- **Summary of Credits and Total Marks for U.G.Programme:**

Semester	B.Tech	
	Total Credits (TH+PR/OR/TU)	**Total Marks**
III	21	725
IV	21	725

- **Description of various Courses:**

Type of Course	Description	Type of Course	Description
ESC	Engineering Science Course - Workshop - Drawing- Fundamentals of different branches	DCC	Department Core Course
BSC	Basic Science Courses	DEC	Department Elective Course
LHSM	Liberal arts, Humanities, Social Sciences and Management courses	OEC	Open Elective Courses of other technical or emerging areas /Courses designed by Industry
PSI	Project work, Seminar, Internship, PBL	IMC	Induction and Mandatory Courses
NC /AC	Non Credit Courses /Audit Courses	ASM	Additional Specialized / MOOCs

Course Code	Course Type	Title of Course	Teaching Scheme Hrs./week			Evaluation Scheme and Marks							Credits			
			TH	TU	PR	In Sem	End Sem	CCE	TU/ TW	PR	OR	Total	TH	TU	PR /OR	Total
INT222001	DCC	Discrete Mathematics	3	-	-	20	60	20	-	-	-	100	3	-	-	3
INT222002	DCC	Data Structures and Algorithms	3	-	-	20	60	20	-	-	-	100	3	-	-	3
INT222003	DCC	Programming Paradigms and Methodology	3	-	-	20	60	20	-	-	-	100	3	-	-	3
INT222004	ESC	Digital Electronics and Logic Design	3	-	-	20	60	20	-	-	-	100	3	-	-	3
INT222005	DCC	Digital Communication	3	-	-	20	60	20	-	-	-	100	3	-	-	3
INT222006	LHSM	Ethics and Values in Information Technology	1	-	-	-	-	-	25	-	-	25	1	-	-	1
INT222007	DCC	Data Structures and Algorithms Lab	-	-	4	-	-	-	25	50	-	75	-	-	2	2
INT222008	DCC	Java Programming Lab	-	-	2	-	-	-	25	25	-	50	-	-	1	1
INT222009	ESC	Digital Electronics and Logic Design Lab	-	-	2	-	-	-	25	25	-	50	-	-	1	1
INT222010	PSI	Soft Skills Lab	-	-	2	-	-	-	25	-	-	25	-	-	1	1
		Total	**16**	**-**	**10**	**100**	**300**	**100**	**125**	**100**	**-**	**725**	**16**	**-**	**5**	**21**

Course Code	Course Type	Title of Course	Teaching Scheme Hrs./week			Assessment Scheme of Marks							Credits			
			TH	TU	PR	In Sem	End Sem	CCE	TU/ TW	PR	OR	Total	TH	TU	PR / OR	Total
SMH222111	BSC	Applied Mathematics –III	3	1	-	20	60	20	25	-	-	125	3	1	-	4
INT222012	DCC	Database Management System	3	-	-	20	60	20	-	-	-	100	3	-	-	3
INT222013	DCC	Computer Organization and Architecture	3	-	-	20	60	20	-	-	-	100	3	-	-	3
INT222014	DCC	Computer Graphics	3	-	-	20	60	20	-	-	-	100	3	-	-	3
INT222015	LHSM	Financial Management	3	-	-	20	60	20	-	-	-	100	3	-	-	3
INT222016	AC	Film and Art Appreciation	1	-	-	-	-	-	-	-	-	-	-	-	-	-
INT222017	DCC	Database Management System Lab	-	-	4	-	-	-	25	50	-	75	-	-	2	2
INT222018	DCC	Assembly Language Programming Lab	-	-	2	-	-	-	25	25	-	50	-	-	1	1
INT222019	DCC	Computer Graphics Lab	-	-	2	-	-	-	25	25	-	50	-	-	1	1
INT222020	PSI	Project Based Learning	-	-	2	-	-	-	25	-	-	25	-	-	1	1
		Total	**16**	**1**	**10**	**100**	**300**	**100**	**125**	**100**	**-**	**725**	**15**	**1**	**5**	**21**

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K.K.Wagh Institute of Engineering Education and Research, Nashik
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S. Y. B. Tech.
Pattern 2022 Semester: III Information Technology
INT222001: 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 : - Applied Mathematics II

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**	**(07hrs)**	**COs Mapped – CO3**

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 Antichain.
Functions: Composition of Functions, Invertible Functions, Pigeon Hole Principle.
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, Chinese 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, 2008, ISBN-13: 9780132297516
2. Edgar G. Goodaire, Michael M. Parmenter, "Discrete Mathematics with Graph Theory", 3rdEdition, Pearson Education, 2005, ISBN 10: 0131679953
3.Tremblay J. S., "Discrete mathematical structures with application", 3rdEdition, Tata McGraw Hill, ISBN-13: 978- 8126562176

Reference Books

1. C. L. Liu and D. P. Mohapatra, "Elements of Discrete Mathematics", 4th Edition, McGraw-Hill, 2011, ISBN-13 978-1259006395
2. Kenneth H. Rosen, "Discrete Mathematics and its Applications", 7th Edition, McGraw-Hill, 2002, ISBN 0–07–338309–0

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	LearniCo Test on Each Unit	10
	Total	**20**

S. Y. B. Tech.
Pattern 2022 Semester: III Information Technology
INT222002: Data Structures and Algorithms
INT222007: Data Structures and Algorithms Lab

Teaching Scheme:	Credit Scheme:	Examination Scheme:
Theory : 03 hrs/week **Practical : 04 hrs/week**	**03** **02**	**Continuous Comprehensive Evaluation: 20Marks** **InSem Exam: 20Marks** **EndSem Exam: 60Marks** **Term Work: 25Marks** **Practical Exam: 50Marks**

Prerequisite Courses : - Discrete Mathematics

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

CO	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 and programming.	3-Apply
CO5	Implement Abstract Data Type (ADT) and data structures for given application.	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 ephemeral 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 and Hashing	(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, topological sorting.
Symbol Table: Notion of Symbol Table, OBST, AVL Trees
Heap: Heap data structure, Min and Max Heap, Heap sort, applications of heap
Hashing: Hash tables and scattered tables, Basic concepts, hash function, characteristics of good hash function

Text Books

1. E. Horowitz, S. Sahni, D. Mehta, "Fundamentals of Data Structures in C++", Galgotia Book Source, 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
3. G. A.V, PAI , "Data Structures and Algorithms ", McGraw Hill, ISBN -13: 978-0-07-066726-6

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	LearniCo Test on Each Unit	10
	Total	**20**

List of Laboratory Experiments / Assignments		
Sr. No.	**Laboratory Experiments / Assignments**	**CO Mapped**
1	Implement stack as an abstract data type using singly linked list and use this ADT for conversion of infix expression to postfix, prefix and evaluation of postfix and prefix expression.	**CO2, CO5**
2	Implement Circular Queue using Linked List. Perform following operations on it. a) Insertion (Enqueue) b) Deletion (Dequeue) c) Display (forward and reverse)	**CO2, CO5**
3	Construct an Expression Tree from postfix and prefix expression. Perform recursive and non- recursive In-order, pre-order and post-order traversals.	**CO3, CO5**
4	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	
5	Implement In-order Threaded Binary Tree. Traverse the implemented tree in Pre-order too.	**CO3, CO5**
6	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. Analyze above two algorithms for space and time complexity	**CO4, CO5**
7	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 algorithm for space and time complexity.	**CO4, CO5**
8	Implement Heap sort to sort given set of values using max or min heap.	**CO4, CO5**
9	Department maintains student's database. The file contains roll number, name, division and address. Write a program to create a sequential file to store and maintain student data. It should allow the user to add, delete information of student. Display information of particular student. If record of student does not exist an appropriate message is displayed. If student record is found it should display the student details.	**CO2, CO5**

10	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 numbers in 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**

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. Operating System recommended:- Linux or its derivative
4. 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 2022 Semester: III Information Technology
INT222003: 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**	**(07hrs)**	**COs Mapped – CO4**

Programming language paradigms: Imperative vs Declarative, Structured, concurrent, Object Oriented, Functional, Logic, Event Driven and Concurrent Programming, Language design issues.
Error Handling: Syntax, type system, control flow, build/debugging tools, Memory errors: vulnerabilities, attacks
Data Types: Properties of Types and objects, Elementary data types, structured data types, Type conversion, Binding and binding times.
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Unit II	**Procedures**	**(08hrs)**	**COs Mapped - CO2**

Sequence Control: Implicit and explicit sequence control, Sequencing with arithmetic expressions, sequencing with Nonarithmetic expressions, sequence control between statements.
Subprogram control: Subprogram sequence control, attributes of data control, shared data in subprograms, different parameter passing methods, lifetime of variables (Scope-Local and Global), Storage management Exceptions and Exception handling.
Desirable and undesirable characteristics of procedural programming.

Unit III	**Functional and Parallel Programming**	**(08hrs)**	**COs Mapped - CO5**

Basic concepts of functional programming: Elements of functional programming, Function

declaration, expression, Evaluation, Type checking, datatypes and recursive functions
Haskell basics
List comprehension, Using higher-order functions: lambda, map, fold, Type classes, Lazy Evaluation
Principles of Parallel Programming, Precedence graph, Data parallelism, Control parallelism, Message passing, Shared address space, Synchronization mechanisms, Mapping, Granularity.

Unit IV	**Compilation of Programming Languages**	**(08hrs)**	**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 analyzer/ 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**

Data flow programming design principles, Database programming design principles, Network programming design principles, Internet programming design principles, Windows programming.

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 and Unit-5	6
2	One Test on Unit 3 and 4	4
3	LearniCo Test on Each Unit	10
	Total	20

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S. Y. B. Tech.
Pattern 2022 Semester: III Information Technology
INT222004: Digital Electronics and Logic Design
INT222009: Digital Electronics and Logic Design Laboratory

Teaching Scheme:	**Credit Scheme:**	**Examination Scheme:**
Theory :03 hrs/week **Practical : 02 hrs/week**	**03** **01**	**Continuous Comprehensive Evaluation: 20Marks** **InSem Exam: 20Marks** **EndSem Exam: 60Marks** **Termwork: 25Marks** **Practical Exam: 25 Marks**

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 and Unit-5	6
2	One Test on Unit 3 and 4	4
3	LearniCo Test on Each Unit	10
	Total	**20**

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. i. Binary to gray 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 1) Full adder 2) Any three variable function (Cascade Method)	**CO1, CO3**
4	Design and implement Full Subtractor using decoder IC 74138	**CO1, CO3**
B. Sequential Logic Design		
5	Design and implement 3 bit Up and 3 bit Down Asynchronous Counters using master slave JK flip-flop IC 7476	**CO1, CO2, CO4, CO5**
6	Design and implement 3 bit Up and 3 bit Down Synchronous Counters using master slave JK flip-flop IC 7476	**CO1, CO2, CO4, CO5**
7	Design and implement Modulo 'n' counter with IC 7490	**CO1, CO2, CO4, CO5**
8	Design and implement Modulo 'n' counter with IC 74191	**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.

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S. Y. B. Tech.
Pattern 2022 Semester: III Information Technology
INT222005: Digital Communication

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 Engg.

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

	Course Outcomes	**Bloom's Level**
CO1	Understand basics of Information and Communication Theory	2-Understand
CO2	Understand different Line coding techniques	2-Understand
CO3	Understand basics of Cryptography aspect in communication	2-Understand
CO4	Use different error detection and correction codes in digital communication	3-Apply
CO5	Analyze quality of digital communication in presence of noise	4-Analyze

COURSE CONTENTS

Unit I	**Basics of Information Theory**	**(07hrs)**	**COs Mapped – CO1, CO5**

Introduction to Information Theory, Uncertainty and Information, Average Mutual Information and Entropy, Source Coding Theorem, Huffman Coding, Shannon Fano Elias Coding, Arithmetic Coding Fundamental theorem of Information Theory, Channel Models, Channel Capacity and Channel Coding.

Unit II	**Basics of Communication Theory**	**(07hrs)**	**COs Mapped – CO1, CO5**

Basics of data communication, Types of Signals, , Transmission Impairments, Data Rate Limits, Bandwidth Utilization and Data Rate Limits, Nyquist and Shannon Theorem, Performance – Bandwidth and Throughput.

Unit III	**Digital Transmission**	**(08hrs)**	**COs Mapped – CO2**

Digital to Digital Conversion - Signal element Vs Data Element, Signal rate Vs Data Rate, Line Coding Schemes – Unipolar, Polar, Bipolar: Manchester & Differential Manchester, AMI
Analog to Digital Conversion - Pulse code modulation (PCM), Nyquist Sampling Theorem, Delta modulation, Digital modulation techniques

Unit IV	**Error Detection and Correction**	**(08hrs)**	**COs Mapped –**

			CO4
Types of Errors, Redundancy, Detection Versus Correction, Coding Block Coding : Error Detection, Hamming Distance, Minimum Hamming Distance Linear Block Codes for Error Correction: Basic Definition, Linear Block Codes, Parity Check Code Cyclic Code: Cyclic Redundancy Check (CRC) codes, Encoder and Decoder, Polynomial, CRC code encoder using Polynomial, Cyclic Code Analysis			
Unit V	**Introduction to Cryptography**	**(06hrs)**	**COs Mapped – CO3**
Definition, Plain text, Cipher text, Key – Symmetric & Asymmetric Key Cryptography, Traditional Ciphers- Substitution & Transposition, RSA Algorithm.			

Text Books

1. Behrouz A. Forouzan, "Data Communication and Networking", McGraw Hill,2012, Fifth Edition, ISBN:978-0073376226
2. Ranjan Bose, "Information Theory Coding and Cryptography", McGraw Hill, 2017, Third Edition, ISBN: 978-9385880568

Reference Books

1. J. A. Thomas and T. M. Cover, "Elements of Information theory", JohnWiley,2006, Second Edition, ISBN: 978-0471241959
2. K. Sam Shanmugam, "Digital and analog communication systems", John Wiley 2006, ,ISBN: 978-8126509140

Guidelines for Continuous Comprehensive Evaluation of Theory Course		
Sr. No.	**Components for Continuous Comprehensive Evaluation**	**Marks Allotted**
1	Two Assignments on Unit-1& 2 and Unit-5	6
2	One Test on Unit 3 and 4	4
3	LearniCo 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 2022 Semester: III Information Technology
INT222006: Ethics and Values in Information Technology

Teaching Scheme:	**Credit Scheme:**	**Examination Scheme:**
Theory : 01 hr/week	**01**	**Termwork: 25 Marks**

Prerequisite Courses : - Nil

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

	Course Outcomes	**Bloom's Level**
CO1	Apprehend ethics in the business relationships and practices of IT.	2- Understand
CO2	Adapt the global ethical principles in IT Profession.	3-Apply
CO3	Implement trustworthy computing to manage risk and security vulnerabilities.	3-Apply
CO4	Analyze concerns of privacy and privacy rights in information-gathering practices in IT.	4-Analyze

COURSE CONTENTS

The course is based on the overview of the Ethics which focuses on specifically on Ethics in the Business World and Ethics in IT. Ethics plays an important role in IT professionals which are mainly focused in this course. Along with this, this course discuss various Common Ethical Issues for IT Users. It gives focus on Social Networking Ethics and various Issues in Social Networking Ethics.

Unit I	**An Overview of Ethics**	**(03hrs)**	**COs Mapped – CO1, CO2**

An overview of Ethics: Brief about ethics, Ethics in the Business World, Ethics in IT.
Ethics for IT professionals and IT users: IT professionals: Changing Professional Services, Professional Relationships, Codes of Ethics, awareness of IT malpractices,
IT Users: Common Ethical Issues for IT Users, Supporting the Ethical Practices of IT Users.

Unit II	**Computer And Internet Crime**	**(03hrs)**	**COs Mapped – CO3, CO4**

Introduction: IT security incidents, Types of Exploits, Types of Perpetrators, Laws for Prosecuting Computer Attacks, Implementing Trustworthy Computing, Risk and Vulnerability Assessment, Educating Employees, Contractors, and Part-Time Workers,Establishing a Security Policy
Privacy: The right of Privacy, Privacy Protection and the Law, Key Privacy and Anonymity Issues Identity Theft, Consumer Profiling, Treating Consumer Data Responsibility
Workplace Monitoring Freedom of Expression: Defamation and Hate Speech, Key issues, Controlling Access to Information on the Internet, Anonymity on the Internet, Corporate Blogging, Pornography

Unit III	Social Networking & Ethics of IT Organization	(03hrs)	COs Mapped – CO1, CO3, CO4
Social Networking: Brief about Social Networking, Social Networking Ethical Issues: Cyber bullying, Cyber stalking, Encounters with Sexual Predators, Uploading of Inappropriate Material, **Online Virtual Worlds**: Crime in Virtual Worlds, Educational and Business Uses of Virtual Worlds. Ethics of IT Organization: Key Ethical Issues for Organizations, of Workers, Outsourcing, Whistle blowing, Code of Ethics and Professional Conduct.			
Unit IV	**Case Study**	**(03hrs)**	**COs Mapped - CO1, CO2, CO3, CO4**
Malware, Medical Implants, Abusive Workplace Behaviour, Automated Active Response Weaponry, Malicious Inputs to Content Filters.			

Text Books

1.George Reynolds, "Ethics in Information Technology", Cengage learning,2019, 5th Edition, ISBN: 978-1285197159
2. R. Subramanian, "Professional Ethics", Oxford University Press, 2017, 2nd Edition, ISBN: 978-0199475070

Reference Books

1. William Lillie,"An Introduction to Ethics", Allied Publishers,1967, ISBN: 978-8170230366
2. Charles b. Fleddermann, "Engineering Ethics", Prentice Hall, 2011, ISBN:978-0132145213
3. M.Govindarajan, S.Natarajan & V.S.Senthilkumar, "Engineering Ethics &Human Values", PHI Learning, 2009, ISBN: 978-8120348165

K.K.Wagh Institute of Engineering Education and Research, Nashik
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S. Y. B. Tech.
Pattern 2022 Semester: III Information Technology
INT222008: 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++

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

	Course Outcomes	**Bloom's Level**
CO1	Implement classes, objects, methods and explore object creation, initialization.	3-Apply
CO2	Implement different types of exception handling techniques and perform generic programming.	3-Apply
CO3	Implement Database connectivity.	3-Apply
CO4	Implement the concept of Abstract Class and Inheritance.	3-Apply

Text Books

1. Herbert Schildt, Java - The Complete Reference**,** McGraw-Hill Education, 11th Edition, ISBN: 978-1260440232
2. Cay S. Horstmann & Gary Cornell, Core Java – Fundamentals, 2007, 8th Edition, ISBN: 978-0132354769

Reference Books

1. R. Nageswara Rao, Core Java: An Integrated Approach, DreamTech Press, 2015, ISBN:978-9351199250
2. Barry Burd, Beginning Programming with Java For Dummies, 5th Edition, ISBN**:**978-8126570867

List of Laboratory Experiments / Assignments

Sr. No.	**Laboratory Experiments / Assignments**	**CO Mapped**
1	Use Eclipse or Netbean platform and acquaint with the various menus, create a test project, add a test class and run it see how you can use auto suggestions, auto fill. Try code formatter and code refactoring like renaming variables, methods and classes. Try debug 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 that connects to a database using JDBC and select from table.	**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 2022 Semester: III Information Technology
INT222010: Soft Skills Lab

Teaching Scheme:	**Credit Scheme:**	**Examination Scheme:**
Practical : 02 hrs/week	**01**	**Termwork: 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.
4. 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 –** a. Explain how to introduce oneself in a professional manner and presenting oneself positively Name, Academic Profile, Achievements, Career Aspirations, Personal Information (hobbies, family, social). b. 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.	**CO1**

	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.	
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. Plagiarism should be discredit and students should be instructed about it.	**CO2, CO3**
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.	**CO3, CO4**

	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.	
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**

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S.Y.B.Tech.
Pattern 2022 Semester: IV Information Technology
SMH222111: Applied Mathematics-III

Teaching Scheme:	Credit Scheme:	Examination Scheme:
Theory: 03hrs/week **Tutorial:01hr/week**	**03** **01**	**Continuous Comprehensive Evaluation:20Marks** **InSem Exam: 20Marks** **EndSemExam:60Marks** **Tutorial:25Marks**

Prerequisite Courses:- Applied Mathematics-I

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

	Course Outcomes	Bloom's Level
CO1	Understand basic concept of Statistic	2-Understand
CO2	Understand basic concept of probability distribution	2-Understand
CO3	Apply the basic concepts of statistics to real life problems	3-Apply
CO4	Apply the basic concepts of probability distribution theory to real life problems	3-Apply
CO5	Analyze real life problems by using theory of statistics and Probability distribution	4-Analyze

COURSE CONTENTS

UnitI	**Descriptive Measures**	**(08hrs+2hrsTutorial)**	**COs Mapped - CO1, CO2, CO3**

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**	**(08hrs+2hrsTutorial)**	**COs Mapped -CO1, CO2, CO3**

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	**Mathematical Expectation and Generating Function**	**(08hrs+2hrsTutorial)**	**COs Mapped - CO3, CO4, CO5**

Mathematical Expectation, Properties of expectation, Moment Generating Function

Unit IV	Probability Distributions	(08hrs+2hrsTutorial)	COsMapped - CO4, CO5
Discrete distributions: Geometric, Binomial, Poisson, Uniform Distribution Continuous distribution: Normal distribution, Standard Normal, Uniform.			
Unit V	**Correlation and Regression**	**(08hrs+2hrsTutorial)**	**COs Mapped - CO1, CO2**
Covariance, Concept of correlation, Karl Pearson's Coefficient of Correlation, Rank Correlation coefficient, Spearman's rank Correlation coefficient. Regression: Lines of Regression, Regression coefficients.			

TextBooks

1. B.V.Ramana,"Higher Engineering Mathematics", TataMcGraw-Hill.
2. B.S.Grewal,"Higher Engineering Mathematics",Khanna Publication,Delhi.
3. AdvancedEngineeringMathematics,7e,bypeterV.O"Neil(ThomsonLearning)
4. IntroductiontoProbabilityandStatistics forEngineersandScientists,5e, bySheldonM.Ross(ElsevierAcademicPress)

ReferenceBooks

1. Erwin Kreyszig,"Advanced Engineering Mathematics",WileyEastern Ltd.
2. P.N.Wartikar and J.N.Wartikar,"Applied Mathematics"(VolumesI and II), Pune Vidyarthi Griha Prakashan, Pune.
3. AdvancedEngineeringMathematics,2e,by M.D.Greenberg(PearsonEducation).

Guidelines for Continuous Comprehensive Evaluation of Theory Course		
Sr.No.	**Components for Continuous Comprehensive Evaluation**	**Marks Alloted**
1	Assignments (Total3Assignment, Unit I and II 20marks,Unit III and IV20marks and UnitV- 10marks &50markswillbeconvertedto10Marks)	10
2	Tests on each unit using LearniCo (Each test for15 Marks and total will be converted out of 10Marks)	10

List of Tutorial Assignments		
Sr.No.	Title	CO Mapped
1	Examples on measures of central tendency and measures of dispersion	CO1,CO2, CO3
2	Examples on Probability density function (p.d.f.) and Cumulative distribution function (Continuous and discrete).	CO1,CO2, CO3
3	Examples on Probability mass function (p.m.f.) and Probability density function (p.d.f.)	CO1,CO2
4	Examples on Cumulative distribution function (Continuous and discrete).	CO1,CO2
5	Solve problems on measures of central tendency using MATLAB	CO1,CO2, CO3,CO4
6	Solve problems on measures of dispersion using MATLAB	CO1,CO2, CO3,CO4
7	Examples on Mathematical Expectation, Properties of expectation,	CO1,CO2, CO3

8	Examples on Moment generating function	CO1,CO2, CO3
9	Examples on Geometric, Binomial, Poisson, Uniform Distribution	CO3, CO4,CO5
10	Examples on Normal, Standard Normal &Uniform distribution	CO3, CO4,CO5
11	Examples on Covariance, Karl Pearson's Coefficient of Correlation, Rank Correlation coefficient, Spearman's rank Correlation coefficient.	CO4,CO5
12	Examples on Lines of regression, Regression coefficients.	CO4,CO5

Guidelines for Tutorial/Termwork Assessment		
Sr.No.	**Components for Tutorial/Termwork Assessment**	**Marks Allotted**
1	Assignment on Computational Software	5
2	Tutorial (Each tutorial carries 15marks)	15
3	Attendance (Above95%:05Marks,below75%: 0Marks)	5

K.K.Wagh Institute of Engineering Education and Research, Nashik
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S. Y. B. Tech.
Pattern 2022 Semester: IV Information Technology
INT222012: Database Management System
INT222017: Database Management System Laboratory

Teaching Scheme:	Credit Scheme:	Examination Scheme:
Theory : 03 hrs/week **Practical : 04 hrs/week**	**03** **02**	**Continuous Comprehensive Evaluation: 20Marks** **InSem Exam: 20Marks** **EndSem Exam: 60Marks** **Termwork: 25Marks** **Practical Exam: 50Marks**

Prerequisite Courses: - Data Structures and Algorithms

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

	Course Outcomes	Bloom's Level
CO1	Use emerging database technologies for large scale data management	2-Understand
CO2	Recognize the processes applied for Transaction Management and query optimization as well as formulate database queries using PL/SQL	2-Understand
CO3	Explain Database recovery methods and architectures	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 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 Modeling: Basic concepts, Entity, attributes, 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, 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, Tables: Creating, Modifying, Deleting.
Views: Create, Drop, Update on Views, Indexes, Nulls.
SQL DML Queries: SELECT query and clauses, Set operations, Tuple Variables, Set comparison, Ordering of Tuples, Aggregate Functions, Nested Queries, Database Modification using SQ Insert, Update, Delete Queries.
PL-SQL constructs: 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	(07hrs)	COs Mapped – CO2

Transaction Management: Basic concept of a Transaction, Properties of Transactions, Database Architecture, Concept of Schedule, Serial Schedule.
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.

Unit V	Database Recovery and Architectures	(07hrs)	COs Mapped – CO1, CO3

Different crash recovery methods: Shadow-Paging.
Log-based Recovery: Deferred and Immediate
Database Architectures: Centralized and Client-Server Architectures, 2 Tier and 3 Tier Architecture, Introduction to Parallel Databases, Key elements of Parallel Database Processing, Architecture of Parallel Databases, Introduction to Distributed Databases, Architecture of Distributed Databases, Distributed Database Design.

Text Books

1. Silberschatz A., Korth H., Sudarshan S. "Database System Concepts", 2013, 6th edition, Tata McGraw Hill Publishers, ISBN: 978-0-07-352332-3
2. G. K. Gupta "Database Management Systems" , Tata McGraw Hill, 2012, 3rd Edition, ISBN: 9781617291562

Reference Books

1. Rab P., Coronel C. "Database Systems Design, Implementation and Management", 5th edition, Thomson Course Technology, 2002, ISBN 981-243-135-7
2. Ramkrishna R., Gehrke J. " Database Management Systems", 3rd edition, McGraw Hill, 2002, ISBN: 0072465638
3. Navathe S. " Fundamentals of Database Systems", 4th edition, Pearson Education, 2003, ISBN: 0-321-12226-7

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	LearniCo Test on Each Unit	10
	Total	**20**

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**
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 • Implementation of SQL relational operators • Boolean operators and pattern matching • Arithmetic operations and built in functions • Group functions • Processing Date and Time functions • 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**
	Group C : PL/SQL	
9	Write and execute PL/SQL stored procedure and function to perform a suitable task on the database. Demonstrate its use	**CO3**
10	Write and execute suitable database triggers .Consider row level and statement level triggers	**CO3**
11	Write a PL/SQL block to implement all types of cursor	**CO3**
	Group D: Relational Database Design	
12	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.	**CO2**

13	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 opensource 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). Programcodes with sample outputs shall be submitted in soft form.

Guidelines for Termwork Assessment

1. Continuous assessment of laboratory work shall be based on overall performance of a student.
2. 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).

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S. Y. B. Tech.
Pattern 2022 Semester: IV Information Technology
INT222013: Computer Organization and Architecture
INT222018: Assembly Language Programming Lab

Teaching Scheme:	**Credit Scheme:**	**Examination Scheme:**
Theory :03 hrs/week **Practical : 02 hrs/week**	**03** **01**	**Continuous Comprehensive Evaluation: 20Marks** **InSem Exam: 20Marks** **EndSem Exam: 60Marks** **Termwork: 25 Marks** **Practical Exam: 25 Marks**

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 operations

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, Assembler directives

Unit III	Memory & Input / Output Systems	(07hrs)	COs Mapped - CO1,CO3
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**
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**
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.
3. Peter Abel, Niyaz Nizamuddin, "IBM PC Assembly Language and Programming", Fifth edition, Pearson, 2007, ISBN: 9 798177 586564

Guidelines for Continuous Comprehensive Evaluation of Theory Course		
Sr. No.	**Components for Continuous Comprehensive Evaluation**	**Marks Allotted**
1	Two Assignments on Unit-1& 2 and Unit-5	6
2	One Test on Unit 3 and 4	4
3	LearniCo Test on Each Unit	10
	Total	**20**

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 i. HEX to BCD ii. BCD to HEX iii. EXIT. Display proper strings to prompt the user while accepting the input and displaying the result.	**CO2**
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: i. Display length of the String ii. 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: i) Concatenation of two strings ii) 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 i. To delete a file ii. To create a directory	**CO2**

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: - 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 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 2022 Semester: IV Information Technology
INT222014: Computer Graphics
INT222019: Computer Graphics Laboratory

Teaching Scheme:	Credit Scheme:	Examination Scheme:
Theory :03 hrs/week **Practical : 02 hrs/week**	**03** **01**	**Continuous Comprehensive Evaluation: 20Marks** **InSem Exam: 20Marks** **EndSem Exam: 60Marks** **Termwork: 25Marks** **Practical Exam: 25Marks**

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, Colour 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

Polygons: Polygons and its types, inside test, Polygon filling methods: Seed Fill – Flood fill and Boundary Fill, Scan-line Fill algorithm
2D Transformations: Translation, Scaling, Rotation, Reflection and Shearing, Matrix representation and homogeneous coordinate system, composite transformations

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", 2nd Edition, Tata McGraw-Hill Publication, 1997, ISBN 0–07–047371–4.

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

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: i) Simple Line ii) Dotted Line iii) Dashed Line iv) 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 : i) Flood fill / Seed fill ii) 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: i) Scaling ii) Rotation about arbitrary point iii) 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).

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S. Y. B. Tech.
Pattern 2022 Semester: IV Information Technology
INT222015: Financial Management

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

Prerequisite Courses: - Nil

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

	Course Outcomes	**Bloom's Level**
CO1	Understand terminologies such as Capex, Opex, Return on Investment, profitability	2- Understand
CO2	Interpret the Balance sheet of a Company for Small, Medium and Large Size	2- Understand
CO3	Understand information about formal courses on Finance and Accounting	2- Understand
CO4	Analyze financial statements, their importance and impact on business	4-Analyze
CO5	Present a case study, based on their own findings and thereby learn importance of good Financial Management over and above Engineering and Technology	4-Analyze

COURSE CONTENTS

Unit I	Basics of Accounting	(06hrs)	**COs Mapped -** CO1
Basics of Accounting Debit, Credit, Books of accounts ,Ledgers Cash flow statements, Assets and Liabilities, Understanding Balance Sheet and Profit & Loss Statement of Companies with Examples of actual Balance Sheets of Small, Medium, Large Size Companies			
Unit II	Basics of Finance	(06hrs)	**COs Mapped -** CO1, CO2
Conceptual Understanding of Cost, Expense, Gross & Net Profit, ROI, Dividend, Depreciation, Taxes, Duties, Reserves, Insurance, Finance for Startups- Govt Schemes / PSU &PSE Bank Finance, Bank Scrutiny for approvals			
Unit III	Project Budgeting	(06hrs)	**COs Mapped –** CO2
Project Budgeting, Capex, Opex and Importance of tracking cost of projects in execution, Key financial ratios, their interpretation, comparison of ratio with competition to identify improvement areas etc.			
Unit IV	Financial Portfolio Management	(06hrs)	**COs Mapped -** CO2
Financial Portfolio Management with Govt and Private Agencies: Key Options of Savings/ Investment – Debt, Equity, Brief Introduction to Mutual Funds and Stock Market.			

Unit V	Case Study	(06hrs)	**COs Mapped –** CO3
Working Capital Management and Ratio Analysis			

Text Books

1. M. P. Narayanan, Vikram K. Nanda, "Finance for Strategic Decision-Making: What Non-Financial Managers Need to Know (J-B-UMBS Series)", 2004, University of Michigan Business School, ISBN: 978-0787965174
2. Karen Dillon , "HBR Guide to Finance Basics for Managers (HBR Guide Series)", Harvard Business Review Press, ISBN: 9781422187302

Reference Books

1. Ramsden Philip, " Finance for Non-financial Managers (Teach Yourself)", Flash, 2008, ISBN: 978-0340972878
2. H. George Shoffner, Susan Shelly, Robert Cooke, "The McGraw-Hill 36-Hour Course: Finance for Non-Financial Managers", McGraw-Hill, ISBN: 978-0071425469

Guidelines for Continuous Comprehensive Evaluation of Theory Course		
Sr. No.	**Components for Continuous Comprehensive Evaluation**	**Marks Alloted**
1	Two Assignments on Unit-1, 2 & Unit 3,4 &5	10
2	Group Presentations	10

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S. Y. B. Tech.
Pattern 2022 Semester: IV Information Technology
INT222016: Audit Course - Film and Art Appreciation

Teaching Scheme:	**Credit Scheme:**	**Examination Scheme:**
Theory : 01 Hr / Week	**-**	**-**

Prerequisite Courses: - Nil

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

	Course Outcomes	**Bloom's Level**
CO1	Demonstrate an understanding of the terminology and conventions of visual expression	2-Understand
CO2	Critically analyze and interpret works of art in terms of form and content.	4-Analyze
CO3	Communicate knowledge of art practices, meaning, values, and methods within diverse historical and cultural contexts	4-Analyze
CO4	Evaluate and critique works of art as assigned in class	4- Analyze

COURSE CONTENTS

Unit I	**Introduction to Art**	(02hrs)	**COs Mapped -** CO1

The Nature of Art , Awareness, Creativity, and Communication , What Is Art and How Does It Work , Why Do We Make Art, Who Are the Artists and Who Uses Art

Unit II	**The Language of Visual Experience**	(02hrs)	**COs Mapped -** CO1, CO2

Visual Elements, Principles of design, Style, Evaluation and Criticism

Unit III	**Two and three Dimensional Arts**	(02hrs)	**COs Mapped –** CO2

Drawing , Painting , Printmaking , Camera and Computer Imaging , Graphic Design and Illustration, Sculpture, Clay, Glass, Metal, Wood, Fiber, Architecture and Environmental Design

Unit IV	**Film Appreciation**	(02hrs)	**COs Mapped -** CO2

What is Film Appreciation? , What do we watch when we watch Films?, Cinema as a Audio-Visual, Spatio-Temporal Medium, Editing in Films, Understanding Mise-En-Scene, Film Sound, Visual Literacy in Cinema

Reference Books

1. Art and Faith: A Theology of Making (Hardcover) by Makoto Fujimura
2. The World Viewed : Reflections on the Ontology of Film, Enlarged Edition by Stanley Cavell

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

S. Y. B. Tech.
Pattern 2022 Semester: IV Information Technology
INT222020: Project Based Learning

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

Prerequisite Courses: Engineering Exploration

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

	Course Outcomes	**Bloom's Level**
CO1	Apply principles from several disciplines.	**3-Apply**
CO2	Demonstrate long-term retention of knowledge and skills acquired.	**3-Apply**
CO3	Implement and integrate various modules of the project	**3-Apply**
CO4	Understand Ethics in IT as well as roles and responsibilities of team members	**4-Analyze**
CO5	Prepare the documentation of the Project Development process	**5-Evaluate**

Reference Books

1. Project-Based Learning, Edutopia, March 14, 2016.
2. What is PBL? Buck Institute for Education.

Preamble

Project Based Learning (PBL) is mainly intended to create to development student's skill set through collaborative as well as personalized learning. These projects are based on problems, which are real-life oriented, curriculum-based and often interdisciplinary.

Students can make use of learning obtained from subjects like Data Structures, Programming Paradigms and Methodology, Digital Electronics and learning from subjects of first and second year to identify problem statement, apply feasibility check and define scope of implementation.

During the course, students will learn how to approach a problem and what activities or processes are required to implement the solution for the problem. Student will also learn to collect, analyze, and synthesize the required information for the project. The main focus of PBL is to motivate the students for self learning and team efforts.

Guidelines for Course Conduction

Project statement finalization:

1. The project selection should be aligned with the IT field. Additionally multi-disciplinary project topic should be preferred.
2. Before the finalization of the topic detail analysis of information and its documentation is expected.
3. Use of Modern Tools and Methodologies are recommended for design and development of project
4. Problem may require in depth study of specific practical, scientific or technical domain.

Team Size: Team of 3 to 4 students.

Mentor/Guide Role: Mentor for each individual group. Mentor should help to the students in following points

- Skill assessment of students for formation of diversified and balanced groups

- Discussion of sample case projects
- Design of the rubrics for evaluation of student performance
- Discussion of the rubrics with students
- Weekly and final Assessment of the deliverables

Guidelines for Course Completion

Students will exhibit/demonstrate the completed project at the end of the semester along with a brief report in a recommended format as term work submission.

Guidelines for Term work Assessment

The Mentor/Guide is committed to assess and evaluate the students' performance. Progress of work done will be monitored on weekly basis.

During process of monitoring and continuous assessment, the individual and team performance is to be measured.

- Individual assessment for each student should be based on understanding individual capacity, role and involvement in the project.
- Group assessment should be based on roles defined, distribution of work, intra-team communication and togetherness.
- Documentation and Demonstration.

It is recommended that all activities are to be recorded regularly and proper documents are to be maintained by both students as well as the course teacher.
Continuous Assessment Sheet (CAS) is to be maintained by the Mentor/Guide.

It is recommended that the all activities are to be recorded in PBL workbook, regular assessment of work to be done and proper documents are to be maintained at college end by both students as well as mentor. The PBL workbook will reflect accountability, punctuality, technical writing ability and work flow of the task undertaken. Continuous Assessment Sheet (CAS) is to be maintained by respective mentor. Recommended parameters for assessment, evaluation and weightage:

1. Consideration of Environment/ Social /Ethics/ Safety measures/Legal aspects for Idea Inception (10%)
2. Documentation (Gathering requirements, design & modeling, implementation/execution, use of technology and final report, other documents (25 %)
3. Team work (task distribution, communication, contribution, cohesiveness) (10%)
4. Outcomes of PBL/Problem Solving Skills/Solution provided/Final product (40%) (Individual assessment and team assessment)
5. Demonstration (Presentation, User Interface, Usability etc.) (15%)

Design the rubrics based on the above parameters for evaluation of student performance