

<b>Course:</b>	<b>Semester:</b>	<b>Title of The Course:</b>	<b>Course Code:</b>	<b>W.E.F</b>
<b>MCA</b>	<b>I</b>	<b>Programming and Problem Solving Using Python</b>	<b>25MCA101</b>	<b>2025-26</b>

<b>Total No of Hours for Teaching – Learning</b>	<b>Instructional Hours for Week</b>		<b>Duration of Semester End Examination in Hours</b>	<b>Max Marks</b>		<b>Credits</b>
	<b>Theory</b>	<b>Practical</b>		<b>CIA</b>	<b>SEE</b>	
<b>60 Hours</b>	<b>4</b>	<b>0</b>	<b>3 Hours</b>	<b>30</b>	<b>70</b>	<b>4</b>

### **Course Description and Purpose:**

The course is designed to provide basic knowledge of Python. Python programming is intended for Software Engineers, system analysts, program managers and user support personnel who wish to learn the Python Programming Language.

### **Course Objectives:**

- Master the fundamentals of writing Python scripts
- Learn core Python scripting elements such as variables and flow control structures
- Discover how to work with lists and sequence data
- Write Python functions to facilitate code reuse
- Use Python to read and write files
- Make their code robust by handling errors and exceptions properly
- Work with the Python standard library
- Explore Python's Pandas, Numpy and Matplotlib

### **Course Learning Outcomes:**

At the end of this course the students should be able to:

**CO-1** Understand computer architecture and data representations (variables, representation of numbers and character strings).

**CO-2** Functions and Modules

**CO-3** Use and understand OOP's Concept's used in programming.

**CO-4** Basics of Numpy and Pandas.

**CO-5** Visualization with Matplot lib.

## **Course Content:**

### **UNIT -I**

**Introduction:** History of Python, Differences between Java and Python, Features of Python, Reading Input from the Console, Variables, Assignment Statements, Operators, Data types, Control Statements, Looping Statements, break, continue, Operator Precedence and Associativity.

### **UNIT-II**

**Python functions:** Modules, defining a Function – Calling a Function –Functions with and without Return Values, Recursive Functions, Anonymous functions, map and filter functions.

**Data Structures:** Lists, Sets, Tuples and Dictionaries in Python.

### **UNIT-III**

**Classes and objects:** Introduction to Object Oriented Programming, Basic principles of Object Oriented Programming in Python ,Classes and Objects, Inheritance and types of inheritance, Abstract Classes and Interfaces. Exception Handling.

### **UNIT-IV**

**Numpy and Pandas:** Introduction to NumPy-Understanding Data Types in Python, The Basics of Numpy Arrays, Computation on NumPy Arrays. Data Manipulation with Pandas, Data Frames in Pandas and its Operations.

### **UNIT-V**

**Visualization:**

**Visualization with Matplotlib-**General Matplotlib Tips, Simple Line Plots, Simple Scatter Plots, Visualizing Errors, Density and Contour Plots, Histograms, Binnings, and Density

### **Reference Books:**

1. Kenneth C. Loudon, Programming Languages Principles and Practice, Second Edition, Cengage Learning(2008).
2. Reema Thareja, Python Programming using Problem Solving Approach, Oxford University Press(2017)
3. Wesley Chun, Core Python Programming, Prentice Hall (2<sup>nd</sup> Edition)

<b>Course:</b>	<b>Semester:</b>	<b>Title of The Course:</b>	<b>Course Code:</b>	<b>W.E.F</b>
<b>MCA</b>	<b>I</b>	<b>Data Structures</b>	<b>25MCA102</b>	<b>2025-26</b>

Total No of Hours for Teaching – Learning	Instructional Hours for Week		Duration of Semester End Examination in Hours	Max Marks		Credits
	Theory	Practical		CIA	SEE	
60 Hours	4	0	3 Hours	30	70	4

### Course Description and Purpose:

An overview of data structure concepts, arrays, stack, queues, trees, and graphs. Discussion of various implementations of these data objects, programming styles, and run, time representations. Course also examines algorithms for sorting, searching and some graph algorithms. Algorithm analysis and efficient code design is discussed.

### Course Objectives:

- Exploring basic data structures such as stacks and queues.
- Introduces a variety of data structures such as search trees, and graphs.
- Introduces sorting and pattern matching algorithms

### Course Learning Outcomes:

At the end of this course the students should be able to:

**CO1:** Ability to select the data structures that efficiently model the information in a problem.

**CO2:** Ability to assess efficiency tradeoffs among different data structure implementations or combinations. Includes searching and sorting

**CO3:** Implement and know the application of algorithms for sorting and pattern matching. Includes linked list and stacks

**CO4:** Design programs using a variety of data structures, including hash tables, binary and general tree structures, search trees, , graphs, and AVL trees

**CO5:** Graphs and representation. Algorithms for shortest path

**Course Content:****Unit-1: (12Hrs)**

**Introduction and Overview:** Elementary Data Organization, Data Structures, Data Structure Operations, And Algorithms: Complexity, Time-Space Tradeoff.

**Sorting:** Bubble sort, Insertion Sort.

**Unit-2: (12Hrs)**

**Arrays, Records and Pointers:** Linear Arrays, Representation and Traversing Linear Arrays, Inserting and Deleting in Linear Arrays, Linear Search, Binary Search

**Sorting:** Selection sort.

**Unit-3: (12Hrs)**

**Linked Lists:** Representation, Traversing, Searching in Single Linked List, Insertion, and Deletion in Two-Way Lists.

**Stacks, Queues:** Stacks, Array representation, Linked List representation, Infix to postfix Conversion, Queues, Linked representation of Queues, Deques, and Priority Queues.

**Sorting:** Quick Sort, Merge Sort

**Unit-4: (12Hrs)**

**Trees :** Binary trees, Representing and traversing binary trees, Tree Traversals, Binary Search Trees, Searching, Insertion and Deletion in Binary Search Trees, AVL Search Trees, Insertion and Deletion in AVL trees

**Heap:** Heap Sort

**Unit-5: (12Hrs)**

**Graphs:** Terminology, Sequential representation of Graphs, Linked representation of Graphs, Operations on Graphs, Traversing a Graph. Breadth First Search, Depth First Search.

**Advanced Sorting Techniques:** Radix Sort and Shell Sort

**Reference Books**

- Seymour Lipschutz, Theory and problems of Data Structures, Mc Graw Hill( Schaums Outlines)
- John R Hubbard, Second Edition, Data Structures with Java, Mc Graw Hill( Schaums Outlines)
- Robert Lafore, Data Structures & Algorithms in Java, Second Edition, Pearson Education.
- Fundamentals of DATA STRUCTURES in C: 2nded, , Horowitz , Sahani, Anderson-freed, Universities Press
- Data Structures, a Pseudocode Approach, Richard F Gilberg, Behrouz A Forouzan, Cengage.

<b>Couse:</b>	<b>Semester:</b>	<b>Title of The Course:</b>	<b>Course Code:</b>	<b>W.E.F</b>
<b>MCA</b>	<b>I</b>	<b>Mathematical and Statistical Foundations</b>	<b>25MCA103</b>	<b>2025-26</b>

<b>Total No of Hours for Teaching – Learning</b>	<b>Instructional Hours for Week</b>		<b>Duration of Semester End Examination in Hours</b>	<b>Max Marks</b>		<b>Credits</b>
	<b>Theory</b>	<b>Practical</b>		<b>CIA</b>	<b>SEE</b>	
<b>60 Hours</b>	<b>4</b>	<b>0</b>	<b>3 Hours</b>	<b>30</b>	<b>70</b>	<b>4</b>

### **Course Description and Purpose:**

To develop the understanding of the mathematical and logical basis to many modern techniques in computer science technology like machine learning, programming language design, and concurrency.

### **Course Objectives:**

Understand the mathematical fundamentals that is prerequisites for variety of courses like Data mining, Network protocols, analysis of Web traffic, Computer security, Software engineering, Computer architecture, operating systems, distributed systems bioinformatics, Machine learning.

Study various sampling and classification problems.

### **Course Learning Outcomes:**

After the completion of the course, student will be able to Learn

**CO-1:** Basics of Foundations and Mathematical Induction

**CO-2:** Basics of Advanced Counting Techniques

**CO-3:** Basics of Recurrence Relations

**CO-4:** Basics of Multiplication rules, Bayes Theorem

**CO-5:** Inferences on the mean and the Variance of a distribution

## **Course Content:**

### **UNIT-I**

**The Foundations:** Logic and Proofs: Propositional Logic – Propositional Equivalences – Predicates and Quantifiers – Nested Quantifiers. Introduction and Recursion: Mathematical Induction – Strong Induction and Well-Ordering – Recursive Definitions and Structural Induction – Recursive Algorithms – Program Correctness

### **UNIT-II**

**Advanced Counting Techniques:** Recurrence Relations – Solving Linear Recurrence Relations – Divide and Conquer Algorithms and Recurrence Relations– Generating Functions – Inclusion – Exclusion – Applications of Inclusion & Exclusion

### **UNIT-III**

**Relations :** Relations and Their Properties –Equivalence Relations – Partial Orderings Graphs: Graphs and Graph Models – Graph Terminology and Special Types of Graphs – Representing Graphs and Graph Isomorphism's – Connectivity – Euler and Hamilton Paths – Shortest Path Problems – Planar Graphs - Graph Coloring.

### **UNIT-IV**

**Some probability laws:** Axioms of Probability, Conditional Probability, Independence of the Multiplication Rule, Bayes' theorem. Discrete Distributions: Random Variables, Discrete Probability Densities, Expectation and distribution parameters, Binomial distribution, Poisson distribution, simulating a discrete distribution.

### **UNIT-V**

**Inferences on the mean and the Variance of a distribution:** Hypothesis Testing, significance testing, Hypothesis and significance test on the mean, Hypothesis tests on the Variance. Inferences on proportions: estimating proportions, testing hypothesis on a proportion, comparing two proportions: estimation, comparing two proportions: hypothesis testing

### **Reference Books**

1. Susan Milton and Jesse C. Arnold, Introduction to Probability and Statistics, Fourth edition.
2. William Mendenhall, Robert J Beaver, Barbara M Beaver, Introduction to Probability and Statistics, Twelfth edition, Thomson.
3. Kenneth H Rosen, Discrete Mathematics and its Applications, 6th Edition, McGraw-Hill (2007) Chapters (1-10)
4. Ralph P. Grimaldi, B.V. Ramana, Discrete and Combinational Mathematics, 5th Edition, Pearson Education (2008).
5. Swapan Kumar Sarkar, A Text Book of Discrete Mathematics, S.Chand (2008)
6. D.S.Malik and M.K.Sen, Discrete Mathematical Structures, Thomson (2006)

<b>Course:</b>	<b>Semester:</b>	<b>Title of The Course:</b>	<b>Course Code:</b>	<b>W.E.F</b>
<b>MCA</b>	<b>I</b>	<b>Operating Systems</b>	<b>25MCA104</b>	<b>2025-26</b>

<b>Total No of Hours for Teaching – Learning</b>	<b>Instructional Hours for Week</b>		<b>Duration of Semester End Examination in Hours</b>	<b>Max Marks</b>		<b>Credits</b>
	<b>Theory</b>	<b>Practical</b>		<b>CIA</b>	<b>SEE</b>	
<b>60 Hours</b>	<b>4</b>	<b>0</b>	<b>3 Hours</b>	<b>30</b>	<b>70</b>	<b>4</b>

### **Course Description and Purpose:**

Covers the classical internal algorithms and structures of operating systems, including CPU scheduling, memory management, and device management. Considers the unifying concept of the operating system as a collection of cooperating sequential processes. Covers topics including file systems, virtual memory, disk request scheduling, concurrent processes, deadlocks, security, and integrity.

### **Course Objectives:**

- To understand the services provided by and the design of an operating system.
- To understand the structure and organization of the file system.
- To understand what a process is and how processes are synchronized and scheduled.
- To understand different approaches to memory management.
- Students should be able to use system calls for managing processes, memory and the file system.
- Students should understand the data structures and algorithms used to implement an OS.

### **Course Learning Outcomes:**

**At the end of this course students will able to understand**

**CO1:** Understand fundamental operating system abstractions such as processes, threads, files, semaphores, IPC abstractions, shared memory regions, etc.,

**CO2:** Analyze important algorithms eg. Process scheduling and memory management algorithms.

**CO3:** Categorize the operating system's resource management techniques, dead lock management techniques, memory management techniques

**CO4:** Understand the File System Structure

**CO5:** Understanding the Distributed Operating Systems

## **Course Content:**

### **UNIT- I**

**Introduction to Operating System Concept:** Types of Operating Systems, Operating Systems Concepts, Operating System Operations. Operating Systems Structures- Operating System Services, User Operating- System Interface, Introduction to System calls, Types of System Calls. Processes Management:

**Process Management:** Process concept, Process State Diagram, Process control block, Process Scheduling, Inter process Communication, Threads- Threading Issues, Scheduling- Basic Concepts, Scheduling Criteria, Scheduling Algorithms.

### **UNIT- II**

**Process Synchronization:** The Critical-Section Problem, Peterson's Solution, Synchronization Hardware, Semaphores, Classic Problems of Synchronization, Monitors. Principles of deadlock: System Model, Deadlock characterization, Deadlock handling, Deadlock Prevention, Detection and Avoidance, Recovery Starvation, Critical Regions form Deadlock.

### **UNIT -III**

**Memory Management:** Swapping, Contiguous Memory Allocation, Paging, structure of the Page Table, Segmentation. Virtual Memory Management- Demand Paging, Page-Replacement Algorithms.

### **UNIT- IV**

**File-System Interface:** File Concept, Access Methods, Directory structure, File-System mounting, Files Sharing, Protection. File-System implementation- File-System Structure, Allocation Methods, Free-Space Management, Disk Structure, Disk Scheduling.

### **UNIT -V**

**Distributed Operating Systems-** Types of network based Operating systems, Network Structure, Network Topology, Communication Structure, Communication Protocols, Robustness, Design Issues .A review of Mobile Operating Systems, Features of Android Operating Systems.

### **Reference Books**

- Abraham Silberschatz, & Peter Baer Galvin, Gagne, Operating System Concepts, Ninth Edition, Wiley, 2015
- William Stallings, Operating Systems-Internals and Design Principles, Fifth Edition, Pearson Education, 2007
- Achyut S Godbole, Operating Systems, Second Edition, TMH, 2007 Flynn/McHoes, Operating Systems, Cengage Learning, 2008.
- Deitel & Deitel, Operating System, Third Edition, Pearson Education, 2008

<b>Couse:</b>	<b>Semester:</b>	<b>Title of The Course:</b>	<b>Course Code:</b>	<b>W.E.F</b>
<b>MCA</b>	<b>I</b>	<b>Personality Development through Life Enlightenment Skills</b>	<b>25MCA105</b>	<b>2025-26</b>

<b>Total No of Hours for Teaching – Learning</b>	<b>Instructional Hours for Week</b>		<b>Duration of Semester End Examination in Hours</b>	<b>Max Marks</b>		<b>Credits</b>
	<b>Theory</b>	<b>Practical</b>		<b>CIA</b>	<b>SEE</b>	
<b>60 Hours</b>	<b>3</b>	<b>1</b>	<b>3 Hours</b>	<b>30</b>	<b>70</b>	<b>3</b>

### **Course Description and Purpose:**

Personality development is the development of your behavior patterns and attitude. It is the result of where we are born, the circle we interact with and our personal temperament. Every person is different. There are some characteristics traits that make you „you“. Personality development through life enlightenment course aims to help students identify negative behaviors which may be stopping them from reaching their desired goals. This course will help students both in their personal and desired professional life. The other purposes of personality development through life enlightenment course are to enable you lead stress-free and healthier life, ethical decision making ability, enhanced confidence level, and building a more pleasing personality.

### **Course Objectives:**

- The Course will introduce the students to
- Learn to achieve the highest goal happily.
- Become a person with stable mind, pleasing personality and determination.
- Learn to build positive attitude, self-motivation, enhancing self-esteem and emotional intelligence
- Learn to develop coping mechanism to manage stress through Yoga and meditation techniques
- Awaken wisdom among them.

### **Course Learning Outcomes:**

At the end of this course the students should be able to:

**CO-1** Develop their personality and achieve their highest goals of life.

**CO-2** Develop Motivation and Self esteem

**CO-3** Practice emotional self-regulation and other aspects of personality development.

**CO-4** Stress Management and Case study

**CO-5** Develop a versatile Attitude

## **Course Content:**

### **UNIT- I**

**Introduction to Personality Development:** The concept of personality - Dimensions of Personality – Theories of Personality development (Freud & Erickson) – The concept of Success and Failure – Factors responsible for Success – Hurdles in achieving Success and Overcoming Hurdles — Causes of failure – Conducting SWOT (Strengths, Weaknesses, Opportunities and Threats) analysis.

### **UNIT- II**

**Motivation and Self-esteem:** Concept of motivation: Definition and Nature of Motivation/Motive – Internal and external motives – Theories of Motivation – Importance of self- motivation- Factors leading to de- motivation. Self-esteem - Definition and Nature of self-esteem – Do's and Don'ts to develop positive self- esteem – Low self esteem.

### **UNIT- III**

#### **Other Aspects of Personality Development**

Body language - Problem-solving - Conflict Management and Negotiation skills - Decision-making skills - Leadership and qualities of a successful leader – Character building -Team-work – Time management - Work ethics – Good manners and etiquette – Emotional Ability/Intelligence – Dimensions of Emotional Intelligence – Building Emotional Intelligence.

### **UNIT- IV**

#### **Stress Management:**

Meaning and Definition of Stress - Types of Stress - Eustress and Distress –Stress Management, work life balance, Quality of work life.

**Case Study:** Case study of Work life balance of Women Employees in Service Sector.

### **UNIT- V**

#### **Attitude:**

Attitude, Concept of attitude, definition and meaning of attitude, types of attitudes, attitude of different persons. Attitude in organization perspective.

**Case Study:** Case Study on Attitude of Students of using electronic devices in Campus.

#### **Reference Books:**

1. Organizational Behavior by K.Asathappa from Himalaya Publications.
2. Personality Development and Communication Skills by Dr. S. S. Nirula .

<b>Couse:</b>	<b>Semester:</b>	<b>Title of The Course:</b>	<b>Course Code:</b>	<b>W.E.F</b>
MCA	I	Survey of Quantum Technologies and Applications	25MCA106	2025-26

Total No of Hours for Teaching – Learning	Instructional Hours for Week		Duration of Semester End Examination in Hours	Max Marks		Credits
	Theory	Practical		CIA	SEE	
60 Hours	3	1	3 Hours	30	70	3

### Course Description and Purpose:

This course is meant to give an overview of the field of quantum technologies and make the students familiar with the state-of-the-art in all four verticals. The emphasis is not on depth in this course, but on covering the exciting aspects of the field.

### Course Objectives:

- The general physical principles of realizing qubits for computation
- The various hardware implementations of qubits for computation
- The basic ideas of quantum sensing
- The applications of quantum sensing
- The implementations of quantum communications protocols in fiber-based and free-space

### Course Learning Outcomes:

At the end of this course the students should be able to:

**CO-1** able to learn what is Quantum Technology

**CO-2** able to learn Qubits

**CO-3** able to learn Quantum Computation

**CO-4** able to learn Quantum Sensing

**CO-5** able to learn Quantum Communications

## **Course Content:**

### **UNIT- I**

**Introduction to Quantum Technologies:** Motivation for Quantum Technologies, Quantum States, Wavefunctions, Probabilistic interpretation, Physical observables, Hermitian operators, expectation values, Heisenberg uncertainty principle, Schrodinger equation, Time evolution, distinction from classical physics, Heuristic description of Superposition, Tunneling and entanglement, No cloning theorem, Simulating classical systems – Feynman’s idea of a quantum simulator and the birth of the field

### **UNIT- II**

**Quantum Computation:** Basics of qubits -- what is a qubit? How is it different from a classical bit? – Review of classical logic gates, Di Vincenzo criteria for realising qubits, Basics of qubit gates and quantum circuits, Physical implementation of qubits.

### **UNIT-III**

**Qubits: Solid State Qubits:** Semiconducting Qubits – quantum dots, spins, Superconducting Qubits – charge, flux and phase, Topological Qubits – proposals and advantages, **Atoms and Ions:** Trapped ions, Rydberg atoms, Neutral atoms, **Photonic Qubits:** Conventional linear optical setups, Integrated Photonics, NMR qubits, Conventional **NMR qubits:** NV centers, Overview of applications and recent achievements, RSA and Shor’s algorithm, Quantum Advantages.

### **UNIT -IV**

**Quantum Sensing:** Basics of quantum sensing, Basics of Photon (single and entangled) generation and detection, Gravimetry, Atomic clock, Magnetometry, State of the art in Quantum Sensing.

### **UNIT- V**

**Quantum Communications:** Basics of digital communication, Quantifying classical information – Shannon entropy, Basic ideas of quantum communication, security, eavesdropping, Overview of quantum communication achievements, Terrestrial – fiber-based, Free space, Satellite-based.

### **Reference Books**

1. Quantum Information Science – Manenti R., Motta M., 1<sup>st</sup> Edition, Oxford University Press (2023)
2. Quantum computation and quantum information – Nielsen M. A., and Chuang I. L., 10<sup>th</sup> Anniversary edition, Cambridge University Press (2010)
3. Elements of Quantum Computation and Quantum Communication, A. Pathak, Boca Raton, CRC Press (2015)
4. An Introduction to Quantum Computing, Phillip Kaye, Raymond Laflamme, and Michele Mosca, Oxford University Press (2006)
5. Quantum computing explained, David McMahon, Wiley (2008)

<b>Couse:</b>	<b>Semester:</b>	<b>Title of The Course:</b>	<b>Course Code:</b>	<b>W.E.F</b>
<b>MCA</b>	<b>I</b>	<b>Data Structures Lab</b>	<b>25MCA106</b>	<b>2025-26</b>

<b>Total No of Hours for Teaching – Learning</b>	<b>Instructional Hours for Week</b>		<b>Duration of Semester End Examination in Hours</b>	<b>Max Marks</b>		<b>Credits</b>
	<b>Theory</b>	<b>Practical</b>		<b>CIA</b>	<b>SEE</b>	
<b>60 Hours</b>	<b>0</b>	<b>6</b>	<b>3 Hours</b>	<b>30</b>	<b>70</b>	<b>3</b>

#### List of Programs

1. Java program to implement Stack operations using Arrays
2. Java program to implement Queue operations using Arrays
3. Java program to implement linked list operations using Arrays
4. Java Program to implement tree traversal techniques
5. Java program to convert infix expression to postfix expression
6. Java program to evaluate postfix expression
7. Java program to implement Binary search.
8. Java program to implement Selection sort
9. Java program to implement Insertion sort
10. Java program to implement quick sort
11. Java program to implement Merge Sort, Shell Sort and Radix Sort.
12. Java Program to perform the following operations:
  - a) Insertion into a AVL Tree b) Searching in a AVL tree.

**Note: Teachers need not to confine for above list they can add more programs based on students' Performance.**

<b>Couse:</b>	<b>Semester:</b>	<b>Title of The Course:</b>	<b>Course Code:</b>	<b>W.E.F</b>
<b>MCA</b>	<b>I</b>	<b>Python Lab</b>	<b>25MCA107</b>	<b>2025-26</b>

<b>Total No of Hours for Teaching – Learning</b>	<b>Instructional Hours for Week</b>		<b>Duration of Semester End Examination in Hours</b>	<b>Max Marks</b>		<b>Credits</b>
	<b>Theory</b>	<b>Practical</b>		<b>CIA</b>	<b>SEE</b>	
<b>60 Hours</b>	<b>0</b>	<b>6</b>	<b>3 Hours</b>	<b>30</b>	<b>70</b>	<b>3</b>

### **List of Programs**

1. Write a Python Program to demonstrate Data types.
2. Write a Python Program to demonstrate Operators
3. Write a Python Program to demonstrate Functions
4. Write a Python Program to demonstrate Modules
5. Write a Python Program to demonstrate Lambda Function
6. Write a Python Program to demonstrate Classes and Objects
7. Write a Python Program to demonstrate Inheritance
8. Write a Python Program to demonstrate Abstract Classes
9. Write a Python Program to demonstrate Exceptions
10. Write a Python Program to demonstrate Numpy
11. Write a Python Program to demonstrate Pandas Data frame.
12. Write a Python Program to demonstrate Matplotlib.

**Note: Teachers need not to confine for above list they can add more programs based on students' Performance.**



<b>Couse:</b>	<b>Semester:</b>	<b>Title of The Course:</b>	<b>Course Code:</b>	<b>W.E.F</b>
<b>MCA</b>	<b>I</b>	<b>Programming and Problem Solving Using Python</b>	<b>25MCA101</b>	<b>2025-26</b>

**MODEL QUESTION PAPER (w.e.f: 2025-26)**

**Time: Three Hours**

**Max Marks: 70M**

**Answer ALL Questions**

**Section-A**

**Answer any 5 of the Following**

**5\*4=20M**

1. Explain about Variables in Python. **CO-1**
2. Explain about Datatypes in Python. **CO-1**
3. Explain about sets in Python. **CO-2**
4. Explain about Classes and Objects in Python. **CO-3**
5. Explain about Modules in Python. **CO-4**
6. Explain about Anonymous Function. **CO-4**
7. Explain about Pandas. **CO-5**
8. Explain about Simple Scatter plots. **CO-5**

**Section-B**

**Answer the following**

**5\*10= 50 Marks**

- 9.a) Explain about Control Statements in Python **CO-1**  
(or)
- b) Explain about Looping Statements **CO-1**
- 10.a) Explain about Dictionaries. **CO-2**  
(or)
- b) Explain about Lists in Python **CO-2**
- 11.a) Explain about Inheritance in Python. **CO-3**  
(or)
- b) Explain about Exception Handling in Python. **CO-3**
- 12.a) Explain about Computation on NumPy Arrays. **CO-4**  
(or)
- b) Explain about Data Frames in Pandas and its Operations. **CO-4**
13. a) Explain about Density and Contour Plots **CO-5**  
(or)
- b) Explain about Histograms, Binnings, and Density **CO-5**

<b>Course:</b>	<b>Semester:</b>	<b>Title of The Course:</b>	<b>Course Code:</b>	<b>W.E.F</b>
<b>MCA</b>	<b>I</b>	<b>Data Structures</b>	<b>25MCA102</b>	<b>2025-26</b>

**MODEL QUESTION PAPER (w.e.f: 2025-26)**

**Time: Three Hours**

**Max Marks: 70M**

**Answer ALL Questions**

**Section-A**

**Answer any 5 of the Following**

**5\*4=20M**

1. Explain about Data Structure Operations. **CO-1**
2. Explain about Bubble sort. **CO-2**
3. Explain about Linear Search. **CO-2**
4. Explain about Searching in Single Linked List. **CO-3**
5. Explain about Deques. **CO-3**
6. Explain about binary trees. **CO-4**
7. Explain about Sequential representation of Graphs. **CO-4**
8. Explain about Traversing a Graph. **CO-5**

**Section-B**

**Answer the following**

**5\*10= 50 Marks**

9. a) Explain about Insertion Sort **CO-1**  
(or)  
b) Explain about Algorithms: Complexity, Time-Space Tradeoff **CO-1**
10. a) Explain about Binary Search. **CO-2**  
(or)  
b) Explain about Selection sort. **CO-2**
11. a) Explain about Insertion, and Deletion in Two-Way Lists.. **CO-3**  
(or)  
b) Explain about Quick Sort. **CO-3**
12. a) Explain about AVL Search Trees **CO-4**  
(or)  
b) Explain about Tree Traversals. **CO-4**
13. a) Explain about Radix Sort **CO-5**  
(or)  
b) Explain about Depth First Search **CO-5**

<b>Course:</b>	<b>Semester:</b>	<b>Title of The Course:</b>	<b>Course Code:</b>	<b>W.E.F</b>
<b>MCA</b>	<b>I</b>	<b>Mathematical and Statistical Foundations</b>	<b>25MCA103</b>	<b>2025-26</b>

**MODEL QUESTION PAPER (w.e.f: 2025-26)**

**Time: Three Hours**

**Max Marks: 70M**

**Answer ALL Questions**

**Section- A**

**Answer any 5 questions**

**5 \*4= 20 Marks**

1. Explain about Strong Induction and Well-Ordering.
2. Explain about Predicates and Quantifiers.
3. Explain about Applications of Inclusion & Exclusion.
4. Explain about Graphs and Graph Models.
5. Explain about Planar Graphs.
6. Explain about Equivalence Relation.
7. Explain about Axioms of Probability.
8. Explain about significance testing.

**Section-B**

**Answer the following**

**5\*10= 50 Marks**

1. A) Give a proof by contradiction of the theorem. "If  $3n+2$  is odd then  $n$  is odd". **CO-1**

**(OR)**

- B) Use mathematical induction to show that  $1+2+2^2+ \dots +2^n=2^{n+1}-1$  **CO-1**

2. A) How many solutions does the equation  $x_1+x_2+x_3=11$  have, where  $x_1, x_2$  and  $x_3$  are non-negative integers? **CO-2**

**(OR)**

- B) Find all solutions of the recurrence relation  $a_n = 5a_{n-1}-6a_{n-2}+7n$  **CO-2**

3. A) Explain about Euler and Hamiltonian Paths **CO-3**

**(OR)**

- B) Find the partition of a set  $A = \{1,2,3,4,5\}$  with respect to the relation  $R=\{(1,1),(2,2),(3,3),(4,4),(5,5),(1,4),(4,1),(2,3),(3,2)\}$ . **CO-3**

4. A) Explain about Binomial distribution, Poisson distribution **CO-4**

**(OR)**

- B) Explain about Bayes' theorem. **CO-4**

5. A) Explain about Hypothesis Testing. **(OR)**  
**CO-5**

- B) Explain testing hypothesis on a proportion, comparing two proportions

**CO-5**

<b>Couse:</b>	<b>Semester:</b>	<b>Title of The Course:</b>	<b>Course Code:</b>	<b>W.E.F</b>
<b>MCA</b>	<b>I</b>	<b>Operating Systems</b>	<b>25MCA104</b>	<b>2025-26</b>

**MODEL QUESTION PAPER (w.e.f: 2025-26)**

**Time: Three Hours**

**Max Marks: 70M**

**Answer ALL Questions**

**Section- A**

**Answer any 5 questions**

**5 \*4= 20 Marks**

1. Explain about Types of System Calls. **CO-1**
2. Explain about Threads- Threading Issues. **CO-1**
3. Explain about Semaphores **CO-2**
4. Explain about Monitors **CO-3**
5. Explain about Virtual Memory Management **CO-3**
6. Explain about File-System implementation **CO41**
7. Explain about Network Topology **CO-4**
8. Explain about Mobile Operating Systems. **CO-5**

**Section-B**

**Answer the following**

**5\*10= 50 Marks**

1. a) Explain about Operating System Structure and Services **CO-1**  
(Or)  
b) Explain about Process Control block and process scheduling **CO-1**
2. a) Explain about Critical-Section Problem and Peterson's Solution? **CO-2**  
(Or)  
b) Explain about Dead Lock Prevention, Detection and Avoidance. **CO-2**
3. a) Explain about Paging and structure of the Page Table **CO-3**  
(Or)  
b) Explain about Page-Replacement Algorithms **CO-3**
4. a) Explain about File-System mounting and Files Sharing? **CO-4**  
(Or)  
b) Describe the concept of Disk Structure and Disk Scheduling. **CO-4**
5. a) Explain about Features of Android Operating Systems **CO-5**  
(Or)  
c) Explain about Types of network based Operating systems? **CO-5**

<b>Couse:</b>	<b>Semester:</b>	<b>Title of The Course:</b>	<b>Course Code:</b>	<b>W.E.F</b>
<b>MCA</b>	<b>I</b>	<b>Personality Development through Life Enlightenment Skills</b>	<b>25MCA105</b>	<b>2025-26</b>

**MODEL QUESTION PAPER (w.e.f: 2025-26)**

**Time: Three Hours**

**Max Marks: 70M**

**Answer ALL Questions**

**Section- A**

**Answer any 5 questions**

**5 \*4= 20 Marks**

1. Explain about concept of personality. **CO-1**
2. Explain about Factors responsible for Success. **CO-2**
3. Explain about Low self esteem **CO-3**
4. Explain about Nature of Motivation **CO-3**
5. Explain about Conflict Management **CO-4**
6. Explain about Character building **CO-4**
7. Explain about Quality of work life **CO-5**
8. Explain about Concept of attitude. **CO-5**

**Section-B**

**Answer the following**

**5\*10= 50 Marks**

9. a) Explain about Theories of Personality development **CO-1**  
(Or)
- b) Explain about SWOT (Strengths, Weaknesses, Opportunities and Threats) analysis. **CO-1**
10. a) Explain about Theories of Motivation? **CO-2**  
(Or)
- b) Explain about Do's and Don'ts to develop positive self- esteem and Low self esteem.. **CO-2**
11. a) Explain about Work ethics **CO-3**  
(Or)
- b) Explain about Dimensions of Emotional Intelligence **CO-3**
12. a) Explain about Types of Stress - Eustress and Distress? **CO-4**  
(Or)
- b) Describe the Case study of Work life balance of Women Employees in Service Sector.. **CO-4**
13. a) Explain about types of attitudes, attitude of different persons **CO-5**  
(Or)
- b) Explain about Case Study on Attitude of Students of using electronic devices in Campus? **CO-5**

<b>Couse:</b>	<b>Semester:</b>	<b>Title of The Course:</b>	<b>Course Code:</b>	<b>W.E.F</b>
<b>MCA</b>	<b>I</b>	<b>Survey of Quantum Technologies and Applications</b>	<b>25MCA106</b>	<b>2025-26</b>

**MODEL QUESTION PAPER (w.e.f: 2025-26)**

**Time: Three Hours**

**Max Marks: 70M**

**Answer ALL Questions**

**Section- A**

**Answer any 5 questions**

**5 \*4= 20 Marks**

Explain about concept of Quantum Technologies. **CO-1**

Explain about Quantum States. **CO-2**

Explain about Basics of qubits **CO-3**

Explain about Di Vincenzo criteria for realising qubits **CO-3**

Explain about NMR qubits **CO-4**

Explain about Atomic clock **CO-4**

Explain about Terrestrial fibre-based **CO-5**

Explain about Free space, Satellite-based. **CO-5**

**Section-B**

**Answer the following**

**5\*10= 50 Marks**

1. a) Explain about No cloning theorem **CO-1**

(Or)

b) Explain about Hermitian operators. **CO-1**

2. a) Explain about Solid State Qubits? **CO-2**

(Or)

b) Explain about Photonic Qubits. **CO-2**

3. a) Explain about Basics of Photon **CO-3**

(Or)

b) Explain about State of the art in Quantum Sensing **CO-3**

4. a) Explain about RSA and Shor's Algorithm? **CO-4**

(Or)

b) Describe the Magnetometry **CO-4**

5. a) Explain about Quantifying classical information **CO-5**

(Or)

b) Explain about – Shannon entropy? **CO-5**