K.K. Wagh Institute of Engineering Education and Research, Nashik

Curriculum

S.Y. B.Tech.

Information Technology

w.e.f.: AY 2024-2025

(2023 Pattern)

S.Y. B. Tech w.e.f AY 2024-25

SEM-III

Course Code	Course Type	Title of Course	Teaching Scheme			Evaluation Scheme and Marks						Credits			
			TH	TU	PR	INSEM	ENDSEM	CCE	TUT /TW	PR /OR	TOTAL	TH	TU	PR	TOTAL
2308201	PCC	Discrete Mathematics	3	-	-	20	60	20			**100**	3	-	-	**3**
2308202	PCC	Data Structures & Algorithm	3	-	-	20	60	20			**100**	3	-	-	**3**
2308203	PCC	Programming Paradigms & Methodology	3	-	-	20	60	20			**100**	3	-	-	**3**
2308204	PCC	Java Programming Lab	-	-	2	-	-	-	25	25	**50**	-	-	1	**1**
2308205	PCC	Data Structures & Algorithm Lab	-	-	4				50	50	**100**	-	-	2	**2**
2308206	MDM	Digital Electronics & Logic Design	3	-	-	20	60	20	-	-	**100**	3	-	-	**3**
2308207	MDM	Digital Electronics & Logic Design Lab	-	-	2	-	-	-	25	25	**50**	-	-	1	**1**
2308208	OE	Digital & Social Marketing	2	-	-	-	-	50	-	-	**50**	2	-	-	**2**
2308209	VEC	Democracy, Election & Governance	-	2	-	-	-	-	TUT-50	-	**50**	-	2	-	**2**
2308210	VSEC	Mobile Application Development	-	1	2	-	-	-	TUT-25 TW-25	-	**50**	-	1	1	**2**
Total			**14**	**03**	**10**	**80**	**240**	**180**	**150**	**100**	**750**	**14**	**3**	**5**	**22**

S.Y. B. Tech w.e.f AY 2024-25

SEM-IV

Course Code	Course Type	Title of Course	Teaching Scheme			Evaluation Scheme and Marks						Credits			
			TH	TU	PR	INSEM	ENDSEM	CCE	TUT /TW	PR /OR	TOTAL	TH	TU	PR	TOTAL
2300211A	BSC	Probability & Statistics	3	-	-	20	60	20			**100**	3	-	-	**3**
2308212	PCC	Database Management System	3	-	-	20	60	20			**100**	3	-	-	**3**
2308213	PCC	Computer Graphics	3	-	-	20	60	20			**100**	3	-	-	**3**
2308214	PCC	Computer Graphics Lab	-	-	2	-	-	-	25	25	**50**	-	-	1	**1**
2308215	PCC	Database Management System Lab	-	-	4				50	50	**100**	-	-	2	**2**
2308216	MDM	Computer Organization & Architecture	3	-	-	20	60	20	-	-	**100**	3	-	-	**3**
2308217	MDM	Assembly Language Programming Lab	-	-	2	-	-	-	25	25	**50**	-	-	1	**1**
2308218	OE	Cyber Laws and Forensics	2	-	-	-	-	50	-	-	**50**	2	-	-	**2**
2308219	VEC	Environment Studies	-	2	-	-	-	-	TUT-50	-	**50**	-	2	-	**2**
2308220	AEC	Soft Skills & Technical Writing	-	1	2	-	-	-	TUT-25 TW-25	-	**50**	-	1	1	**2**
Total			**14**	**03**	**10**	**80**	**240**	**180**	**150**	**100**	**750**	**14**	**3**	**5**	**22**

SEM-I

S.Y. B. Tech w.e.f AY 2024-25

SEM-III

Course Code	Course Type	Title of Course	Teaching Scheme			Evaluation Scheme and Marks						Credits			
			TH	TU	PR	INSEM	ENDSEM	CCE	TUT /TW	PR /OR	TOTAL	TH	TU	PR	TOTAL
2308201	PCC	Discrete Mathematics	3	-	-	20	60	20			**100**	3	-	-	**3**
2308202	PCC	Data Structures & Algorithm	3	-	-	20	60	20			**100**	3	-	-	**3**
2308203	PCC	Programming Paradigms & Methodology	3	-	-	20	60	20			**100**	3	-	-	**3**
2308204	PCC	Java Programming Lab	-	-	2	-	-	-	25	25	**50**	-	-	1	**1**
2308205	PCC	Data Structures & Algorithm Lab	-	-	4				50	50	**100**	-	-	2	**2**
2308206	MDM	Digital Electronics & Logic Design	3	-	-	20	60	20	-	-	**100**	3	-	-	**3**
2308207	MDM	Digital Electronics & Logic Design Lab	-	-	2	-	-	-	25	25	**50**	-	-	1	**1**
2308208	OE	Digital & Social Marketing	2	-	-	-	-	50	-	-	**50**	2	-	-	**2**
2308209	VEC	Democracy, Election & Governance	-	2	-	-	-	-	TUT-50	-	**50**	-	2	-	**2**
2308210	VSEC	Mobile Application Development	-	1	2	-	-	-	TUT-25 TW-25	-	**50**	-	1	1	**2**
Total			**14**	**03**	**10**	**80**	**240**	**180**	**150**	**100**	**750**	**14**	**3**	**5**	**22**

K. K. Wagh Institute of Engineering Education and Research, Nashik
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S. Y. B. Tech.
Pattern 2023 Semester: III Information Technology
2308201: Discrete Mathematics

Teaching Scheme:	Credit Scheme:	Examination Scheme:
Theory :03 hrs/week	03	Continuous Comprehensive Evaluation: 20Marks InSem Exam: 20Marks EndSem Exam: 60Marks

Prerequisite Courses, if any: -Basic Mathematics

Course Outcomes: On completion of the course, students will be able to–

	Course Outcomes	Bloom's Level
CO1	Select suitable graph technique to solve real life problems related to graph theory.	2-Understand
CO2	Apply mathematical propositions and formal proof techniques to check the truthfulness of real life situation	3-Apply
CO3	Solve problems using Minimum Spanning Tree Algorithms	3-Apply
CO4	Solve problems related to discrete objects using concepts of relation and function	3-Apply
CO5	Use concepts of Number Theory & Algebraic Structure to solve a given problem.	3-Apply

COURSE CONTENTS

Unit I	Foundations: Set Theory, Logic & Proofs	(08hrs)	COs Mapped – CO2

Prepositions: Prepositional Logic, Prepositional Equivalences, Predicates and Quantifiers, Nested Quantifiers, Rules of Inference, Normal Forms, Mathematical Induction.
Sets: Sets, Combination of Sets, Finite & Infinite Sets, Set Operations, Venn Diagram, Principle of Inclusion & Exclusion, Multiset. Applications of Sets and Preposition.

Unit II	Graphs	(07hrs)	COs Mapped – CO1

Basic Terminology, Representations of Graphs, Multi-Graphs and Weighted Graphs, Operations on Graphs, Paths and Circuits, Shortest Paths in Weighted Graphs, Eulerian Paths and Circuits, Hamiltonian Paths and Circuits, Factors of a Graph, Planar Graph, Graph Coloring.

Unit III	Trees	(08hrs)	COs Mapped – CO3

Trees: Tree Terminologies, Rooted Trees, Path Length in Rooted Trees, Prefix Codes, Spanning Trees and Cut-sets, Minimum Spanning tree, Kruskal and Prims Algorithm,

Transport Networks.

Unit IV	Relations, Functions and Recurrence Relations	(08hrs)	COs Mapped – CO4

Relations: Introduction, Properties of Binary Relations, Closure of relations, Warshall Algorithm, Equivalence Relation and Partitions, Partial Order Relations and Lattices, Chains and Anti chain..
Functions: Composition of Functions, Invertible Functions, Pigeon Hole Principle. Injective, surjective and bijective functions.
Recurrence Relations: Introduction, Linear Recurrence Relation with Constant Coefficients, Homogeneous Solutions, Particular Solutions, Total Solutions.

Unit V	Number Theory and Algebraic Structures	(08hrs)	COs Mapped – CO2,CO5

Number Theory: Greatest Common Divisor GCD and its Properties, Euclidean Algorithm, Extended Euclidean Algorithm, Prime Factorization Theorem, Congruence Relation, Modular Arithmetic, Euler Phi Function, Euler's Theorem, Fermat's Little Theorem, Additive and Multiplicative Inverses, Chines Remainder Theorem.
Algebraic Structures: Groups, Subgroups, Cosets, Permutation Groups, Codes & Group Codes, Rings, Integral Domain, Fields.

Text Books

1. Bernard Kolman, Robert C. Busby, Sharon Cutler Ross, "Discrete mathematical structures", 6th edition, Prentice Hall of India.
2. Edgar G. Goodaire, Michael M. Parmenter, "Discrete Mathematics with Graph Theory", 3rdEdition, Pearson Education.

Reference Books

1. C. L. Liu and D. P. Mohapatra, "Elements of Discrete Mathematics", 4thEdition, McGraw-Hill.
2. Kenneth H. Rosen, "Discrete Mathematics and its Applications", & 7thedition, McGraw-Hill.

Guidelines for Continuous Comprehensive Evaluation of Theory Course

Sr. No.	Components for Continuous Comprehensive Evaluation	Marks Allotted
1	Two Assignments on Unit-1 &2, Unit 5	06
2	One Test on Unit-3 & 4	04
3	LMS Test on Each Unit	10
	Total	**20**

K. K. Wagh Institute of Engineering Education and Research, Nashik
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S. Y. B. Tech.
Pattern 2023 Semester: III Information Technology
2308202: Data Structure & Algorithm

Teaching Scheme:	Credit Scheme:	Examination Scheme:
Theory : 03 hrs/week	03	Continuous Comprehensive Evaluation: 20Marks InSem Exam: 20Marks EndSem Exam: 60Marks

Prerequisite Courses : - Discrete Mathematics

Course Outcomes: On completion of the course, students will be able to–

	Course Outcomes	Bloom's Level
CO1	Select appropriate searching and sorting techniques in the application development.	2-Understand
CO2	Apply appropriate linear data structures for problem solving and programming.	3-Apply
CO3	Use appropriate tree data structures for problem solving and programming.	3-Apply
CO4	Use appropriate graph data structures for problem solving andprogramming.	3-Apply
CO5	Implement Abstract Data Type (ADT) and data structures for givenapplication.	3-Apply

COURSE CONTENTS

Unit I	Introduction to Data Structure	(08hrs)	COs Mapped – CO2

Introduction: Concept of data, Data object, Data structure, Concept of Primitive and non-primitive, linear and Nonlinear, static and dynamic, persistent and ephem ral data structures, Definition of ADT
Analysis of Algorithm: Frequency count and its importance in analysis of an algorithm, Time complexity & Space complexity of an algorithm Big 'O', 'Ω' and 'Θ' notations,
Sequential Organization: Single and multidimensional array and address calculation.
Linked Organization: Concept of linked organization, Singly Linked List, Doubly Linked List, Circular Linked List (Operations: Create, Display, Search, Insert, Delete).

Unit II	Searching and Sorting	(07 hrs)	COs Mapped-CO1

Searching and sorting: Need of searching and sorting, Concept of internal and external sorting, sort stability. Searching methods: Linear and binary search algorithms, Fibonacci **Series. Sorting methods:** Bubble, insertion, Quick, Merge, shell and comparison of all sorting methods. Analyze Insertion sort, Quick Sort, binary search, hashing for Best, Worst and Average case.

Unit III	Stack and Queue	(07 hrs)	COs Mapped – CO2

Stack: Concept of stack, Concept of implicit and explicit stack, Stack as an ADT using sequential and linked organization.
Applications of stack: recursion, converting expressions from infix to postfix or prefix form, evaluating postfix or prefix form.
Queue: Concept of queues as ADT, Implementation of queue using array and linked organization, Concept of circular queue, double ended queue, Applications of queue: priority queue.

Unit IV	Tree	(07 hrs)	COs Mapped – CO3

Tree : Trees and binary trees concept and terminology of trees, Expression tree, Binary tree as an ADT, , Binary search tree, Recursive and Non recursive algorithms for binary tree traversals , Binary search tree as ADT, tree operations Insert Search Delete, level wise Display.
Threaded Binary Tree: Concept of threaded binary tree (Inorder, Preorder and Postorder). Preorder and In-order traversals of in-order threaded binary tree, Applications of trees.

Unit V	Graph & Advance data Structure	(09 hrs)	COs Mapped – CO4

Graph: Concept and terminologies, Graph as an ADT, Representation of graphs using adjacency matrix and adjacency list, Breadth First Search traversal, Depth First Search traversal, Prim's and Kruskal's algorithms for minimum spanning tree, Shortest path using Dijkstra's algorithm, Applications of Graph
Heap: Heap data structure, Min and Max Heap, Heap sort, applications of heap
Self-Balancing BSTs: AVL Tree
Hashing: Concept of Hash tables and scattered tables, hash function

Text Books

1. E. Horowitz, S. Sahni, D. Mehta, "Fundamentals of Data Structures in C++", Galgotia BookSource, New Delhi, 1995, ISBN 16782928
2. Y. Langsam, M. Augenstin, A. Tannenbaum, "Data Structures using C and C++", 2nd Edition, Prentice Hall of India, 2002, ISBN-81-203-1177-9.

Reference Books

1. M. Welss, “Data Structures and Algorithm Analysis in C++", 2nd edition, Pearson Education,2002, ISBN81-7808-670-0
2. A. Tharp ,"File Organization and Processing", 2008 ,Willey India edition, 9788126518685

Guidelines for Continuous Comprehensive Evaluation of Theory Course		
Sr. No.	**Components for Continuous Comprehensive Evaluation**	**Marks Allotted**
1	Two Assignments on Unit-1 &2, Unit 5	06
2	One Test on Unit-3 & 4	04
3	LMS Test on Each Unit	10
	Total	**20**

K. K. Wagh Institute of Engineering Education and Research, Nashik
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S. Y. B. Tech.
Pattern 2023 Semester: III Information Technology
2308203: Programming Paradigms and Methodology

Teaching Scheme:	Credit Scheme:	Examination Scheme:
Theory :03 hrs/week	03	Continuous Comprehensive Evaluation: 20Marks InSem Exam: 20Marks EndSem Exam: 60Marks

Prerequisite Courses, if any: - Programming in C++

Course Outcomes: On completion of the course, students will be able to–

	Course Outcomes	Bloom's Level
CO1	Acquire the skills for expressing syntax and semantics in formal notation	2-Understand
CO2	Understand the basic building blocks of programming Languages.	2-Understand
CO3	Understand Network and Database programming	2-Understand
CO4	Apply a suitable programming paradigm for a given computing application.	3-Apply
CO5	Explore Parallel and Functional Programming	3-Apply

COURSE CONTENTS

Unit I	Introduction to Programming Paradigms	(06hrs)	COs Mapped – CO4

Introduction: History, development and role of Programming Languages. Programming language paradigms: Imperative Vs. Declarative, Structured, Concurrent, Object Oriented, Functional, Logic, Event Driven and Concurrent Programming, Control flow.
Error Handling: Types of Errors, Memory Errors, Build/debugging tools.
Data Types: Variables, Elementary data types, structured data types, Type conversion, Binding and binding times, Scope, Lifetime

Unit II	Procedures	(07hrs)	COs Mapped – CO2

Sequence Control: Implicit and explicit sequence control, Sequence control within expressions, Sequence control within statements Subprogram control: Subprogram sequence control, different parameter passing methods, Exceptions and Exception handling.
Storage Management: Static, Stack-based, Heap-based allocation- Internal/External Fragmentation Desirable and undesirable characteristics of procedural programming and Object-oriented Programming.

Unit III	Functional and Parallel Programming	(06hrs)	COs Mapped – CO5

Basic concepts of functional programming: Elements of functional programming- Little Language, Function declaration, Expression Evaluation, Type checking, data types and recursive functions, Haskell basics: List comprehension, Using higher-order functions: lambda, map And fold, Lazy Evaluation Principles of Parallel Programming: Precedence graph, Data parallelism, Control parallelism, Mapping, Granularity.

Unit IV	Compilation of Programming Languages	(06hrs)	COs Mapped CO1

Introduction: What is a compiler, high-level view of Compilation, A general structure of a Compiler? The Front-End: Lexical analysis, Syntax analysis, Semantic analysis Lexical Analyzer: The Role of the Lexical Analyzer, Input Buffering. Specification of Tokens Syntax analyser/ Parser: Role of parsers, Classification of Parser Semantic analysis: Need, Syntax Directed Translation The Middle-End: Intermediate representation, Code Optimization, The Back-End: Code generation.

Unit V	Additional Programming Paradigms	(05hrs)	COs Mapped – CO3

Database programming design principles, Network programming design principles, Windows programming

File operations in Java: Create a File, Read from a File, Write to a File, Delete a File.

Text Books

1. Sethi Ravi, "Programming Languages: Concepts and Constructs" Pearson Education, 2nd edition, 2013, ISBN: 9788177584226
2. Pratt T.W., Zelkowitz "Programming Languages: Design and Implementation" PHI, 4th edition, 2000, ISBN: 978-0130276780

Reference Books

1. Robert W. Sebesta, "Concepts of Programming Languages", Pearson Education, 12th edition, 2018, ISBN : 978-0134997186
2. E. Horowitz, "Fundamentals of Programming Languages", Springer-Verlag Publication, 2nd edition, 2011, ISBN : 978-3642694080

Guidelines for Continuous Comprehensive Evaluation of Theory Course		
Sr. No.	**Components for Continuous Comprehensive Evaluation**	**Marks Allotted**
1	Two Assignments on Unit-1 &2, Unit 5	06
2	One Test on Unit-3 & 4	04
3	LMS Test on Each Unit	10
	Total	**20**

K. K. Wagh Institute of Engineering Education and Research, Nashik
(Autonomous from Academic Year 2022-23)

S. Y. B. Tech.
Pattern 2023 Semester: III Information Technology
2308204: Java Programming Lab

Teaching Scheme:	Credit Scheme:	Examination Scheme:
Practical: 02 hrs/week	01	Termwork: 25 Marks Practical Exam: 25 Marks

Prerequisite Courses : - Programming in C++

List of Laboratory Experiments / Assignments

Sr. No.	Laboratory Experiments / Assignments	CO Mapped
1	Use Eclipse or Netbean platform and acquaint with the various menus. Debug a program step by step with a small program of mathematical operations on two numbers.	**CO1**
2	Write a program to find the Fibonacci series using recursive and non-recursive functions.	**CO1,CO4**
3	Write a program to multiply two given matrices.	**CO1**
4	Write a program to display the employee details using scanner class using inheritance	**CO1,CO4**
5	Write a program that checks whether a given string is palindrome or not.	**CO1**
6	Write a program to represent Abstract class with example	**CO1,CO4**
7	Write a program to implement Interface using extends keyword.	**CO1,CO4**
8	Write a program for creating try catch blocks for exception handling.	**CO1,CO2**

9	Write a program for File operations for Student information System.	**CO1,CO3**

Guidelines for Laboratory Conduction

Use of coding standards and Hungarian notation, proper indentation and comments. Use of open source software is to be encouraged. Programming tools recommended: - Eclipse / Netbeans.

Guidelines for Student's Lab Journal

The laboratory assignments are to be submitted by students in the form of a journal. Journal consists of Certificate, table of contents, and handwritten write-up of each assignment (Title, problem statement, theory Concepts in brief, algorithm, test cases and conclusions). Program codes with sample outputs shall be submitted in soft form.

Guidelines for Termwork Assessment

1. Each experiment from lab journal is assessed for thirty marks based on three rubrics.
2. Rubric R-1 for timely completion, R-2 for understanding and R-3 for presentation/journal writing where each rubric carries ten marks.

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S. Y. B. Tech.
Pattern 2023 Semester: III Information Technology
2308205: Data Structure and Algorithm Lab

Teaching Scheme:	Credit Scheme:	Examination Scheme:
Practical: 04hrs/week	02	Term work: 50 Marks Practical Exam: 50Marks

Prerequisite Courses : - Programming basics

List of Laboratory Experiments / Assignments		
Sr. No.	**Laboratory Experiments / Assignments**	**CO Mapped**
1	Write a C program to implement operations of singly Linked List and Doubly Linked List. Creation, insertion, and deletion	**CO2**
2	Consider a student database of SEIT class (at least 15 records). Database contains different fields of every student like Roll No, Name and SGPA.(array of structure) a. Design a roll call list, arrange list of students according to roll numbersin ascending order (Use Bubble Sort) b. Arrange list of students alphabetically. (Use Insertion sort) c. Arrange list of students to find out first ten toppers from a class. (Use Quick sort) d. Search students according to SGPA. If more than one student having same SGPA, then print list of all students having same SGPA. e. Search a particular student according to name using binary search without recursion. (all the student records having the presence of search key should be displayed)	**CO2, CO5**
3	Implement stack as an abstract data type using singly linked list and use this ADT for conversion of infix expression to postfix and evaluation of postfix expression.	**CO2, CO5**
4	Implement Circular Queue using Linked List. Perform	**CO2, CO5**

	followingoperations on it. a. Insertion (Enqueue) b. Deletion (Dequeue) c. Display (forward and reverse)	
5	Construct an Expression Tree from postfix and prefix expression. Performrecursive and non- recursive In-order, pre-order and post-order traversals.	**CO3, CO5**
6	Implement binary search tree and perform following operations: a. Insert (Handle insertion of duplicate entry) b. Delete c. Search d. Display tree (Traversal) e. Display - Depth of tree f. Display - Mirror image g. Create a copy h. Display all parent nodes with their child nodes i. Display leaf nodes j. Display tree level wise	**CO3, CO5**
7	Implement In-order Threaded Binary Tree and perform in-order traversal of constructed TBT.	**CO3, CO5**
8	Represent a graph of your college campus using adjacency list or adjacency matrix. Nodes should represent the various departments or institutes and links should represent the distance between them. Find minimum spanning tree using a. Using Kruskal's algorithm. b. Using Prim's algorithm. c. Analyze above two algorithms for space and time complexity.	**CO4, CO5**
9	Represent a graph of city using adjacency matrix /adjacency list. Nodes should represent the various landmarks and links should represent the distance between them. Find the shortest path using Dijkstra's algorithm from single source to all destination. Analyze the implemented algorithmfor space and time complexity.	**CO4, CO5**
10	Implement Heap sort to sort given set of values using max or min heap.	**CO4, CO5**
Guidelines for Laboratory Conduction		

Use of coding standards and Hungarian notation, proper indentation and comments.
Use of open source software is to be encouraged.
Operating System recommended:- Linux or its derivative
Programming tools recommended: - Open Source line g++

Guidelines for Student's Lab Journal

The laboratory assignments are to be submitted by students in the form of a journal. Journal consists of Certificate, table of contents, and handwritten write-up of each assignment (Title, problem statement, theory Concepts in brief, algorithm, flowchart, test cases and conclusions). Program codes with sample outputs shall be submitted in soft form.

Guidelines for Term work Assessment

Continuous assessment of laboratory work shall be based on overall performance of a student. Assessment of each laboratory assignment shall be based on rubrics that include R1- timely completion (10), R2- understanding of assignment (10) and R3- presentation/clarity of journal writing (10).

K. K. Wagh Institute of Engineering Education and Research, Nashik
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S. Y. B. Tech.
Pattern 2023 Semester: III Information Technology
2308206: Digital Electronics and Logic Design

Teaching Scheme:	**Credit Scheme:**	**Examination Scheme:**
Theory :03 hrs/week	**03**	**Continuous Comprehensive Evaluation: 20Marks** **InSem Exam: 20Marks** **EndSem Exam: 60Marks**

Prerequisite Courses : - Fundamentals of Electronics Engineering

Course Outcomes: On completion of the course, students will be able to–

	Course Outcomes	**Bloom's Level**
CO1	Simplify and Minimize a given Boolean expressions using K Map and Quine Mc-Cluskey method	3-Apply
CO2	Design and implement combinational circuits using AND OR logic	3-Apply
CO3	Design and implement combinational circuits using SSI and MSI logic	3-Apply
CO4	Explain applications of Flip Flops	3-Apply
CO5	Design and implement sequential logic circuits using Flip Flops.	3-Apply

COURSE CONTENTS

Unit I	**Logic Minimization Technique**	**(08hrs)**	**COs Mapped - CO1**

Signed Binary Number Representation: Signed Magnitude, 1's Complement, 2's Complement Binary Arithmetic, Boolean expression: Sum of product (SOP) and Product of sum (Pos) form, Don't Care Conditions, Simplification of logical functions, Minimization of Boolean expression using K-map and Quine Mc-Cluskey Method.

Unit II	**Introduction to Combinational Circuits**	**(08hrs)**	**COs Mapped - CO2**

Introduction to Combinational Circuits, Codes & Code converter : BCD, Excess-3, Gray code, Binary Code, Half- Adder, Full Adder, Half Subtractor, Full Subtractor, n bit Binary adder, Look ahead carry generator, 4 bit Binary Adder (IC 7483), BCD adder

Unit III	**Combinational Logic Design**	**(07hrs)**	**COs Mapped - CO3**

Multiplexers, Cascading multiplexers, Programmable Logic Devices: ROM, PLA, PAL, Demultiplexers, Decoder, Implementation of Boolean expression using Multiplexer and Demultiplexer, Comparators, Encoder, Parity generators and Checker.

Unit IV	Introduction to Sequential Circuits	(06hrs)	COs Mapped – CO4

Difference between Combinational and Sequential Circuits, Flip-Flops: SR, JK, D, T; Preset & Clear, Master Slave JK Flip Flop, Edge Triggered and level Triggered Flip Flops, Truth Tables and Excitation tables, Shift Registers, Bidirectional Shift Register, Ring Counter, Twisted Ring Counter, Universal Shift Register .

Unit V	Sequential Logic Design	(09hrs)	COs Mapped – CO5

Counters: Asynchronous Counter, Modulus of the counter, Decade Counter, Synchronous Counters: Up , Down and Up/Down Counters, Synchronous Sequential Circuit Design , State diagram, State Assignment , State Table , State Reduction , Design Procedure Difference between Asynchronous and Synchronous Counters Design of modulus n counter using ICs- 7490, ICs 74191 Sequence generators using Counters: Pseudo Random Binary Sequence Generator Sequence Detector using Moore & Mealy model.

Text Books

1. R.P. Jain, "Modern Digital Electronics", Tata McGraw-Hill, 2009, Fourth Edition, ISBN: 978-0070669116
2. Moris Mano, "Digital Logic and Computer Design", Pearson, 2004, Second Edition, ISBN: 978-8177584097

Reference Books

1. John Yarbrough, "Digital Logic applications and Design", Thomson Publication, 2006, Fourth Edition, ISBN:978-8131500583
2. Thomas Floyd, "Digital Fundamentals", Pearson, 2015, Eleventh Edition, ISBN: 978-1-292-07598-3
3. Malvino, D.Leach " Digital Principles and Applications", Tata McGraw-Hill, 2008, Sixth Edition, ISBN: 978-0070601758

Guidelines for Continuous Comprehensive Evaluation of Theory Course		
Sr. No.	**Components for Continuous Comprehensive Evaluation**	**Marks Allotted**
1	Two Assignments on Unit-1 &2, Unit 5	06
2	One Test on Unit-3 & 4	04
3	LMS Test on Each Unit	10
	Total	**20**

K. K. Wagh Institute of Engineering Education and Research, Nashik
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S. Y. B. Tech.
Pattern 2023 Semester: III Information Technology
2308207: Digital Electronics and Logic Design Lab

Teaching Scheme:	Credit Scheme:	Examination Scheme:
Practical: 02 hrs/week	01	Termwork: 25 Marks Practical Exam: 25 Marks

Prerequisite Courses : - Fundamentals of Electronics Engineering

List of Laboratory Experiments / Assignments

Sr. No.	Laboratory Experiments / Assignments	CO Mapped
A. Combinational logic design		
1	Design (truth table, K map) and implement 4 bit Code converter like Binary to gray and vice versa., Excess-3 to Binary and vice versa	**CO1, CO2**
2	Design (truth table, K-map) and implementation of 4 bit BCD Adder using IC7483.	**CO1, CO2**
3	Design and implement following using multiplexer IC 74153 a. Full adder b. Any three variable function (Cascade Method)	**CO1, CO3**
4	Design and implement Full Subtractor using decoder IC 74138	**CO1, CO3**
5	Design and implement Parity Generator and Parity Checker.	**CO1, CO3**
B. Sequential Logic Design		
6	Design and implement 3 bit Up and 3 bit Down Asynchronous Counters using master slave JK flip-flop IC 7476	**CO1, CO2, CO4, CO5**

7	Design and implement 3 bit Up and 3 bit Down Synchronous Counters using master slave JK flip-flop IC 7476	**CO1, CO2, CO4, CO5**
8	Design and implement Modulo ‘n’ counter with IC 7490	**CO1, CO2, CO4, CO5**
9	Design and implement Modulo ‘n’ counter with IC 74191	**CO1, CO2, CO4, CO5**
10	Design and implement a sequence detector using D Fliplfop IC 7474	**CO1, CO2, CO4, CO5**

Guidelines for Laboratory Conduction

1. Teacher will brief the given experiment to students its procedure
2. Apparatus and equipments required for the allotted experiment will be provided by the lab assistants using SOP
3. Students will perform the allotted experiment in a group (three/four students in each group) under the supervision of faculty and lab assistant
4. After performing the experiment students will check their output from the teacher

Guidelines for Student's Lab Journal

Write-up should include title, aim, steps of circuit designing (Block Diagram , Truth Table , K Map, Expression , Realization , Conclusion)

Guidelines for Termwork Assessment

1. Each experiment from lab journal is assessed for thirty marks based on three rubrics.
2. Rubric R-1 for timely completion, R-2 for understanding and R-3 for presentation/journal writing where each rubric carries ten marks.

K. K. Wagh Institute of Engineering Education and Research, Nashik
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S. Y. B. Tech.
Pattern 2023 Semester: III Information Technology
2308208: Digital And Social Marketing

Teaching Scheme:	**Credit Scheme:**	**Examination Scheme:**
Theory : 02 hr/week	**01**	**Continuous Comprehensive Evaluation: 50Marks**

Prerequisite Courses: -

Course Outcomes: On completion of the course, students will be able to–

	Course Outcomes	**Bloom's Level**
CO1	Get strategic understanding of Digital Marketing and Social Media Marketing.	2-Understand
CO2	Understand how to use it for branding and sales.	3-Apply

COURSE CONTENTS

Unit I	**Digital Marketing**	**(06 hrs)**	**COs Mapped –CO2**

History of Digital Marketing, Importance of Digital Marketing, Effective use of Digital Marketing, Effects of wrong Digital Marketing, Digital Marketing to develop brands, Digital Marketing for sales, Digital Marketing for product and service development.

Unit II	**Techniques for effective Email Marketing and Pitfalls**	**(06 hrs)**	**COs Mapped –CO1**

Various online email marketing platforms such as Campaign Monitor and Mail Chimp, Web content, web usability, navigation and design, Bookmarking and News Aggregators, Really Simple Syndication RSS),Blogging, Live Chat, User Generated Content (Wikipedia etc),Multi-media - Video (Video Streaming, YouTube etc),Multi-media - Audio & Podcasting (iTunes etc), Multi-media - Photos/Images (Flickr etc),Google Alerts and Giga Alert (Brand, product and service monitoring online),Crowdsourcing, Virtual Worlds.

Unit III	**Social Media for a real marketing**	**(06 hrs)**	**COs Mapped – CO2**

Utilizing Facebook and LinkedIn's Advertising functionality and Applications, Brand

reputation management techniques, Systems for 'buzz monitoring' for brands, products and services, effective Public Relations (PR) online and business development.			
Unit IV	**Optimization Technique**	**(06 hrs)**	**COs Mapped – CO2**
Search Engine Optimization (SEO), Search Engine Optimization (SEO) tips and techniques, Google Adwords, Google various applications such as 'Google Analytics', Maps, Places etc to enhance a brand's products, services and operations.			

Text Books

1. Vandana Ahuja, Digital Marketing, Oxford Press, ISBN: 9780199455447, 1st Edition.
2. Email Marketing: An Hour a Day, Wiley, Jeanniey Mullen, David Daniels, David Gilmour- ISBN: 978-0-470-38673-6, 1st Edition.

Guidelines for Continuous Comprehensive Evaluation of Theory Course		
Sr. No.	**Components for Continuous Comprehensive Evaluation**	**Marks Allotted**
1	One Assignments on each Unit (4 * 5)	20
2	One MCQ test on each Unit (4 * 5)	20
3	One Case Study presentation	10
	Total	**50**

K. K. Wagh Institute of Engineering Education and Research, Nashik
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S. Y. B. Tech.
Pattern 2023 Semester: III
2308209: Democracy, Election and Governance

Teaching Scheme:	**Credit Scheme:**	**Examination Scheme:**
Tutorial : 02hrs/week	**02**	**Tutorial : 50Marks**

Prerequisite Courses, if any: Basic knowledge of civics.

Course Outcomes: On completion of the course, students will be able to–

	Course Outcomes	**Bloom's Level**
CO1	Understand and practice key principles of Democracy	2-Understand
CO2	Identify how different rights are protected in Democratic systems	2-Understand
CO3	Understand various approaches for Governance	2-Understand
CO4	Reflect on the various threats and challenges to Democracy	3-Apply

COURSE CONTENTS

Unit I	**Democracy- Foundation and Dimensions**	**(06 hrs)**	**COs Mapped – CO1, CO2,CO4**

Constitution of India, Evolution of Democracy- Different Models, Dimensions of Democracy- Social, Economic, and Political.

Unit II	**Decentralization**	**(06 hrs)**	**COs Mapped – CO1, CO2,CO3, CO4**

Indian tradition of decentralization, History of Panchayat Raj institution in the lost independence period 73rd and 74thamendments, Challenges of caste, gender, class, democracy and ethnicity.

Unit III	**Governance**	**(06 hrs)**	**COs Mapped – CO2, CO3, CO4**

Meaning and concepts, Government and governance, Inclusion and exclusion.

Unit IV	**Social Awareness**	**(06 hrs)**	**COs Mapped – CO2, CO3, CO4**

Socialization, Ethics, Values and Prejudices, Meaning of Socialization, Functions of Socialization, Agents of Socialization, Importance of Socialization, Role of Ethics In Individual Development, Role of Basic Human Values In Individual Development, Relative Value System.

Text Books
1. Basu, D. D. (1982), “Introduction to the Constitution of India”, Prentice Hall of India. 2. Chandra, B. (1999), “Essays on contemporary India”, Har-Anand Publications.

Guidelines for Continuous Comprehensive Evaluation of Theory Course		
Sr. No.	**Components for Continuous Comprehensive Evaluation**	**Marks Allotted**
1	One Assignments on each Unit (4 * 5)	20
2	One MCQ test on each Unit (4 * 5)	20
3	One Case Study / Presentation	10
	Total	**50**

K. K. Wagh Institute of Engineering Education and Research, Nashik
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S. Y. B. Tech.
Pattern 2023 Semester: III Information Technology
2308210: Mobile Application Development

Teaching Scheme:	Credit Scheme:	Examination Scheme:
Tutorial : 01 hr/week **Practical: 02 hrs/week**	**01** **01**	**Tutorial : 25 Marks** **Term work: 25 Marks**

Prerequisite Courses : - Object Oriented Programming

Course Outcomes: On completion of the course, students will be able to–

	Course Outcomes	Bloom's Level
CO1	Students gain proficiency in mobile app development tools, programming.	2-Understand
CO2	Students develop an understanding of the architecture, design principles, and best practices specific to mobile platforms.	3-Apply
CO3	Students learn principles of UI and UX design, including designing intuitive user interfaces, optimizing for mobile devices, and enhancing user engagement and satisfaction.	4-Evaluate
CO4	Students gain knowledge of the mobile app development lifecycle, including requirements gathering, design, development, testing, deployment, and maintenance.	4-Evaluate

COURSE CONTENTS

Unit I	**Introduction to Android**	**(2h + 4hr Practical)**	**COs Mapped – CO1, CO2**

The Android Platform, Android SDK, Eclipse Installation, Android Installation, Building your First Android application, Understanding Anatomy of Android Application, Android Manifest file. Android Environment Setup Downloading JDK Setting Path of JDK Installation of Android Studio in Mac, Linux and Windows Setting up ADT Plug In Creating First Android Application Creation of App Android Studio.

Unit II	**Android Application Design Essentials**	**(2h + 4hr Practical)**	**COs Mapped – CO1, CO2**

Anatomy of an Android applications, Android terminologies, Application Context, Activities, Services, Intents, Receiving and Broadcasting Intents, Android Manifest File and its common settings, Using Intent Filter, Permissions.

Unit III	**Fundamentals of Android Studio**	**(2h + 4hr Practical)**	**COs Mapped – CO1, CO2**
Android Studio Fundamentals and Android Studio IDE Viewing and adding Java Compilation and Runtime Compilation Process. Creating Hello Project Android Components Android Intent Types of Intent MVP Pattern Advantages of using MVP Android Services Types of Android Services Broadcast Receivers.			
Unit IV	**Media Functions**	**(2h + 4hr Practical)**	**COs Mapped – CO1, CO2, CO3, CO4**
Working with Tic-Tac-Toe Game, Working with Video, Controlling Audio, Audio Volume Seeking Grid Layout and working with Grid Layout, App Basic Phases, Working with App Basic Phases. Introduction to App Bar, Working with App Bar - Adding items, working with Toolbar Activity. Fragments, Working with Fragment Design Working with Fragments Activity.			
Unit V	**Advanced Android Features**	**(2h + 4hr Practical)**	**COs Mapped – CO1, CO2, CO3, CO4**
List View, Time Table App Working with Time Table App Egg Timer App Working with Egg Timer App Showing and Hiding UI Element Demonstration of Showing and Hiding UI Element Brain Trainer Working with Brain Trainer App, Try and Catch Block.			

Text Books

1. T1. Lauren Darcey and Shane Conder, "Android Wireless Application Development", Pearson Education, 2nd ed2. Chandra, B. (1999), "Essays on contemporary India", Har-Anand Publications.

SEM-II

S.Y. B. Tech w.e.f AY 2024-25

SEM-IV

Course Code	Course Type	Title of Course	Teaching Scheme			Evaluation Scheme and Marks						Credits			
			TH	TU	PR	INSEM	ENDSEM	CCE	TUT /TW	PR /OR	TOTAL	TH	TU	PR	TOTAL
2300211A	BSC	Probability & Statistics	3	-	-	20	60	20			**100**	3	-	-	**3**
2308212	PCC	Database Management System	3	-	-	20	60	20			**100**	3	-	-	**3**
2308213	PCC	Computer Graphics	3	-	-	20	60	20			**100**	3	-	-	**3**
2308214	PCC	Computer Graphics Lab	-	-	2	-	-	-	25	25	**50**	-	-	1	**1**
2308215	PCC	Database Management System Lab	-	-	4				50	50	**100**	-	-	2	**2**
2308216	MDM	Computer Organization & Architecture	3	-	-	20	60	20	-	-	**100**	3	-	-	**3**
2308217	MDM	Assembly Language Programming Lab	-	-	2	-	-	-	25	25	**50**	-	-	1	**1**
2308218	OE	Cyber Laws and Forensics	2	-	-	-	-	50	-	-	**50**	2	-	-	**2**
2308219	VEC	Environment Studies	-	2	-	-	-	-	TUT-50	-	**50**	-	2	-	**2**
2308220	AEC	Soft Skills & Technical Writing	-	1	2	-	-	-	TUT-25 TW-25	-	**50**	-	1	1	**2**
Total			**14**	**03**	**10**	**80**	**240**	**180**	**150**	**100**	**750**	**14**	**3**	**5**	**22**

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S. Y. B. Tech.
Pattern 2023 Semester: IV Information Technology
2300211A: Probability & Statistics

Teaching Scheme:	**Credit Scheme:**	**Examination Scheme:**
Theory: 03hrs/week	**03**	**Continuous Comprehensive Evaluation:20Marks** **In Sem Exam: 20Marks** **EndSemExam:60Marks**

Prerequisite Courses:- Basic concepts of statistics and probability.

Course Outcomes: On completion of the course, students will be able to–

	Course Outcomes	**Bloom's Level**
CO1	Define and understand basic concept of Statistics and Probability	2-Understanding
CO2	Apply the basic concepts of statistics to real life problems	3- Apply
CO3	Apply the basic concepts of probability distribution theory to real life problems	3- Apply
CO4	Analyze real life problems by using theory of statistics and Probability distribution	4-Analyze
CO5	Evaluate real life problems by using theory of statistics and Probability distribution	5-Evaluate

COURSE CONTENTS

Unit I	**Descriptive measures**	**(08hrs)**	**Cos Mapped-** **CO1, CO2, CO4, CO5**

Measures of central tendency (Mean, Median, Mode), Measures of dispersion (Variance,Standard Deviation, Range), coefficients of variation, Moments, Skewness and Kurtosis.

Unit II	**Random Variable & Distribution functions**	**(7hrs)**	**Cos Mapped-** **CO1, CO3, CO4, CO5**

Random Variable, Distribution functions (Continuous and discrete), Properties of distribution function, Probability mass function (p.m.f.), Probability density function (p.d.f.) and Cumulative distribution function (Continuous and discrete).

Unit III	**Probability distributions**	**(7hrs)**	**Cos Mapped -** **CO1, CO3, CO4, CO5**

Mathematical expectation and Generating function: Mathematical Expectation, Properties of expectation, Moment generating function.
Probability distributions: Geometric, Binomial, Poisson, Uniform Distribution, Normal distribution, Standard Normal, Uniform.

Unit IV	**Bivariate Distribution Functions**	**(7hrs)**	**Cos Mapped - CO1, CO3, CO4, CO5**

Joint and Marginal Probability Mass Function, Joint and Marginal Probability Density Function and Conditional Probability Functions.

Unit V	**Correlation and Regression**	**(7hrs)**	**Cos Mapped - CO1, CO2, CO4, CO5**

Covariance, Concept of correlation, Karl's Pearson's Coefficient of Correlation, Rank correlation coefficient, Spearman's rank Correlation coefficient. Regression: Lines of regression, Regression coefficients. Fitting of Curve: Fit Straight Line, Parabola and Exponential curves.

Text Books

1. S.C. Gupta, V.K. Kapoor, "Fundamentals of Mathematical Statistics, S. Chand & Sons, Tenth revised edition.
2. B. S. Grewal, "Higher Engineering Mathematics", Khanna Publication, Delhi.
3. J. Medhi, "Statistical Methods: An Introductory Text", Second Edition, New Age International Ltd.

Reference Books

1. Glen Cowan, "Statistical Data Analysis", University of Siegen, Clarendon Press, Oxford.
2. Montgomery Douglas C, "Applied Statistics and probability for Engineers", Fifth Edition, New Delhi; Wiley India Pvt. Ltd.
3. Advanced Engineering Mathematics with MATLAB, 2e, by Thomas L. Harman, James Dabney and Norman Richert (Brooks/Cole, Thomson Learning).

Guidelines for Continuous Comprehensive Evaluation of Theory Course		
Sr. No.	**Components for Continuous Comprehensive Evaluation**	**Marks Allotted**
1	Tests on each unit using (Each test for 15 M and total will be converted out of 05 M)	05
2	Problem solving through Computational Software	05
3	Tutorial (1 tutorial on each unit for 15 marks and total will be converted out of 05 M)	05
4	Group Presentation on real life problem	05

Sr. No.	Title	CO Mapped
1	Examples on descriptive measures.	**CO1, CO2, CO4, CO5**
2	Examples on Probability density function (p.d.f.) and Cumulative distribution function (Continuous and discrete).	**CO1, CO3, CO4, CO5**
3	Examples on Mathematical Expectation, Properties of expectation, Moment generating function.	**CO1, CO3, CO4, CO5**
4	Examples on bivariate distribution functions.	**CO1, CO3, CO4, CO5**
5	Examples on correlation and regression.	**CO1, CO2, CO4, CO5**

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S. Y. B. Tech.
Pattern 2023 Semester: IV Information Technology
2308212: Database Management System

Teaching Scheme:	**Credit Scheme:**	**Examination Scheme:**
Theory :03 hrs/week	**03**	**Continuous Comprehensive Evaluation: 20Marks** **InSem Exam: 20Marks** **EndSem Exam: 60Marks**

Prerequisite Courses : - Data structures, searching and sorting strategies

Course Outcomes: On completion of the course, students will be able to–

	Course Outcomes	**Bloom's Level**
CO1	Learn use of emerging database technologies for large scale data management.	1-Remember
CO2	Recognize the processes applied for Transaction Management and query optimization as well as formulate database queries using PL/SQL.	2-Understand
CO3	Understand and analyze various data mining techniques applied over transactional data stored in data warehouse.	2-Understand
CO4	Formulate database queries using SQL DML/DDL/DCL commands.	3-Apply
CO5	Compare various database models such as ER, EER and RDBMS will be able to create logical design of database.	4-Analyze

COURSE CONTENTS

Unit I	**Data models**	**(07hrs)**	**COs Mapped – CO5**

Limitations of file processing systems, Advantages of DBMS over file system, Data abstraction, Data models, concept of Data independence, Multi-user DBMS architecture. Overview of DBMS models: RDBMS, OODB, ORDB, NoSQL DB. Data Modelling: Basic concepts, Entity, attribute, relationships, constraints, keys.

ER and EER diagrams: Components of ER model, Conventions, Converting ER diagrams into schema diagram. Relational Model: Basic concepts, Attributes and Domains, Codd's rules.

Relational Integrity: Nulls, Entity, Referential integrities, Enterprise constraints.

Unit II	RDBMS	(07hrs)	COs Mapped – CO5

Relational Databases Design: Purpose of Normalization, Data Redundancy and Update Anomalies, Insert anomalies, Delete anomalies.
Functional Dependencies, The process of Normalization: 1NF, 2NF, 3NF, BCNF .Relational **Algebra:** Basic Operations, Selection, projection, joining, outer join, union, difference ,intersection, Cartesian product, division operations (examples of queries in relational algebraic using symbols)

Unit III	SQL	(08hrs)	COs Mapped – CO4, CO5

Introduction to SQL: SQL Data Types, Literals, DDL, DML, SQL Operators,
SQL DML Queries: SELECT query and clauses, Set operations, Tuple Variables, Set comparison, Ordering of Tuples , Aggregate Functions, Nested Queries, Database Modification using Stored Procedure, Triggers, Function, cursor, checkpoints and assertions.
Introduction to Query Processing: Overview, Measures of Query cost, Selection and Join operations, Evaluation of Expressions. Introduction to Query optimization: Estimation, Transformation of Relational Expression.

Unit IV	Transaction Management	(09 hrs)	COs Mapped – CO2

Transaction Management, Serializability, Conflict and View, Cascaded aborts Recoverable and Non-recoverable Schedules. Concurrency Control: Need Locking methods Dead locks, Time stamping Methods. Optimistic
Techniques, Multi-version, Concurrency Control. Different crash recovery methods: Shadow-Paging. Log-based Recovery: Deferred and Immediate Database Architectures: Centralized and, Introduction to Distributed Databases, Architecture of Distributed Databases, Distributed Database Design.

Unit V	Data Warehousing and Mining	(07 hrs.)	COs Mapped – CO1, CO3

Operations data, Transactional data Introduction, Evolution of Data. Data Mining: Process, Knowledge Discovery, Goals of Data Mining, Data Mining Tasks, Association, Classification, Clustering, Big Data (Terminology and examples) Introduction to Machine learning for Big Data and Business Intelligence. Emerging Database Technologies: Introduction, No SQL Databases- Internet Databases, Cloud databases, Mobile Databases, SQLite database, Concept of big data analytics.

Text Books

1. Silberschatz A., Korth H., Sudarshan S. “Database System Concepts”, 6th edition, Tata McGraw Hill Publishers

2. G. K. Gupta “Database Management Systems” , Tata McGraw Hill

Reference Books

1. Rab P., Coronel C. “Database Systems Design, Implementation and Management”, 5th edition, Thomson Course Technology, 2002
2. Ramkrishna R., Gehrke J. “ Database Management Systems”, 3rd edition, McGraw Hill
3. Navathe S. “ Fundamentals of Database Systems”, 4th edition, Pearson Education, 2003

Guidelines for Continuous Comprehensive Evaluation of Theory Course

Sr. No.	Components for Continuous Comprehensive Evaluation	Marks Allotted
1	Two Assignments on Unit-1 &2, Unit 5	06
2	One Test on Unit-3 & 4	04
3	LMS Test on Each Unit	10
	Total	**20**

K. K. Wagh Institute of Engineering Education and Research, Nashik
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S. Y. B. Tech.
Pattern 2023 Semester: IV Information Technology
2308213 : Computer Graphics

Teaching Scheme:	**Credit Scheme:**	**Examination Scheme:**
Theory :03 hrs/week	**03**	**Continuous Comprehensive Evaluation: 20Mrks** **InSem Exam: 20Marks** **EndSem Exam: 60Marks**

Prerequisite Courses : Data Structures and Algorithms

Course Outcomes: On completion of the course, students will be able to–

	Course Outcomes	**Bloom's Level**
CO1	Implement line and circle generation algorithms.	2-Understand
CO2	Understand the concept of Clipping, Projections & Hidden Surface Removal.	2-Understand
CO3	Express comprehensive knowledge of Illumination models, Color Models and shading.	2-Understand
CO4	Apply polygon filling, 2D and 3D transformations and viewing into The real world applications.	3-Apply
CO5	Demonstrate the knowledge of curves, fractals and animation to build Graphics application.	3-Apply
CO6	Explore OpenGL API for rendering 2D graphics.	3-Apply

COURSE CONTENTS

Unit I	**Basics of Computer Graphics**	**(08hrs)**	**COs Mapped - CO1, CO6**

Introduction :Introduction to computer graphics, basics of graphics systems, raster and random scan, basic display processor
OpenGL – Introduction, Graphics function, OpenGL Interface, primitives and attributes, Control functions, programming events
Line Drawing: DDA Line drawing algorithm, Bresenham Line drawing algorithm Circle Drawing: Bresenham circle drawing algorithm
Character Generation: Stroke principle, starburst principle, bitmap method, Introduction to aliasing and anti-aliasing.

Unit II	**Polygons, 2D & 3D Transformations**	**(08hrs)**	**COs Mapped – CO4**

3D Transformation: Translation, scaling, rotation about X, Y, Z & arbitrary axis, and reflection about XY, YZ, XZ & arbitrary plane

Projections: Types of projections- Parallel, Perspective Parallel: oblique – Cavalier, Cabinet, Orthographic – isometric, diametric, trimetric Perspective: vanishing points as 1 point, 2 point and 3 point.

Unit III	Clipping, Projection & Hidden Surface removal	(08hrs)	COs Mapped – CO2

Line & Polygon Clipping: Concept of window and viewport, viewing transformations, Cohen Sutherland method of line clipping, Sutherland Hodgeman method for convex and concave polygon clipping.

Projections: Types of projections- Parallel, Perspective

Hidden Surface Removal: Back face removal, Z-Buffer algorithm, Painter's algorithm, Binary space partitioning trees, Scan line algorithm, Warnock's algorithm.

Unit IV	Illumination models, Colour models and Shading	(07hrs)	COs Mapped – CO3

Illumination models: Light sources, ambient light, diffuse light, specular reflection, Phong model, combined diffuse and specular reflections with multiple light sources

Color Models: CIE Chromaticity Diagram, Color Gamut, RGB, CMY, YCbCr, HSV color models Shading Algorithms: Constant intensity shading, Halftone, Gourad and Phong Shading Segments: Introduction, Segment table, segment creation, closing, deleting, renaming, and visibility.

Unit V	Curves, fractals and Animation	(06hrs)	COs Mapped – CO5

Curves: Introduction, interpolation and approximation, Spline Interpolation Methods – hermite interpolation, Bezier curves, B-Splines

Fractals: Introduction, Classification, fractal Dimension, Fractal dimension and surfaces, Hilbert curve, Koch Curve

Animation: Basics of animation, types of animation, design of animation sequences, animation languages, key frame, morphing, motion specification.

Text Books

1. Donald Hearn and Pauline Baker, "Computer Graphics with OpenGL", Third Edition, Prentice Hall of India, 2009, ISBN:0-13-015390-7.
2. Foley J.D, Van Dam A, Eiener S.K. and Hughes J.F., "Computer Graphics Principles and Practice", Second Edition, Pearson Education, 1996, ISBN: 978-0-201-84840-3.
3. S. Harrington, "Computer Graphics", 2nd Edition, McGraw-Hill Publications, 1987, ISBN 0–07–100472–6.

Reference Books
1. F.S. Hill JR, "Computer Graphics Using Open GL", 3rd Edition, Pearson Education, 2007, ISBN:978-0131496705. 2. D. Rogers, "Procedural Elements for Computer Graphics", 2ndEdition, Tata McGraw-Hill Publication, 1997, ISBN 0–07–047371–4.

Guidelines for Continuous Comprehensive Evaluation of Theory Course		
Sr. No.	**Components for Continuous Comprehensive Evaluation**	**Marks Allotted**
1	Two Assignments on Unit-1 &2, Unit 5	06
2	One Test on Unit-3 & 4	04
3	LMS Test on Each Unit	10
	Total	**20**

K. K. Wagh Institute of Engineering Education and Research, Nashik
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S. Y. B. Tech. **Pattern 2023 Semester: IV Information Technology** **2308214 : Computer Graphics Lab**		
Teaching Scheme:	**Credit Scheme:**	**Examination Scheme:**
Practical : 02 hrs/week	**01**	**Term work: 25Marks** **Practical Exam: 25Marks**
Prerequisite Courses : Data Structures and Algorithms		

List of Laboratory Experiments / Assignments		
Sr. No.	**Laboratory Experiments / Assignments**	**CO Mapped**
1	Install and explore the OpenGL.	**CO6**
2	Implement DDA and Bresenham line drawing algorithm to draw: Simple Line a. Dotted Line b. Dashed Line c. Solid line; Using mouse interface divide the screen in four quadrants with center as (0, 0). The line should work for all the slopes positive as well as negative.	**CO1**
3	Implement Bresenham circle drawing algorithm to draw any object. The object should be displayed in all the quadrants with respect to center and radius.	**CO1**
4	Implement the following polygon filling methods: a. Flood fill / Seed fill b. Boundary fill Using mouse click, keyboard interface and menu driven programming.	**CO4**
5	Implement Cohen Sutherland polygon clipping method to clip the Polygon with respect the viewport and window. Use mouse click, keyboard interface.	**CO2**

6	Implement following 2D transformations on the object with respect to axis: a. Scaling b. Rotation about arbitrary point c. Reflection	**CO4**
7	Generate fractal patterns using i) Bezier ii) Koch Curve	**CO5**
8	Implement animation principles for any object.	**CO5**

Guidelines for Laboratory Conduction

Use of coding standards and Hungarian notation, proper indentation and comments. Use of open source software is to be encouraged. Operating System recommended:- Linux or its derivative Programming tools recommended: - VSCode/CodeBlock (C++ Editor) and OpenGL toolkit.

Guidelines for Student's Lab Journal

The laboratory assignments are to be submitted by students in the form of a journal. Journal consists of Certificate, table of contents, and handwritten write-up of each assignment (Title, problem statement, theory Concepts in brief, algorithm, test cases and conclusions). Program codes with sample outputs shall be submitted in soft form.

Guidelines for Termwork Assessment

Continuous assessment of laboratory work shall be based on overall performance of a student. Assessment of each laboratory assignment shall be based on rubrics that include R1- timely completion (10), R2- understanding of assignment (10) and R3- presentation/clarity of journal writing (10).

K. K. Wagh Institute of Engineering Education and Research, Nashik
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S. Y. B. Tech.
Pattern 2023 Semester: IV Information Technology
2308215: Database Management System Lab

Teaching Scheme:	**Credit Scheme:**	**Examination Scheme:**
Practical: 04hrs/week	**02**	**Term work: 50 Marks** **Practical Exam: 50 Marks**

Prerequisite Courses : - Programming in C++

Course Outcomes: On completion of the course, students will be able to–

List of Laboratory Experiments / Assignments

Sr. No.	**Laboratory Experiments / Assignments**	**CO Mapped**
	Group A : Study of Databases	
1	Study of MySQL Open source software. Discuss the characteristics like efficiency, scalability, performance and transactional properties.	**CO5, CO1**
2	Install and configure client and server of MySQL.(Show all commands and necessary steps for installation and configuration)	**CO5**
3	Study of SQLite: What is SQLite? Uses of SQLite. Building and installing SQLite	**CO5**
	Group B :MySQL	
4	Design any database with at least 3 entities and relationships between them. Draw suitable ER/EER diagram for the system	**CO1, CO2, CO4**
5	Design and implement a database (for assignment no 1) using DDL statements and apply normalization on them	**CO1, CO2, CO4**

6	Create Table with primary key and foreign key constraints. a. Alter table with add n modify b. Drop table	**CO1, CO2, CO4**
7	Perform following SQL queries on the database created in assignment a. Implementation of SQL relational operators b. Boolean operators and pattern matching c. Arithmetic operations and built in functions d. Group functions e. Processing Date and Time functions f. Complex queries and set operators	**CO1, CO2, CO4**
8	Execute DDL/DML statements which demonstrate the use of views. Update the base table using its corresponding view. Also consider restrictions on updatable views and perform view creation from multiple tables	**CO1, CO2, CO4**
9	Implementation of Joins: Inner join, Left join, Right join and Natural join.	**CO4, CO5**
	Group C : PL/SQL	
10	Write and execute PL/SQL stored procedure and function to perform a suitable task on the database. Demonstrate its uses.	**CO3**
11	Write and execute suitable database triggers .Consider row level and statement level triggers.	**CO3**
12	Write a PL/SQL block to implement all types of cursor.	**CO3**
	Group D: Relational Database Design	

13	Design and case study of any organization (back end only), Project Proposal and High Level SRS To prepare for project, do the following: 1. Form teams of around 3 to 4 people 2. Create requirements document with the following information:-a. Give one or two paragraph description of your goals for the topic(s). b. List what all types of users will be accessing your application c. List the various functionalities that your application will support. Explain each in about a paragraph worth of detail. d. List the hardware and software requirements at the backend and at the front end. e. Give an estimate of the number of users of each type, the expected load (transactions per day), and the expected database size.	
14	For ER diagram and Database design following guidelines can be used: 1. Draw an ER diagram of your project. 2. Reduce this ER diagram into the tables and complete database design. 3. Subsequently, list all the functional dependencies on each table that you expect will hold. 4. Check that the database schema is in 3NF/BCNF. If it is not, apply normalization. Use non-loss decomposition and bring the database schema in 3NF/BCNF. Give the ER diagram and the data dictionary as part of the requirement specifications file which you created for the project proposal	**CO2**

Guidelines for Laboratory Conduction

1. Use of open source software is to be encouraged.
2. Operating System recommended:- Windows
3. Programming tools recommended: - MYSQL, SQLite and Oracle.

Guidelines for Student's Lab Journal

1. The laboratory assignments are to be submitted by students in the form of a journal.
2. Journal consists of Certificate, table of contents, and handwritten write-up of each assignment (Title, problem statement, theory Concepts in brief, algorithm, test cases and conclusions). Program codes with sample outputs shall be submitted in soft form.

Guidelines for Termwork Assessment

Continuous assessment of laboratory work shall be based on overall performance of a student. Assessment of each laboratory assignment shall be based on rubrics that include R1- timely completion (10), R2- understanding of assignment (10) and R3- presentation/clarity of journal writing (10).

K. K. Wagh Institute of Engineering Education and Research, Nashik
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S. Y. B. Tech.
Pattern 2023 Semester: IV Information Technology
2308216 : Computer Organization and Architecture

Teaching Scheme:	**Credit Scheme:**	**Examination Scheme:**
Theory :03 hrs/week	**03**	**Continuous Comprehensive Evaluation: 20Marks** **InSem Exam: 20Marks** **EndSem Exam: 60Marks**

Prerequisite Courses : - Digital Electronics and Logic Design

Course Outcomes: On completion of the course, students will be able to–

	Course Outcomes	**Bloom's Level**
CO1	Describe the functions & organization of building blocks of computer.	1-Remember
CO2	Understand processor instruction characteristics and concepts related to Assembly Language Programming	2- Understand
CO3	Describe characteristics of memory system and I/O devices.	2-Understand
CO4	Understand concept of memory management using segment registers and features of Privileged Instructions	2-Understand
CO5	Understand concepts of Parallel and multicore processing.	2-Understand

COURSE CONTENTS

Unit I	**Computer Organization**	**(07hrs)**	**COs Mapped - CO1**

Computer organization, Von Neumann & Harvard architecture, functions & types of computer units Memory: Types & their uses in computer Input Output: Types & Functions, Types of Bus Register: Types & functions of user visible Register, Control & Status registers such as General purpose, Address registers, Data registers, Flags, Program Counter Introduction to Arithmetic and logic Unit and its signals (Related to 8086) Micro Operations: Fetch, Indirect, Execute, Interrupt and Control signals for these Micro operation.

Unit II	**Processor Instructions**	**(08hrs)**	**COs Mapped - CO2**

Instruction: Elements of Machine instruction, Instruction representation, Instruction Format & 0-1-2-3 address formats, Addressing modes; Instruction types based on operations, Instruction pipelining Interrupt: Purpose, Types, classes & interrupt handling, Exceptions, Assembly Language Programming(ALP): Introduction to Assembly Language Programming, ALP tools- Assembler, linker, loader, debugger, emulator concepts, and Assembler directives.

Unit III	Memory & Input / Output Systems	(07hrs)	COs Mapped -CO1, CO3

Memory & Input / Output Systems

Memory Systems: Characteristics of Memory Systems, Memory Hierarchy, signals to connect memory to processor, memory read & write cycle Memory – Principle of Locality, Organization, Mapping functions, write policies, Replacement policies, Multilevel Caches, Cache Coherence, Input / Output Systems: I/O Module, Programmed I/O, Interrupt Driven I/O, Direct Memory Access (DMA).

Unit IV	80X86 Memory Segmentation	(08hrs)	COs Mapped – CO4

80X86 Memory Segmentation

Introduction to 80X86 Processor: 16/32bit processor 80x86, 80386 Features and Architecture, Register Set, 80386 Real mode segmentation and Address translation.

Segmentation- Support registers, Related instructions descriptors, Memory management through segmentation, Logical to Linear/physical address translation

Protection in segmentation, Privileged instructions.

Unit V	Processor Enhancements	(06hrs)	COs Mapped – CO1, CO5

Processor Enhancements

Multiprocessor systems: Taxonomy of Parallel Processor Architectures, two types of MIMD clusters & SMP (organization & benefits) & multicore processor (various Alternatives & advantages 0f multicores).

Text Books

1. W.Stallings, "Computer Organization and Architecture: Designing for Performance", Eighth Edition, Prentice Hall of India, 2010, ISBN 13: 978-0-13-607373-4
2. James Turley, "Advanced 80386 Programming Techniques", McGraw Hill Education, ISBN:9780070598416

Reference Books

1. C. Hamacher, V. Zvonko, S. Zaky, "Computer Organization", Fifth edition, McGraw Hill, 2002, ISBN: 007-120411-3
2. Douglas V Hall," Microprocessors and Interfacing", Third Edition, McGraw-Hill, 2005, ISBN: 9781283188982.

Guidelines for Continuous Comprehensive Evaluation of Theory Course		
Sr. No.	**Components for Continuous Comprehensive Evaluation**	**Marks Allotted**
1	Two Assignments on Unit-1 &2, Unit 5	06
2	One Test on Unit-3 & 4	04
3	LMS Test on Each Unit	10
	Total	**20**

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S. Y. B. Tech.
Pattern 2023 Semester: IV Information Technology
2308217 : Assembly Language Programming Lab

Teaching Scheme:	**Credit Scheme:**	**Examination Scheme:**
Practical: 02hrs/week	**01**	**Term work: 25 Marks** **Practical Exam: 25 Marks**

Prerequisite Courses : - Programming in C++

List of Laboratory Experiments / Assignments

Sr. No.	**Laboratory Experiments / Assignments**	**CO Mapped**
1	Write Assembly language program (ALP) to- a. Display "Hello World" b. Accept and display an array of N numbers	**CO2**
2	Write Assembly language program (ALP) to Search highest number stored in the memory	**CO2**
3	Write Assembly language program (ALP) to Add array of N numbers stored in the memory.	**CO2**
4	Write Assembly language program (ALP) to- a. Find average of numbers declared in data segment b. Perform multiplication of two numbers declared in data segment	**CO2**
5	Write ALP to perform non-overlapped and overlapped block transfer	**CO2**
6	Write ALP to convert 4-digit Hex number into its equivalent BCD number and 5-digit BCD number into its equivalent HEX number. Make your program user friendly to accept the choice from user for a. HEX to BCD b. BCD to HEX	**CO2**

	c. EXIT. Display proper strings to prompt the user while accepting the input and displaying the result.	
7	Write ALP to perform string manipulation. The strings to be accepted from the user is to be stored in code segment and write NEAR PROCEDURES for following operations on the string: a. Display length of the String b. Reverse a String	**CO2**
8	Write ALP to perform string manipulation. The strings to be accepted from the user is to be stored in code segment Module_1 and write FAR PROCEDURES in code segment Module_2 for following operations on the string: a. Concatenation of two strings b. Compare two strings **Note**: Use PUBLIC and EXTERN directive. Create .OBJ files of both the modules and link them to create an EXE file.	**CO2**
9	Write following programs in C using int86x, intdos functions To delete a file To create a directory	**CO2**

Guidelines for Laboratory Conduction

1. Use of coding standards and Hungarian notation, proper indentation and comments.
2. Use of open source software is to be encouraged.
3. Programming tools recommended: - MASM.

Guidelines for Student's Lab Journal

The laboratory assignments are to be submitted by students in the form of a journal. Journal consists of Certificate, table of contents, and handwritten write-up of each assignment (Title, problem statement, theory Concepts in brief, algorithm, test cases and conclusions). Program codes with sample outputs shall be submitted in soft form.

Guidelines for Term work Assessment

Each experiment from lab journal is assessed for thirty marks based on three rubrics. Rubric R-1 for timely completion, R-2 for understanding and R-3 for presentation/journal writing where each rubric carries ten marks.

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S. Y. B. Tech.
Pattern 2023 Semester: III Information Technology
2308218 : Cyber laws and Forensics

Teaching Scheme:	**Credit Scheme:**	**Examination Scheme:**
Theory : 02 hr/week	**01**	**Continuous Comprehensive Evaluation: 50Marks**

Prerequisite Courses: -

Course Outcomes: On completion of the course, students will be able to–

	Course Outcomes	**Bloom's Level**
CO1	To correctly define and cite appropriate instances for the application of computer forensics Correctly	2-Understand
CO2	Collect and analyze computer forensic evidence.	3-Apply

COURSE CONTENTS

Unit I	**Basics of Forensic**	**(06 hrs)**	**COs Mapped –CO2**

Computer organisation, components of computer- input and output devices, CPU, Memory hierarchy, types of memory, storage devices, system softwares, application softwares, basics of computer languages.

Unit II	**Cyber Crime and Computer Crime**	**(06 hrs)**	**COs Mapped –CO1**

Introduction to Digital Forensics, Definition and types of cybercrimes, electronic evidence and handling, electronic media, collection, searching and storage of electronic media, introduction to internet crimes, hacking and cracking, credit card and ATM frauds, web technology, cryptography, emerging digital crimes and modules.

Unit III	**Computer Forensics**	**(06 hrs)**	**COs Mapped – CO2**

Definition and Cardinal Rules, Data Acquisition and Authentication Process, Windows Systems-FAT12, FAT16, FAT32 and NTFS, UNIX file Systems, mac file systems, computer artifacts, Internet Artifacts, OSArtifacts and their forensic applications.

Unit IV	Forensic Tools and Processing of Electronic Evidence	(06 hrs)	COs Mapped – CO2
Introduction to Forensic Tools, Usage of Slack space, tools for Disk Imaging, Data Recovery, Vulnerability Assessment Tools, Encase and FTK tools, Anti Forensics and probable counters, retrieving information, process of computer forensics and digital investigations, processing of digital evidence, digital images, damaged SIM and data recovery, multimedia evidence, retrieving deleted data: desktops, laptops and mobiles, retrieving data from slack space, renamed file, ghosting, compressed files.			

Text Books

1. C. Altheide& H. Carvey Digital Forensics with Open Source Tools, Syngress, 2011. ISBN: 9781597495868.

Guidelines for Continuous Comprehensive Evaluation of Theory Course		
Sr. No.	**Components for Continuous Comprehensive Evaluation**	**Marks Allotted**
1	One Assignments on each Unit (4 * 5)	20
2	One MCQ test on each Unit (4 * 5)	20
3	One Case Study presentation	10
	Total	**50**

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S. Y. B. Tech.
Pattern 2023 Semester: III Information Technology
2308219 : Environment Studies

Teaching Scheme:	**Credit Scheme:**	**Examination Scheme:**
Tutorial: 02 hr/week	**01**	**Tutorial : 50Marks**

Prerequisite Courses: - Basic knowledge about environment.

Course Outcomes: On completion of the course, students will be able to–

	Course Outcomes	**Bloom's Level**
CO1	Understand the concept of green IT and relate it to sustainable development.	2-Understand
CO2	Apply the green computing practices to save energy.	3-Apply

COURSE CONTENTS

Unit I	**Fundamentals of Green IT**	**(06 hrs)**	**COs Mapped –CO2**
Green IT Fundamentals: Business, IT, and the Environment – Green computing: carbon foot Print - Measuring, Details, reasons to bother, Plan for the Future, Cost Savings: Hardware, Power.			
Unit II	**Green Assets and Power Problems**	**(06 hrs)**	**COs Mapped –CO1**
Green Assets: Buildings, Data Centers, Networks, and Devices, Green Information Systems : Design and Development Models, Monitoring Power Usage, Servers, Low-Cost Options, Reducing Power Use, Data De-Duplication, Low-Power Computers and peripheral devices.			
Unit III	**Green Information Systems**	**(06 hrs)**	**COs Mapped – CO2**
Initial Improvement Calculations, Selecting Metrics, Tracking Progress, Change Business Processes, Customer Interaction, Paper Reduction, Green Supply Chain, Improve Technology Infrastructure, Reduce PCs and Servers, Shared Services, Hardware Costs, Cooling.			
Unit IV	**Green Information Systems**	**(06 hrs)**	**COs Mapped – CO2**

Climate change, global warming, ozone layer depletion, acid rain and impacts on human communities and agriculture Environment Laws: Environment Protection Act; Air (Prevention & Control of Pollution) Act; Water (Prevention and control of Pollution) Act; Wildlife Protection Act; Forest Conservation Act. International agreements: Montreal and Kyoto protocols and Convention on Biological Diversity (CBD). Nature reserves, tribal populations and rights, and human wildlife conflicts in Indian context.

Text Books

1. Woody Leonhard, Katherrine Murray, "Green Home computing for dummies", August2009, ISBN: 978-0-470-46745-9 2. Alvin Galea, Michael Schaefer, Mike Ebbers, "Green Data Center: steps for the Journey",
2. Savitribai Phule Pune University, Pune B.E. (Information Technology) Syllabus 2015 Course 48 Shoff/IBM rebook, 2011. ISBN: 10: 1-933742-05-4; 13: 978-1-933742-05-2.

Guidelines for Continuous Comprehensive Evaluation of Theory Course

Sr. No.	Components for Continuous Comprehensive Evaluation	Marks Allotted
1	One Assignments on each Unit (4 * 5)	20
2	One MCQ test on each Unit (4 * 5)	20
3	One Case Study presentation	10
	Total	**50**

K. K. Wagh Institute of Engineering Education and Research, Nashik
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S. Y. B. Tech.
Pattern 2023 Semester: IV Information Technology
2308220: Soft Skills and Technical Writing

Teaching Scheme:	Credit Scheme:	Examination Scheme:
Theory : 01 hr/week **Practical: 02 hr/week**	**01** **01**	**Tutorial: 25 Marks** **Term work: 25 Marks**

Prerequisite Courses: - Communication Skills

Course Outcomes: On completion of the course, students will be able to–

	Course Outcomes	Bloom's Level
CO1	Introspect about individual's goals, aspirations by evaluating one's SWOC and think creatively.	2-Understand
CO2	Develop effective communication skills.	3-Apply
CO3	Constructively participate in group discussion, meetings and prepare and deliver Presentations	4-Evaluate
CO4	Practice professional etiquette, present oneself confidently and successfully handle personal interviews	4-Evaluate
CO5	Function effectively in multi-disciplinary and heterogeneous teams through the knowledge of team work, Inter-personal relationships, conflict management and leadership quality.	4-Evaluate

Text Books

1. Gajendra Singh Chauhan, Sangeeta Sharma,"Soft Skills – An Integrated Approach to Maximize Personality", WILEY INDIA, ISBN: 9788126556397
2. Business Communication and Soft skills, McGraw Hill Publication

Reference Books

1. Susan Hodgson, Brilliant Answers to Tough Interview Questions, Pearson Education, ISBN: 9780273714644
2. TIME, How to Do Well in GDs and Interviews, 1/e, Pearson Education, ISBN - 9788131725542
3. R.S. Naagarazan, Professional ethics and human values, New Age international Publishers. Dr. R. L. Bhatia, "Managing time for competitive edge".

List of Laboratory Assignments

Sr. No.	Title	CO Mapped
1	**Introspective & Self Development – Self Awareness, Self-confidence, Integrity –** Explain how to introduce oneself in a professional manner and presenting oneself positively Name, Academic Profile, Achievements, Career Aspirations, Personal Information (hobbies, family, social). Focus on introspection and become aware of one's Strengths, Weakness, Opportunities and Challenges. c. Students can write down their SWOC in a matrix and the teacher can discuss the gist personally. Make students understand the difference between a job and a career. Elaborate steps on how to plan a career. Students can choose a career and they should write down what skills, knowledge, steps needed to be successful in that particular career and how they can get the right opportunity.	**CO1**
2	**Social Skills, Drive for Results, Teamwork and Preparing for the Interview** a. Explain to students how to plan short term and long term goals. Think and write down their short-term goals and long terms goals. Teacher can read and discuss (provide basic counselling) about the choices written. b. Resume Writing The teacher should conduct a brief session outlining the importance of a CV / Resume and students can write / type out their own resumes i. Share various professional formats. ii. Focus on highlighting individual strengths. iii. Develop personalized professional goals / statement at the beginning of the resume. c. Team Building Activities The class will be divided into groups of 4-5 students in each group and an activity will be given to each group. The activities chosen for each team should be competitive and should involve every student in the team. The activities may be conducted indoors or outdoors depending on infrastructure. While selecting the team, ensure that each team has a mix of students who have varied skills. The teacher should give critical feedback including areas of improvement at the end of the activity.	**CO1, CO2, CO5**
3	**Acting with Sensitivity, Energy level, Grooming, Body Language, Demeanor and Interview Expectation** Every student will have to choose a topic of his/her choice and make a 5-minute presentation using audio-video aids / PPT. The topic can either be technical or non-technical. Focus and evaluation of each presentation should be the depth of knowledge about the topic, originality of perspective on the topic, well-researched or not, verbal and non-verbal skills and ability to answer questions effectively.	**CO2, CO3**

	Plagiarism should be discredit and students should be instructed about it.	
4	**The Interview, Group Discussion, Fluency, Extempore, and Vocal Qualities** a. Student has to undergo interview session and the teacher should seek the assistance of another faculty member / TPO Officer/ Alumni to act as interview panel. Students will be informed beforehand about the job profile that they are appearing the interview for and they have to come prepared with a printed copy of their resume, formally dressed. Questions will include technical as well as HR. Interviewer can choose to give problems to solve using technical skills. Students will be graded on the basis of their technical knowledge, ability to answer questions well, presentation of self, body language and verbal skills. b. The class will be divided into groups of 8 – 10 students in for a discussion lasting 10 minutes. Topics should be topical and non-controversial. After each group finishes its discussion, the teacher will give critical feedback including areas of improvement. The teacher should act as a moderator / observer only.	**CO3, CO4**
5	**Communication Roadblocks, Communicating Across Cultures and Interview Role Play** The teacher can design an interactive session that allows students to be involved in understanding the requirements of a corporate environment. This can be done using innovative quiz competition in the classroom and the teacher explaining the concept / relevance of that particular aspect in the professional context. Alternatively, the teacher can invite professionals to have an interactive session with students about various aspects of professional etiquette.	**CO2, CO4**
6	**Lateral and Creative Thinking** Every student needs to step out of the linear thinking and develop lateral and creative thinking. Teacher can develop creative activities in the classroom / lab that will help students enhance their creative thinking. Some of the suggested activities, **i.** Each group (3-4 students) can be given random unrelated items and they will be given sufficient time to come up with creative ideas on how the objects can be used for activities / purposes other than its intended one. **ii.** Each student is given a random line and he/she has to spin a fictional story and tell it to the class (3 minutes). Each story should have a beginning, middle and end. **iii.** Each group (3-4 students) can be given a fictional / hypothetical dangerous situation and they have to find a solution to that problem. They can present it to the other teams who will then get the opportunity to pick flaws in the ideas.	**CO2, CO3, CO4, CO5**