SEM I

Walchand College of Engineering, Sangli

(Government Aided Autonomous Institute)

AY 2024-25

Course Information

Programme	B.Tech. (Information Technology)
Class, Semester	Second Year B. Tech., Sem III
Course Code	7MA206
Course Name	Discrete Mathematics
Desired Requisites:	General curiosity, maturity expected from adult student.

Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	3 Hrs/week	ISE	MSE	ESE	Total
Tutorial		20	30	50	100
		Credits: 3			

Course Objectives

1	To impart logical thinking and its application to computer science.
2	To inculcate ability to reason and ability to present a coherent and mathematically correct argument.
3	To present the knowledge and skills obtained to investigate and solve a variety of discrete mathematical problems.

Course Outcomes (CO) with Bloom's Taxonomy Level

At the end of the course, the students will be able to,

CO	Course Outcome Statement/s	Bloom's Taxonomy Level	Bloom's Taxonomy Descriptor
CO1	Articulate fundamental concepts such as sets, relations, functions, logic, and proof techniques.	II	Understanding
CO2	Adapt problem-solving skills using mathematical reasoning and logical thinking to solve problems related to discrete structures.	III	Applying
CO3	Maximize proficiency in algorithmic thinking and apply algorithms to solve problems involving graphs, trees, and networks.	IV	Analyzing
CO4	Checking combinatorial principles, counting techniques, permutations, combinations, and their applications.	V	Evaluating

Module	Module Contents	Hours
I	**Logic:** Proposition and Predicate Logic, introduction to proof techniques. Advanced proof techniques, resolution, induction	6
II	**Set Theory:** Definitions and notation, Set operations, Venn diagrams, Cartesian products and power sets, Cardinality theory, countable and uncountable sets, Cantors diagonalization, multisets.	6
III	**Relations and Functions:** Relations and Their Properties: Definitions and examples, Representing Relations: Matrices of relationss, Directed graphs. Properties of relations: Equivalence relations and partitions, Partial orderings	7
IV	**Combinatorics:** The rule of sum and the rule of product, Permutations and combinations, Pigeonhole principle, Inclusion-exclusion principle, recurrence relations, generating functions.	6

V	**Graph and Trees:** Graph Theory: Definitions and basic concepts, Types of graphs, Graph isomorphism, Connectivity in graphs. Graph Algorithms: Euler and Hamiltonian paths, Planar graphs and graph coloring. Graph as Trees: Introduction to Trees, Definitions and properties, Rooted trees, Tree traversal algorithms, Spanning trees, Applications of Trees, Binary search trees.	7
VI	**Abstract Algebra:** Introduction, Groups, Subgroups, Generators and Evaluation of Powers, Permutation Groups, Lattices and Algebraic Systems, Basic Properties of Algebraic System Defined by Lattices, Distributive and Complemented Lattices.	6

Textbooks	
1	C. L. Liu, D P Mohapatra, "Elements of Discrete Mathematics: A Computer Oriented Approach", TMG, 3rd Edition, 2011.
2	Kenneth H. Rosen," Discrete Mathematics and Its Application", TMG, 7th Edition, 2011
3	J.P. Tremblay &R. Manohar,"Discrete Mathematical structure with applications to computer",TMG, 1st Edition, 1997.

References	
1	K.D. Joshi, "Foundation of Discrete Mathematics", 2019
2	Lipschutz, Marc Lipson ,"Discrete mathematics", Schaum'soutline series,3rd Edition, 2007

Useful Links	
1	https://nptel.ac.in/courses/106106183
2	https://nptel.ac.in/courses/106108227

CO-PO Mapping

	Programme Outcomes (PO)												**PSO**	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3											1	1	
CO2	2	3		1								2		1
CO3		2		2								1	1	
CO4	3	2	2	1										1

The strength of mapping is to be written as 1,2,3; Where, 1: Low, 2: Medium, 3: High
Each CO of the course must map to at least one PO.

Assessment

The assessment is based on MSE, ISE and ESE.
MSE shall be typically on modules 1 to 3.
ISE shall be taken throughout the semester in the form of teacher's assessment. Mode of assessment can be field visit, assignments etc. and is expected to map at least one higher order PO.
ESE shall be on all modules with around 40% weightage on modules 1 to 3 and 60% weightage on modules 4 to 6.
For passing a theory course, Min. 40% marks in (MSE+ISE+ESE) are needed and Min. 40% marks in ESE are needed. (ESE shall be a separate head of passing)

Walchand College of Engineering, Sangli

(Government Aided Autonomous Institute)

AY 2024-25

Course Information

Programme	B.Tech. (Information Technology)
Class, Semester	Second Year B. Tech., Sem III/IV
Course Code	7IT201
Course Name	Data Structures
Desired Requisites:	Programming in C including pointers and File Handling

Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	3 Hrs/week	**ISE**	**MSE**	**ESE**	**Total**
Tutorial	-	20	30	50	100
		Credits: 3			

Course Objectives

1	To use specific data structures for algorithm
2	To describe use of recursion in program development
3	To explain linear, non-linear data structures and algorithms

Course Outcomes (CO) with Bloom's Taxonomy Level

At the end of the course, the students will be able to,

CO	**Course Outcome Statement/s**	**Bloom's Taxonomy Level**	**Bloom's Taxonomy Description**
CO1	Describe the fundamental concepts of data structure using dynamic memory allocation	II	Understanding
CO2	Recite use of linear and non-linear data structures like link list and trees	III	Applying
CO3	Identify need of recursion and solve various recursive problem	IV	Analyzing
CO4	Compare various searching and sorting techniques to analyse performance of algorithms	IV	Analyzing

Module	**Module Contents**	**Hours**
I	**Introduction:** Basic Concepts: Algorithm, Pseudo-code, ADT, Data Structure, Algorithmic Efficiency, And Recursion, Dynamic Memory allocation, Introduction of Pointers to Arrays ,functions and Structures.	5
II	**Linked Lists:** Concept of linked organization, Singly linked list, doubly linked list and dynamic storage management, circular linked list, Operations such as insertion, deletion, inversion, concatenation, computation of length, traversal on linked list, Representation and manipulations of polynomials using linked lists	7
III	**Stacks and Queues:** Fundamentals stack and queue as ADT, Representation and Implementation of stack and queue using linked organization, Circular queue: representation and implementation, Application of stack for expression evaluation and for expression conversion, Backtracking, Stacks and Recursion, Priority queue Doubly Ended Queue.	7
IV	**Trees:** Basic terminology, binary trees and its representation, binary tree traversals (recursive and nonrecursive), operations such as copy, equal on binary tree, expression trees, General Trees, Binary Search Trees, Heaps and its operations. B-Tree – B+ Tree	7

V	**Graphs:** Terminology and Representation of graphs using adjacency matrix, adjacency list and adjacency Multi-list, Traversals Depth First and Breadth First, Minimum Spanning Tree	6
VI	**Searching & Sorting Technique:** **Search:** Importance of searching, Sequential, Binary, Fibonacci search algorithms, Sorting: Internal and External Sorts, Insertion, Shell, Heap, Quick sort, Merge sort, Radix sort, Two-way merge sort **Hashing:** Hashing functions, overflow handling with and without chaining, open addressing: linear, quadratic, double, rehashing, Indexing Techniques: hashed indexes, File Handling.	8

Textbooks	
1	Richard F. Gilberg, Behrouz A. Forouzan, "Data Structures, A Pseudocode Approach With C", Cengage Learning, 2nd Edition, 2007
2	S. Lipschutz, "Data Structures with C", Schaum's Outlines Series, Tata McGraw-Hill, 2nd edition, 2017
3	Narsimha Karumanchi "Data Structure and algorithms", Careermonk 5th edition, 2011

References	
1	Yashavant Kanetkar, "Understanding pointers in C", 6th edition, BPB Publication, 2019

Useful Links	
1	https://nptel.ac.in/courses/106/102/106102064/
2	https://archive.nptel.ac.in/courses/106/106/106106127/

CO-PO Mapping

	Programme Outcomes (PO)												**PSO**	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3		2	1										2
CO2		3											3	
CO3	2	2	1	2									2	
CO4	3	1		3										2

The strength of mapping is to be written as 1: Low, 2: Medium, 3: High
Each CO of the course must map to at least one PO.

Assessment

The assessment is based on MSE, ISE and ESE.
MSE shall be typically on modules 1 to 3.
ISE shall be taken throughout the semester in the form of teacher's assessment. Mode of assessment can be field visit, assignments etc. and is expected to map at least one higher order PO.
ESE shall be on all modules with around 40% weightage on modules 1 to 3 and 60% weightage on modules 4 to 6.
For passing a theory course, Min. 40% marks in (MSE+ISE+ESE) are needed and Min. 40% marks in ESE are needed. (ESE shall be a separate head of passing)

Walchand College of Engineering, Sangli
(Government Aided Autonomous Institute)

AY 2024-25

Course Information

Programme	B.Tech. (Information Technology)
Class, Semester	Second Year B. Tech., Sem IV
Course Code	7IT202
Course Name	Computer Networks
Desired Requisites:	Data Communication and Networking

Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	2 Hrs/week	**ISE**	**MSE**	**ESE**	**Total**
Tutorial	-	20	30	50	100
		Credits: 2			

Course Objectives

1	Describe fundamental concepts of computer networking
2	Introduce various services provided by TCP/IP model
3	Acquaint with different protocols of TCP/IP and OSI model

Course Outcomes (CO) with Bloom's Taxonomy Level

At the end of the course, the students will be able to,

CO	**Course Outcome Statement/s**	**Bloom's Taxonomy Level**	**Bloom's Taxonomy Description**
CO1	Discuss functioning of various networking components for local and wide area network	II	Understanding
CO2	Illustrate physical, logical and service point addressing system using IPv4 and IPv6	III	Applying
CO3	Explain port and service point mechanism using sockets	IV	Analyzing
CO4	Compare different protocols of TCP/IP model for various applications	IV	Analyzing

Module	**Module Contents**	**Hours**
I	**Data link layer** Analog and Digital Data Transmission. Wired and Wireless Transmissions, Frame structure, error control, flow control, Multiple Access Protocols- CSMA, CSMA/CD, Ethernet Cabling.	4
II	**Network Layer** Network Layer Design issues- Packet Switching, Services to transport layer, Routing- Static & Dynamic routing, flooding, Fragmentation. Congestion Control Algorithms.	4
III	**The Network Layer in the Internet** Addressing, Internet Control Protocols- SPF, BGP, IP operations, Sub-netting, Super-netting, IPv4, IPv6.	5
IV	**Transport Layer** Elements of transport protocol- TCP segment header, TCP Port, Socket Programing, TCP connection establishment, release, flow control, buffering and multiplexing. UDP, RPC, RTP, service points and sockets.	5
V	**Application Layer** DNS—The Domain Name System-name space, resource records, name servers. Electronic Mail- architecture and service, user agent, message format and transfer final delivery.	4

VI	**Application Layer Protocols** The World Wide Web-architecture overview, Application layer protocol: HTTP, FTP, SMTP, Case study: Campus Network.	4
Textbooks		
1	Larry Peterson and Bruce Davie, "Computer Networks: A Systems Approach", Morgan Kaufmann, 6th Edition, October 2020	
2	Behrouz A. Forouzan, "Data Communication and Networking" TMGH 4th edition., 2013	
References		
1	James F. Kurose, Keith W. Ross, "Computer Networking: A Top-Down Approach", 7th Edition, Pearson Publication, 2016	
Useful Links		
1	https://nptel.ac.in/courses/106105183	
2	https://archive.nptel.ac.in/courses/106/105/106105081/	

CO-PO Mapping

	Programme Outcomes (PO)												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	1											2	
CO2	2	3	1											2
CO3	2		3										2	
CO4	3	2		2									3	

The strength of mapping is to be written as 1: Low, 2: Medium, 3: High
Each CO of the course must map to at least one PO.

Assessment

The assessment is based on MSE, ISE and ESE.
MSE shall be typically on modules 1 to 3.
ISE shall be taken throughout the semester in the form of teacher's assessment. Mode of assessment can be field visit, assignments etc. and is expected to map at least one higher order PO.
ESE shall be on all modules with around 40% weightage on modules 1 to 3 and 60% weightage on modules 4 to 6.
For passing a theory course, Min. 40% marks in (MSE+ISE+ESE) are needed and Min. 40% marks in ESE are needed. (ESE shall be a separate head of passing)

Walchand College of Engineering, Sangli

(Government Aided Autonomous Institute)

AY 2024-25

Course Information

Programme	B. Tech. (Information Technology)
Class, Semester	Second Year B. Tech., Sem III
Course Code	7IT203
Course Name	Computer Architecture & Microprocessor
Desired Requisites:	Digital Electronics

Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	3 Hrs/week	**ISE**	**MSE**	**ESE**	**Total**
Tutorial	-	20	30	50	100
		Credits: 3			

Course Objectives

1	To Provide fundamental knowledge of processors architecture & the memory organization
2	To Instruct the basic concepts of execution speedup by pipelining
3	To demonstrate the basic building blocks and operations of 16/32/64 bit microprocessors & concept of multiple processor systems
4	To inculcate the ability to design assembly language programs.

Course Outcomes (CO) with Bloom's Taxonomy Level

At the end of the course, the students will be able to,

CO	**Course Outcome Statement/s**	**Bloom's Taxonomy Level**	**Bloom's Taxonomy Description**
CO1	Discuss the design issues in computer architecture for concurrent execution of instruction set	II	Understanding
CO2	Apply memory management techniques for efficient computation	III	Applying
CO3	Estimate the performance metrics for computer architecture with pipelining	IV	Analysing
CO4	Utilize the architecture and organization of microprocessors with instruction set to design assembly language programs	VI	Creating

Module	**Module Contents**	**Hours**
I	**Arithmetic & Control Design** Encoding of machine instructions. Design of signed multiplication, Booth's algorithm, bit-pair recording, division, floating point numbers and operations, guard bits and rounding. Execution of a complete instruction, sequencing of control signals, micro programmed control, microinstruction format	7
II	**Memory** Computer memory organization, RAM, ReadOnly memories, cache memories, mapping functions, replacement algorithms, performance consideration: Multimodal memories & interleaving, hit rate & miss penalty, multilevel cache organization, virtual memories, address translation, memory management requirement	6
III	**Pipelining** Basic concepts in pipelining, data hazards, instruction hazards, control hazards, influence of pipelining on instruction set, data-path & control considerations, performance considerations, and Flyn's classification of computer architectures.	6

IV	**Introduction to 8086(16 bit):** Functional & architectural comparison of 8085 & 8086, programming, implementing standard programming structures in 8086, string, procedure & macros	5
V	**Introduction to 80386(32 bit):** Features & architecture of 80836, Pin description, 80836 register set, special 80386 registers, 80386 Real mode memory segmentation, data types used in real mode, instruction format, addressing modes of 80386. Introduction to Intel Core2 (64 bit) microprocessor	6
V	**Programming techniques & interfacing:** Writing assembly language programs, debugging, looping, counting, indexing, arithmetic operations related to memory, counters & delays, stacks, Interrupts, I/O (USB) interface, data communication.	7

Textbooks	
1	J. Hayes , "Computer Architecture and Organization", McGraw Hill, 3rd Edition, 2017
2	C. Hamacher et. al, "Computer Organization", 5th Edition, 2010`
3	M. Morris Mano & Michael D. Ciletti,"Digital Design", Pearson Prentice Hall Publication, 4th Edition, 2008
4	A K Ray & K M Bhurchandi, "Advanced Microprocessors & Peripherals", Second Edition, Tata McGraw-Hill education private limited, 2012.

References	
1	D. Patterson, Morgan Kaufmann "Computer Architecture", 6th Edition, 2017
2	Floyd & Jain, "Digital fundamentals", Pearson education, Eighth Edition, 2007.
3	James Turley, "Advanced 80386 Programming Techniques", Tata McGraw-Hill, Second Edition, 2005.

Useful Links	
1	https://www.geeksforgeeks.org/computer-organization-and-architecture-tutorials
2	https://nptel.ac.in/courses/106/108/106108100/2
3	https://nptel.ac.in/courses/108/107/108107029/3
4	https://nptel.ac.in/courses/108/105/108105102/

CO-PO Mapping

	Programme Outcomes (PO)												**PSO**	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	2	2											
CO2		1	3		2								1	
CO3	2	2		3									2	3
CO4	3		3		2									2

The strength of mapping is to be written as 1: Low, 2: Medium, 3: High
Each CO of the course must map to at least one PO.

Assessment

The assessment is based on MSE, ISE and ESE.
MSE shall be typically on modules 1 to 3.
ISE shall be taken throughout the semester in the form of teacher's assessment. Mode of assessment can be field visit, assignments etc. and is expected to map at least one higher order PO.
ESE shall be on all modules with around 40% weightage on modules 1 to 3 and 60% weightage on modules 4 to 6.
For passing a theory course, Min. 40% marks in (MSE+ISE+ESE) are needed and Min. 40% marks in ESE are needed. (ESE shall be a separate head of passing)

Walchand College of Engineering, Sangli

(Government Aided Autonomous Institute)

AY 2024-25

Course Information

Programme	B.Tech. (Information Technology)
Class, Semester	Second Year B. Tech., Sem III/IV
Course Code	7IT251
Course Name	Data Structures Lab
Desired Requisites:	Programming in C including pointers

Teaching Scheme		**Examination Scheme (Marks)**			
Practical	2 Hrs/ Week	**LA1**	**LA2**	**Lab ESE**	**Total**
	-	30	30	40	100
		Credits: 1			

Course Objectives

1	To demonstrate various operations on linear and non-linear data structures
2	To use and compare sorting and searching algorithms
3	To acquaint with file handling concepts in data structures

Course Outcomes (CO) with Bloom's Taxonomy Level

At the end of the course, the students will be able to,

CO	**Course Outcome Statement/s**	**Bloom's Taxonomy Level**	**Bloom's Taxonomy Description**
CO1	Apply appropriate linear and non-linear data structures to solve problems	III	Applying
CO2	Implement various operations like insert, delete on data structures	III	Applying
CO3	Compare different sorting and searching algorithms to analyse the performance	IV	Analysing
CO4	Recommend the appropriate recursive algorithm to solve recursive problems	V	Evaluating

List of Experiments / Lab Activities/Topics

List of Lab Activities:

1. Program based on structures and pointers in C
2. Program based on arrays and pointers in C
3. File handling and command line arguments
4. Implementation of recursion
5. Developing ADT for singly linked list and its applications
6. Developing ADT for Doubly linked list and its applications
7. Developing ADT for circular linked list and its applications
8. Developing ADT for stack and queue and their applications
9. Implementation of double ended queue
10. Implementation of recursive and non-recursive tree traversals
11. Binary search tree and application
12. Implementation of graph, DFS, BFS
13. Implementation of searching : linear search, binary search, Fibonacci search
14. Sorting Methods: Insertion sort, shell sort, heap sort, quick sort, merge sort, radix sort etc.
15. Implementation of hash tables

Textbooks

1	Richard F. Gilberg, Behrouz A. Forouzan, “Data Structures, A Pseudocode Approach With C”, Cengage Learning, 2nd Edition, 2007
2	S. Lipschutz, “Data Structures with C”, Schaum's Outlines Series, Tata McGraw-Hill, 2nd edition, 2017
3	Narsimha Karumanchi “Data Structure and algorithms”, Careermonk 5th edition, 2011

References	
1	Yashavant Kanetkar, “Understanding pointers in C”, 6th edition, BPB Publication, 2019

Useful Links	
1	https://nptel.ac.in/courses/106/102/106102064/
2	https://archive.nptel.ac.in/courses/106/106/106106127/

CO-PO Mapping

	Programme Outcomes (PO)												**PSO**	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	1	2			3									2
CO2			3	2	2								3	
CO3		2	3											2
CO4	2				3								3	

The strength of mapping is to be written as 1,2,3; where, 1: Low, 2: Medium, 3: High
Each CO of the course must map to at least one PO, and preferably to only one PO.

Assessment

There are three components of lab assessment, LA1, LA2 and Lab ESE.
IMP: Lab ESE is a separate head of passing.(min 40 %), LA1+LA2 should be min 40%

Assessment	**Based on**	**Conducted by**	**Typical Schedule**	**Marks**
LA1	Lab activities, attendance, journal	Lab Course Faculty	During Week 1 to Week 8 Marks Submission at the end of Week 8	30
LA2	Lab activities, attendance, journal	Lab Course Faculty	During Week 9 to Week 16 Marks Submission at the end of Week 16	30
Lab ESE	Lab activities, journal/ performance	Lab Course Faculty and External Examiner as applicable	During Week 18 to Week 19 Marks Submission at the end of Week 19	40

Week 1 indicates starting week of a semester. Lab activities/Lab performance shall include performing experiments, mini-project, presentations, drawings, programming, and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments and related activities if any.

Walchand College of Engineering, Sangli
(Government Aided Autonomous Institute)

AY 2024-25

Course Information

Programme	B.Tech. (Information Technology)
Class, Semester	Second Year B. Tech., Sem IV
Course Code	7IT252
Course Name	Computer Network Lab
Desired Requisites:	

Teaching Scheme		**Examination Scheme (Marks)**			
Practical	2 Hrs/ Week	**LA1**	**LA2**	**Lab ESE**	**Total**
		30	30	40	100
		Credits: 1			

Course Objectives

1	To introduce and configure various devices at TCP/IP layer
2	To demonstrate various routing protocol using network tools
3	To illustrate client server model for communication

Course Outcomes (CO) with Bloom's Taxonomy Level

At the end of the course, the students will be able to,

CO	**Course Outcome Statement/s**	**Bloom's Taxonomy Level**	**Bloom's Taxonomy Description**
CO1	Demonstrate various Routing Protocols in computer networks using simulators	III	Applying
CO2	Implement various network topologies using switch, router and cables	IV	Analysing
CO3	Analyze TCP/IP datagram using CISCO packet tracer, wire shark and Pcap Library	IV	Analysing
CO4	Design client server communication model for campus network using CISCO packet tracer	VI	Creating

List of Experiments / Lab Activities/Topics

List of Lab Activities:

1. List different network devices on TCP/IP layers and design case study for campus network
2. Design different computer network topologies in CISCO packet tracer
3. Implement various routing protocol using CISCO packet tracer
4. Design and implement subnetting concepts using CISCO packet tracer for given network
5. Design and implement subnetting concepts using CISCO packet tracer for given network
6. Design and implement Wi-Fi connectivity through DHCP using CISCO packet tracer
7. Capture and analyze LAN traffic using wire shark tool.
8. Demonstrate the TCP/IP header fields in wire shark
9. Capture and analyze LAN traffic using wire shark tool to guess the password
10. Implement client server application using socket programming for TCP/UDP in java

Textbooks

1	Larry Peterson and Bruce Davie, "Computer Networks: A Systems Approach", Morgan Kaufmann, 6th Edition, October 2020
2	Behrouz A. Forouzan, "Data Communication and Networking" TMGH 4th edition., 2013

References

1	James F. Kurose, Keith W. Ross, "Computer Networking: A Top-Down Approach", 7th Edition, Pearson Publication, 2016

Useful Links	
1	https://nptel.ac.in/courses/106/105/106105183/

CO-PO Mapping														
	Programme Outcomes (PO)												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	2		2										2	
CO2		2		1	3				2				1	3
CO3	1		2		2								2	
CO4	1		3	2	2				3					3

The strength of mapping is to be written as 1,2,3; where, 1: Low, 2: Medium, 3: High
Each CO of the course must map to at least one PO, and preferably to only one PO.

Assessment

There are three components of lab assessment, LA1, LA2 and Lab ESE.
IMP: Lab ESE is a separate head of passing.(min 40 %), LA1+LA2 should be min 40%

Assessment	Based on	Conducted by	Typical Schedule	Marks
LA1	Lab activities, attendance, journal	Lab Course Faculty	During Week 1 to Week 8 Marks Submission at the end of Week 8	30
LA2	Lab activities, attendance, journal	Lab Course Faculty	During Week 9 to Week 16 Marks Submission at the end of Week 16	30
Lab ESE	Lab activities, journal/ performance	Lab Course Faculty and External Examiner as applicable	During Week 18 to Week 19 Marks Submission at the end of Week 19	40

Week 1 indicates starting week of a semester. Lab activities/Lab performance shall include performing experiments, mini-project, presentations, drawings, programming, and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments and related activities if any.

Walchand College of Engineering, Sangli
(Government Aided Autonomous Institute)

AY 2024-25

Course Information

Programme	B.Tech. (Information Technology)
Class, Semester	Second Year B. Tech.
Course Code	7IT253
Course Name	Python Programming Lab
Desired Requisites:	Computer Programming

Teaching Scheme		**Examination Scheme (Marks)**			
Lectures	1 Hrs/Week	**LA1**	**LA2**	**Lab ESE**	**Total**
Practical	2 Hrs/Week	30	30	40	100
		Credits: 2			

Course Objectives

1	To understand why Python is a useful scripting language for developers.
2	To learn how to design and program Python applications.
3	To make use of the different libraries of Python.
4	To implement python code and add visualization using various libraries.

Course Outcomes (CO) with Bloom's Taxonomy Level

At the end of the course, the students will be able to,

CO	**Course Outcome Statement/s**	**Bloom's Taxonomy Level**	**Bloom's Taxonomy Description**
CO1	Define the significance of the various data structures available in Python programming language and apply them in solving computational problems.	III	Applying
CO2	Analyze the programming models and make use of the different libraries of Python	IV	Analyzing
CO3	Implement, test and debug the code written in Python	VI	Creating
CO4	Design various kinds of plots using python libraries	VI	Creating

Module	**Module Contents**	**Hours**
I	**Introduction to Python:** Variables and Data Types: Introduction to different data types (integers, floats, strings, lists, tuples, dictionaries) ,operators and variable assignment Control Flow: Using conditional statements (if, else, elif) and loops (for, while) to control the execution flow of a program.	**4**
II	**Functions, Modules and packaging:** **Functions:** Defining and calling functions, understanding scope (local and global variables), and using lambda functions (anonymous functions) **Modules and Packages**: Importing and using standard libraries and creating custom modules. Files, System Functions and Parameters, Strings, Tuples, **Data Structures** -Lists and Dictionaries, Lists and Mutability, Functions as Objects. Programming using functions, modules and external packages.	**4**
III	**File handling:** Python File Operations: Reading files, Writing files in python, Understanding read functions, read(), readline(), readlines(). Understanding write functions, write() and writelines() Manipulating file pointer using seek Programming,	**4**

	using file operations. Database Programming: Connecting to a database, Creating Tables, INSERT, UPDATE, DELETE and READ operations, Transaction Control, Disconnecting from a database, and Exception Handling in Databases.	
IV	**Classes and Object-Oriented Programming:** Abstract Data Types and Classes, Information Hiding, Class in Python Objects in Python, Polymorphism in Python, Encapsulation in Python Inheritance in Python, Data Abstraction in Python. **Exception Handling**:- Understanding exceptions, Handling exceptions using try, except, finally	**6**
V	**Python-Numpy and Pandas:** NumPy: Introduction, Numpy array, Numpy array indexing, Numpy operations. Pandas: Series, Data frames, managing missing data, groupby, merging & concatenation, operations, data input and data output. Introduction to NumPy and Pandas for data manipulation and analysis.	**4**
VI	**Python for Data Visualization:** Working with Graphs: Understanding and implementing graph algorithms, visualizing graphs using libraries -Matplotlib, Seaborn, Plotly and Cufflinks, Geographical Plotting. Matplotlib: Creating various types of plots (line, bar, scatter, histogram) and customizing them. Seaborn: Generating advanced visualizations and integrating with Matplotlib for enhanced graphics	**6**

List of Experiments / Lab Activities/Topics

List of Lab Activities:

1. Problem solving using core Python functionality like strings, variables, functions.
2. Problem solving using core Python functionality like tuples, dictionary, list, objects
3. Problem solving using Class & object concepts.
4. Problem statement on inheritance in classes
5. Problem based on encapsulation in classes
6. Problem statement on array
7. Problem statement on NumPy libraries with different operations
8. Problem statement on Pandas libraries with different operations
9. Problem statement on NumPy and Pandas use for data manipulation and analysis.
10. Problem statement on data visualization using Matplot Libraries.
11. Problem statement on data visualization using Seaborn Libraries.

Best Practices for lab:

- Writing clean and readable code
- Testing and debugging
- Documentation and comments
- Version control with Git

Textbooks

1	R. Nageswara Rao, ―Core Python Programming‖, Dreamtech Press, 2nd Edition, 2017
2	Chun, J Wesley, ―Core Python Programming‖, Pearson, 2nd Edition, 2007 Reprint 2010
3	Eric Matthes - "Python Crash Course", "Automate the Boring Stuff with Python" 2nd Edition,2019

References

1	Barry, Paul, Head First Python, O Rielly,2nd Edition, 2010
2	Lutz, Mark, Learning Python, O Rielly, 4th Edition, 2009

Useful Links

1	https://onlinecourses.nptel.ac.in/noc19_mg47/preview

	https://onlinecourses.nptel.ac.in/noc24_cs45/preview https://onlinecourses.nptel.ac.in/noc22_cs32/preview
2	https://docs.python.org/3/tutorial/
3	https://www.learnpython.org/
4	https://leetcode.com/
5	https://www.codewars.com/
6	https://www.hackerrank.com/

CO-PO Mapping														
	Programme Outcomes (PO)												**PSO**	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	2	2			3									2
CO2	1		3	2	2								3	
CO3		3	3											1
CO4	2				3								2	
The strength of mapping is to be written as 1,2,3; where, 1: Low, 2: Medium, 3: High Each CO of the course must map to at least one PO, and preferably to only one PO.														

Assessment				
There are three components of lab assessment, LA1, LA2 and Lab ESE. IMP: Lab ESE is a separate head of passing.(min 40 %), LA1+LA2 should be min 40%				
Assessment	**Based on**	**Conducted by**	**Typical Schedule**	**Marks**
LA1	Lab activities, attendance, journal	Lab Course Faculty	During Week 1 to Week 8 Marks Submission at the end of Week 8	30
LA2	Lab activities, attendance, journal	Lab Course Faculty	During Week 9 to Week 16 Marks Submission at the end of Week 16	30
Lab ESE	Lab activities, journal/ performance	Lab Course Faculty and External Examiner as applicable	During Week 18 to Week 19 Marks Submission at the end of Week 19	40
Week 1 indicates starting week of a semester. Lab activities/Lab performance shall include performing experiments, mini-project, presentations, drawings, programming, and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments and related activities if any.				

Walchand College of Engineering, Sangli

(Government Aided Autonomous Institute)

AY 2024-25

Course Information	
Programme	B.Tech. (Information Technology)
Class, Semester	Second Year B. Tech., Sem III/IV
Course Code	7IT254
Course Name	OOP-I (CPP Programming) Lab
Desired Requisites:	C Programming or Any Procedural programming Language

Teaching Scheme		**Examination Scheme (Marks)**			
Lectures	1 Hrs/Week	**LA1**	**LA2**	**Lab ESE**	**Total**
Practical	2 Hrs/Week	30	30	40	100
		Credits: 1			

Course Objectives	
1	To learn the fundamental programming concepts and methodologies which are essential to
2	building good C/C++ programs

Course Outcomes (CO) with Bloom's Taxonomy Level

At the end of the course, the students will be able to,

CO	**Course Outcome Statement/s**	**Bloom's Taxonomy Level**	**Bloom's Taxonomy Description**
CO1	Describe Object Oriented Programming (OOP) concepts for real time applications	I	Understanding
CO2	Implement simple C++ programs using classes and objects	III	Applying
CO3	Compare procedural and object-oriented programming approaches	IV	Analysing
CO4	Assess the advantages and disadvantages of using classes and objects in C++	V	Evaluating

Module	Module Contents	Hours
I	**Introduction to OOP and Basics of C++:** Introduction to Object-Oriented Programming concepts, Understanding classes and objects, Basic syntax and structure of C++ programming language, Data types, variables, and operators in C++.	2
II	**Object and Classes:** Creating classes and objects in C++ , Member functions and data members, Access specifiers: public, private, and protected, Constructors and destructors	2
III	**Polymorphism:** Polymorphism and its types: compile-time and runtime polymorphism. Overloading unary operations. Overloading binary operators, data conversion, pitfalls of operators overloading and conversion keywords. Explicit and Mutable.	2
IV	**Inheritance-I:** Understanding inheritance and its types: single, multiple, multilevel, and hierarchical inheritance, Implementing inheritance in C++ using base and derived classes, ,Virtual functions and function overriding in C++	2
V	**Advanced OOP Concepts:** Abstract classes and pure virtual functions, Interface classes and their usage, Friend functions and friend classes	2
VI	**Exception Handling and Templates:** Understanding exceptions and exception handling in C++, Try-catch blocks and exception specifications, Introduction to C++ templates for generic programming, Writing and using class templates and function templates	2

List of Experiments / Lab Activities/Topics

List of Lab Activities:

List of Lab Activities:

1. Program on input/output stream
2. Program on class and objects.
3. Program on Inline/Friend functions.
4. Program on Constructor/Destructors.
5. Program static variables/class/functions.
6. Program on polymorphism.
7. Program on different types of inheritance.
8. Program on operator overloading.
9. Program on File Operations.
10. Program on Templates.

Textbooks

1	E.Balguruswamy, “Object Oriented Programming C++”, Tata McGraw Hill, 3rd Edition, 2006.
2	Bjarne Stroustrup, “The C++ Programming language”, Third edition, Pearson Education.

References

1	Robert Laffore, ”Object Oriented Programming in c++”, SAMS publication, 4thEdition,2008.

Useful Links

1	https://nptel.ac.in/courses/106/105/106105151

2	https://nptel.ac.in/courses/106/101/106101208/
3	

CO-PO Mapping														
	Programme Outcomes (PO)												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	1	2			3									2
CO2	2		3	2	2								3	
CO3		2	3		1								1	2
CO4	1				3								2	
The strength of mapping is to be written as 1,2,3; where, 1: Low, 2: Medium, 3: High Each CO of the course must map to at least one PO, and preferably to only one PO.														

Assessment				
There are three components of lab assessment, LA1, LA2 and Lab ESE. IMP: Lab ESE is a separate head of passing.(min 40 %), LA1+LA2 should be min 40%				
Assessment	**Based on**	**Conducted by**	**Typical Schedule**	**Marks**
LA1	Lab activities, attendance, journal	Lab Course Faculty	During Week 1 to Week 8 Marks Submission at the end of Week 8	30
LA2	Lab activities, attendance, journal	Lab Course Faculty	During Week 9 to Week 16 Marks Submission at the end of Week 16	30
Lab ESE	Lab activities, journal/ performance	Lab Course Faculty and External Examiner as applicable	During Week 18 to Week 19 Marks Submission at the end of Week 19	40
Week 1 indicates starting week of a semester. Lab activities/Lab performance shall include performing experiments, mini-project, presentations, drawings, programming, and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments and related activities if any.				