheme:**

Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				MSE	CE	P	Theory	P	
4	0	0	4	20	20	-	60	-	100

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h. Text Book and Reference Book:

1.	Introductory Methods of Numerical Analysis By Sastry S. S Prentice Hall of India
2.	Introduction to Numerical Analysis By C.E. Froberg Addison Wesley Publishing Company
3.	Numerical Methods in Engineering & Science with Programs in C and C++ (TextBook) By Dr. B. S. Grewal Khanna Publishers
4.	Introduction to Probability (TextBook) By P. G. Hoel, S. C. Port and C. J. Stone, UBS Publishers,
5.	Fundamentals of Mathematical Statistics (TextBook) By S.C. Gupta and V. K. Kapoor Sultan Chand & Sons

i. Course Content:

Sr. No.	Content	Weightage	Teaching Hours
1	UNIT 1 Correlation, Regression and Curve fitting: Correlation and Regression – Rank correlation Curve Fitting by The Method of Least Squares- Fitting of Straight Lines, Second Degree Parabolas and More General Curves.	18	11
2	UNIT 2 Probability and Probability Distributions: Probability Spaces, Conditional Probability, Bayes' Rule, Discrete and continuous random variables, Independent Random Variables, Expectation and Variance of Discrete and Continuous Random Variables, Distribution and Their Properties: Binomial Distribution, Poisson Distribution, Normal Distribution.	23	13
3	UNIT 3 Testing of Hypothesis: Test of significance: Large sample test for single proportion, difference of proportions, single mean, difference of means, and difference of standard deviations. Test for single mean, difference of means, Test for ratio of variances, Chi-square test for goodness of fit and independence of attributes.	26	15
4	UNIT 4 Solution of a System of Linear Equations, Roots of Algebraic and Transcendental Equations: Gauss-Jacobi and Gauss Seidel Methods, Solution of Polynomial and Transcendental Equations – Bisection Method, Newton- Raphson Method and Regula-Falsi Method.	11	7
5	UNIT 5 Finite Differences and Interpolation: Finite Differences, Relation between Operators, Interpolation using Newton's Forward and Backward Difference Formulae. Newton's Divided and Lagrange's Formulae for Unequal Intervals.	11	7
6	UNIT 6 Numerical Integration: Trapezoidal rule, Simpson's 1/3rd and 3/8th Rules, Gaussian Quadrature Formulae. Numerical solution of Ordinary Differential Equations: Taylor's Series, Euler and Modified Euler's Methods. Runge-Kutta Method of Fourth Order for Solving First and Second Order Equations.	11	7

- a. **Course Name:** Professional Soft Skills - 1
- b. **Course Code:** 03010004HM01
- c. **Prerequisite:** Knowledge of Functional Communication Skills
- d. **Rationale:** This course develops interpersonal effectiveness, leadership orientation, and critical thinking abilities required for collaborative and professional environments
- e. **Course Learning Objective:**

CLOBJ 1	Develop professional grooming, etiquette, and interpersonal communication skills required for effective workplace interaction.
CLOBJ 2	Enhance teamwork, collaboration, and leadership abilities by understanding group dynamics, motivation, and ethical practices.
CLOBJ 3	Apply decision-making and critical-thinking skills to analyse situations, evaluate alternatives, and solve problems logically.
CLOBJ 4	Strengthen verbal communication skills through structured activities such as cross talk, debates, and group discussions.
CLOBJ 5	Prepare for employment interactions by developing interview skills, self-assessment abilities, and professional confidence.

f. Course Learning Outcomes:

CLO 1	Recall concepts related to professional grooming, workplace etiquette, leadership qualities, interview types, and group discussion norms.
CLO 2	Understand teamwork principles, leadership styles, motivation techniques, and conflict resolution strategies in group-based activities.
CLO 3	Apply effective speaking, listening, and reasoning skills during cross talk, debates, and basic group discussion activities.
CLO 4	Analyse interview performance by examining the effectiveness of responses, body language, and professional conduct.
CLO 5	Evaluate real-life situations using decision-making frameworks and critical thinking techniques to arrive at reasoned solutions.

g. Teaching & Examination Scheme:

Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				MSE	CE	P	Theory	P	
0	0	2	1	-	-	20	-	30	50

L- Lectures; **T-** Tutorial; **P-** Practical; **C-** Credit; **MSE-** Mid-Semester Evaluation, **CE-** Continuous Evaluation, **ESE-** End Semester Examination

h. Course Content:

Sr. No.	Content	Weightage	Teaching Hours
1	Professional Grooming and Etiquette <ul style="list-style-type: none"> • Personal hygiene and appearance • Dress code (formal & informal) • Workplace manners and etiquette Body language and first impressions	8	2
2	Teamwork and Collaboration Skills • Importance of teamwork <ul style="list-style-type: none"> • Team roles and responsibilities • Communication in teams Conflict resolution	10	2
3	Leadership Skills <ul style="list-style-type: none"> • Meaning and qualities of leadership • Leadership styles • Motivation and influence Ethical leadership	14	4
4	Decision Making <ul style="list-style-type: none"> • Decision-making process • Types of decisions • Evaluating alternatives Real-life decision scenarios	12	4
5	Critical Thinking <ul style="list-style-type: none"> • Meaning of critical thinking • Analytical thinking skills • Identifying assumptions and bias Problem-solving techniques	12	4
6	Cross Talk <ul style="list-style-type: none"> • Concept of cross talk • Active listening skills • Spontaneous responses Turn-taking and clarity	6	2
7	SOAR Analysis <ul style="list-style-type: none"> • Concept of SOAR • Strengths, Opportunities, Aspirations and Results Practical application of SOAR	8	2
8	Debate <ul style="list-style-type: none"> • Format and rules of debate • Argument and counterargument • Logical reasoning • Persuasive speaking 	8	2
9	Foundations of Group Discussion <ul style="list-style-type: none"> • Purpose and types of GD • Do's and don'ts of GD Initiation and participation	10	4
10	Foundations of Interview <ul style="list-style-type: none"> • Types of interviews • Interview preparation • Common interview questions Interview etiquette and body language	12	4

i. Text Book and Reference Book:

1.	Emotional Intelligence By Goleman, Daniel Bloomsbury Publishing, Pub. Year 2015
2.	Personality Development and Soft Skills By Barun K Mitra Oxford, 2011
3.	Business Communication. By Rai, Urmila, and S. M. Rai Himalaya Publishing House,, Pub. Year 2016
4.	Organizational Behaviour. By Robbins, Stephen P. Pearson Education,, Pub. Year 2018
5.	Business Communication Today. By Bovee, Courtland L., and John V. Thill. Pearson Education,, Pub. Year 2019