KAKARAPARTI BHAVANARAYANA COLLEGE: PG CENTRE (Autonomous)
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Vijayawada – 520001.

Couse:	Semester:	Title of The Course:	Course Code:	W.E.F
MCA	I	Programming and Problem Solving Using Python	R22MCA101	2022-23

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:
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 object, oriented features

Course Learning Outcomes:

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

- Understand computer architecture and data representations (variables, representation of numbers and character strings).
- Learn basic algorithmic problem, solving techniques (decision structures, loops, functions).
- Use and understand objects used in programming.
- Design, document, implement and test solutions to programming problems.
- Identify and repair coding errors in a program.

Course Content:

UNIT -I

Introduction: What is a programming language, Abstractions in programming languages, Computational paradigms, Language definition, Language translation, Language design? Principles of Programming Languages: Attributes, binding and semantic functions, Declarations, blocks and scope, the symbol table, Name resolution and overloading, Allocation, Lifetimes and the environment, Variables and Constants, Aliases, Dangling references and garbage.

UNIT-II

Basics of Python Programming, Features of Python, History of Python, The Future of Python, Writing and Executing FirstPython Program, Literal Constants, Variables and Identifiers, Data Types, Input Operation, Comments, Reserved Words, Indentation, Operators and Expressions, Expressions in Python, Operations on Strings, Other Data Types, Type Conversion. Decision Control Statements, Conditional Branching Statements, Basic Loop Structures, Nested Loops, The break statement, The continue statement, The pass statement. The else statement used with loops.

UNIT-III

Functions and Modules, Function Definition, Function Call, Variable Scope and Lifetime, The return statement, More on Defining Functions, Recursive functions, Modules, Packages in Python, Standard Library Modules. Python Strings Revisited,Concatenating, Appending and Multiplying Strings, String formatting operator, Builtin String Methods and Functions, Comparing Strings, Regular Expressions. Sequence, Lists, Functional Programming, Tuple, Sets, Dictionaries.

UNIT-IV

Classes and Objects, Class Method and self Argument, Class variables and Object Variables, Public and Private Data Members, Private Methods, Calling a Class Method from Another Class Method, Built,in Class Attributes, Class Methods, Static Methods.

UNIT-V

Inheritance, Inheriting Classes in Python, Types of Inheritance, Abstract Classes and Interfaces. Error and Exception Handling, Introduction to Errors and Exceptions, Handling Exceptions, RaisingExceptions, Built, in and User defined Exceptions Operator Overloading, concept of Operator Overloading, Advantage of Operator Overloading, Implementing OperatorOverloading.

Reference Books:

1. Kenneth C. Louden, 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^{nd} Edition)

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Couse:	Semester:	Title of The Course:	Course Code:	W.E.F
MCA	I	Data Structures	R22MCA102	2022-23

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:

- Ability to select the data structures that efficiently model the information in a problem.
- Ability to assess efficiency tradeoffs among different data structure implementations or combinations.
- Implement and know the application of algorithms for sorting and pattern matching.
- Design programs using a variety of data structures, including hash tables, binary and general tree structures, search trees, , graphs, and AVL trees

Course Content:

UNIT-I

Introduction and Overview:

Elementary Data Organization, Data Structures, Data Structure Operations, and Algorithms: Complexity, Time, and Space Tradeoff. Linear Arrays, Representation and Traversing Linear Arrays, Inserting and Deleting, Linear Search, Binary Search, Multidimensional Arrays, Pointer Arrays, Record Structures, Representation of records in memory, Parallel Arrays, Matrices, Sparse Matrices.

UNIT-II

Stacks: Stacks, Array representation, Linked List representation, Evaluation of Arithmetic Expressions, Quick sort, Recursion, Towers of Hanoi. Queues: Linked representation of Queues, Deques, and Priority Queues.

Linked Lists: Representation, Traversing, Searching, Memory Allocation: Garbage Collection, Insertion, Deletion, Header Linked Lists, Two Way Lists.

UNIT-III

Trees : Binary trees, Representing and traversing binary trees, Traversal algorithms using stacks, Binary Search Trees, Searching, Insertion and Deletion in Binary Search Trees, AVL Search Trees, Insertion and Deletion in AVL trees, Heap: Heap Sort, Huffman's Algorithms, General Trees

UNIT-IV

Multi-way Search Trees: M-Way Search Trees, Definition and Properties, Searching an M-Way Search Tree, B-Trees, Definition and Properties, Number of Elements in a B-tree, Insertion into B-Tree, Deletion from a B-Tree, B+-Tree Definition, Searching a B+-Tree, Insertion into B+-tree, Deletion from a B+-Tree.

UNIT-V

Graphs Algorithms – Elementary Graph Algorithms: Topological sort, Single Source Shortest Path Algorithms: Dijkstra’s, Bellman-Ford, All-Pairs Shortest Paths: Floyd-Warshall’s Algorithm

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.

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Couse:	Semester:	Title of The Course:	Course Code:	W.E.F
MCA	I	Mathematical and Statistical Foundations	R22MCA103	2022-23

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:

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

• Apply the basic rules and theorems of probability theory such as Baye's Theorem, determine probabilities that help to solve engineering problems and to determine the expectation andvariance of a random variable from its distribution.

• Able to perform and analyze of sampling, means, proportions, variances and estimates themaximum likelihood based on population parameters.

• Learn how to formulate and test hypotheses about sample means, variances and proportions andto draw conclusions based on the results of statistical tests.

• Design various ciphers using number theory.

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. Arno ld, Introduction to Probability and Statistics,Fourth edition.

2. William Mendenhall, Robert J Beaver, Barbara M Beaver, Introduction to Probability and Statistics,Twelth edition, Thomson.

3. Kenneth H Rosen, Discrete Mathematics and itsApplications,6thEdition, McGraw-Hill (2007)Chapters(1-10)

4. Ralph P. Grimaldi,B.V. Ramana, Discrete and Combinational Mathematics, 5thEdition, Pearson Education (2008).

5. Swapan KumarSarkar, A Text Book ofDiscreteMathematics, S.Chand (2008)

6. D.S.Malik andM.K.Sen, Discrete Mathematical Structures,Thomson (2006)

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Couse:	Semester:	Title of The Course:	Course Code:	W.E.F
MCA	I	Operating Systems	R22MCA104	2022-23

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:

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 the students should be able to:

- Understand fundamental operating system abstractions such as processes, threads, files, semaphores, IPC abstractions, shared memory regions, etc.,
- Analyze important algorithms eg. Process scheduling and memory management algorithms.
- Categorize the operating system’s resource management techniques, dead lock management techniques, memory management techniques

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

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Couse:	Semester:	Title of The Course:	Course Code:	W.E.F
MCA	I	Personality Development through Life Enlightenment Skills	R22MCA105	2022-23

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

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 mange 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:
- Develop their personality and achieve their highest goals of life.
- Lead the nation and mankind to peace and prosperity
- Practice emotional self-regulation.
- Develop a positive approach to work and duties
- Develop a versatile personality

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

Attitude, Motivation and Self-esteem: Conceptual overview of Attitude – Types of Attitudes – Attitude Formation – Advantages/Disadvantages of Positive/Negative Attitude - Ways to Develop Positive Attitude 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 - Personality having low self esteem - Positive and negative self esteem.

UNIT- III

Other Aspects of Personality Development

Body language - Problem-solving - Conflict Management and Negation 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

Neetisatakam-Holistic Development of Personality Verses- 19,20,21,22 (wisdom) – Verses- 29,31,32 (pride and heroism) – Verses- 26,28,63,65 (virtue) Personality of Role Model – ShrimadBhagwadgeeta Chapter2-Verses 17 – Chapter 3-Verses 36,37,42 – Chapter 4-Verses 18, 38,39 – Chapter18 – Verses 37,38,63.

UNIT- V

Yoga & Stress Management

Meaning and definition of Yoga - Historical Perspective of Yoga - Principles of Astanga Yoga by Patanjali – Meaning and Definition of Stress - Types of Stress - Eustress and Distress –Stress Management – Pranayama- Pranayama: Anulom and Vilom Pranayama - Nadishudhi Pranayama– Kapalabhati-Pranayama - Bhramari Pranayama - Nadanusandhana Pranayama – Meditation techniques: Om Meditation - Cyclic meditation : Instant Relaxation technique (QRT), Quick Relaxation Technique (QRT), Deep Relaxation Technique (DRT) (Theory & Practical).

PRACTICAL COMPONENTS:

- Students should identify different types of personality to know their own personality. Students are to describe the characteristics of their personalities and submit the same for assessment.
- Students are to form in groups (a group consists of 4-6 students) to identify and write a brief note on famous personalities of India and World.
- Students are required to identify different types of attitudes and give any five examples of each.
- Students are expected to check their attitudes and develop ways to improve their attitudes at work place and home.
- Students are required to identify keys to self-motivation to achieve their goals.
- Students are expected to identify at least seven types of body language and conduct activities with the following:

S. No.	Pose	Possible Interpretations
1	Standing with your hands on your hips	Aggressive, disgusted
2	Standing upright	Confidence
3	Arms crossed on your chest	Defensive
4	Resting your hand on your cheek	Thinking
5	Touching or rubbing your nose	Doubt, lying
6	Resting your head in your hands	Boredom, tired
7	Tapping your fingers	Impatience
8	Biting your nails	Nervous, insecure
9	Playing with your hair	Insecure
10	Rubbing your eyes	Disbelief, doubt

- Conduct the following exercise to develop communication skills – Negotiation Skills andEmpathy

Exercise: **Card Pieces**

In this activity, team members trade pieces of playing cards to put together complete cards. Uses -This exercise is useful for showing team members others' perspectives. It builds communication and negotiation skills , and helps people to develop empathy .

People and Materials

- Enough people for at least three teams of two.
- Playing cards – use between four and six for each person.
- A private room.

Time -15 minutes. **Instructions**:

1. Cut each playing card into half diagonally, then in half diagonally again, so you have four triangular pieces for each card.

2. Mix all the pieces together and put equal numbers of cards into as many envelopes as you have teams.

3. Divide people up into teams of three or four. You need at least three teams. If you're short of people, teams of two will work just as well.

4. Give each team an envelope of playing card pieces.

5.Each team has three minutes to sort its pieces, determine which ones it needs tomake complete cards, and develop a bargaining strategy.

6. After three minutes, allow the teams to start bartering for pieces. People can barter on their own or collectively with their team. Give the teams eight minutes to barter.

7. When the time is up, count each team's completed cards. Whichever team has themost cards wins the round.

Advice for the Teacher/Facilitator

After the activity, ask your team members to think about the strategies they used. Discussthese questions:

1) Which negotiation strategies worked? Which didn't?

2) What could they have done better?

3) What other skills, such as active listening or empathy , did they need to use?

Conduct following Time management activity - Ribbon of Life

Take a colored ribbon length of approximately 1 meter/100 cm. and scissors. Start with the following questions:

- If the life span of an individual is say, 100 years. Consider that each cm represents one year. The response will be that few live that long. Assuming a life of 75 to 90 years, cut 10 to 25 cm off the ribbon, accordingly.
- What is the average age of the participants sitting here, the response would be 25 to 30 depending on the group, in that case, cut another 25 cms of the ribbon and say that is gone you cannot do anything.
- What is left is 50 years? People will say, “Yes,” but the answer is NO.
- Every year we have 52 weeks, that is 52 Sundays. If we multiply that by 50 years, it comes to 7.14 years. Reduce the ribbon by another 7.14 cm.
- We also usually have Saturdays off, so reduce another 7. cms.
- Public/National holidays are 10 multiple with 50 years. That comes to another 1.5 years. Reduce ribbon by another 1.5 cms.
- Your casual leave, sick leave, and annual holidays approx. 40 days a year, multiplied by 50. Cut off another 5 cms. Now you are left with about 29.5 years. But, the calculation is not over yet.
- You sleep an average of 8 hours daily; multiply that by 365 days and again by 50 years (i.e. 122 days X 50 = almost 17 years). Cut off another 17 cm.
- You spend time eating lunch, breakfast, snacks, and dinner total 2 hours daily (i.e. 30 days a year X 50 years= 4 years or so). Cut off another 4 cm.
- Last, let‟s figure we spend about 1 hour a day traveling from place to place for activities and

such. (that‟s about 2 more years). We‟re down to 6 (SIX) years of life to make it or break it.

•Exercise Decision making skills - Create Your Own

In this exercise, teams must create their own, brand new, problem-solving activity.

Uses

This game encourages participants to think about the problem-solving process. It builds skills such as creativity, negotiation and decision making, as well as communication and time management. After the activity, teams should be better equipped to work together, and to think on their feet.

What You'll Need

•Ideally four or five people in each team.

•A large, private room.

•Paper, pens and flip charts.

Time -Around one hour.

Instructions:

1. As the participants arrive, you announce that, rather than spending an hour on a problem- solving team building activity, they must design an original one of their own.

2. Divide participants into teams and tell them that they have to create a new problem-solving team building activity that will work well in their organization. The activitymust not be one that they have already participated in or heard of.

3. After an hour, each team must present their new activity to everyone else, and outline its key benefits.

There are four basic steps in problem solving : defining the problem, generating solutions, evaluating and selecting solutions, and implementing solutions. Help your team to think creatively at each stage by getting them to consider a wide range of options. If ideas run dry, introduce an alternative brainstorming technique, such as brain writing . This allows your people to develop one others' ideas, while everyone has an equal chance to contribute.

After the presentations, encourage teams to discuss the different decision-making processes they followed. You might ask them how they communicated and managed their time . Another question could be about how they kept their discussion focused. And to round up, you might ask them whether they would have changed their approach after hearing the other teams' presentations.

Advice for the Teacher/Facilitator:

•Students are asked to recite verses: 26,28,63,65 (virtue) of Neetisatakam-Holistic development of personality.

•Students are asked to identify personality of role Models from Shrimad Bhagwadgeeta and portray the roles of the same.

•Students are asked to practice Yoga and meditation techniques

Reference Books:

1. Hurlock, E.B. Personality Development, 28th Reprint. New Delhi: Tata McGraw Hill, 2006.

2. Gopinath,Rashtriya Sanskrit Sansthanam P, Bhartrihari"s ThreeSatakam, Niti-sringar- vairagya, New Delhi, 2010

3. Swami Swarupananda, Srimad Bhagavad Gita, Advaita Ashram,Publication Department, Kolkata, 2016.

4. Lucas, Stephen. Art of Public Speaking. New Delhi. Tata - Mc-Graw Hill. 2001

5. Mile, D.J Power of positive thinking. Delhi. Rohan Book Company, (2004).

6. Pravesh Kumar. All about Self- Motivation. New Delhi. Goodwill Publishing House. 2005.

7. Smith, B. Body Language. Delhi: Rohan Book Company. 2004

8. Yogic Asanas for Group Training - Part-I: Janardhan Swami Yogabhyasi Mandal, Nagpur.

9. Rajayoga or Conquering the Internal Nature by Swami Vivekananda, Advaita Ashrama (Publication Department), Kolkata.

10.Nagendra H.R nad Nagaratna R, Yoga Perspective in Stress Management, Bangalore, Swami Vivekananda Yoga Prakashan.

Online Resources:

1. https://onlinecourses.nptel.ac.in/noc16_ge04/preview

2. https://freevideolectures.com/course/3539/indian-philosophy/11

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Couse:	Semester:	Title of The Course:	Course Code:	W.E.F
MCA	I	Data Structures Lab	R22MCA106	2022-23

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

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
12. Java Program to perform the following operations:

a) Insertion into a B-Tree b) Searching in a B-Tree.

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

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Couse:	Semester:	Title of The Course:	Course Code:	W.E.F
MCA	I	Python Lab	R22MCA107	2022-23

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

List of Programs

1. Write Python program to reverse a number and also find the sum of digits in the reversed number. Prompt the user for input.

2. Write Python code to check the given year is leap year or not.

3. Write Python code to determine whether the given string is Palindrome or not using slicing

4. Write Python code to add two matrices and also find the transpose of the resultant matrix.

5. Write Python code to swap two numbers without using intermediate variable.

6. Consider a rectangle class and create two rectangle objects. Write a python program to check whether the area of first rectangle is greater than the second by overloading greater than operator.

7. Write Python program to count the number of times an item appears in the list.

8. Write Python code to convert uppercase letters to lowercase and vice versa

9. Write Python code to perform a linear search for a given key number in the list and report success or failure.

10. Write Python code to sort numbers in a list in ascending order using Bubble sort by passing the list as an argument to the function call.

11. Write Python code to calculate the area and perimeter of different shapes using polymorphism.

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

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Couse:	Semester:	Title of The Course:	Course Code:	W.E.F
MCA	I	Programming and Problem Solving Using Python	R22MCA101	2022-23

MODEL QUESTION PAPER (w.e.f: 2022-23)

Time: Three Hours **Max Marks: 70M**

Answer ALL Questions

All Questions carry equal marks (5 X 14 = 70)

1. A) Explain about Attributes, binding and semantic functions.

(or)

B) Explain about Variables and Constants, Aliases?

2. A) Explain Operators in python?

(or)

B) Explain about looping statements in python.

3. A) Explain about Functions in python?

(or)

B) Explain about dictionaries in python.

4. A) Explain about classes and objects in python?

(or)

B) Explain Calling a Class Method from Another Class Method in python?

5. A) Explain about inheritance in python.

(Or)

B) Explain about Exception Handling in python.

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Couse:	Semester:	Title of The Course:	Course Code:	W.E.F
MCA	I	Data Structures	R22MCA102	2022-23

MODEL QUESTION PAPER (w.e.f: 2022-23)

Time: Three Hours **Max Marks: 70M**

Answer ALL Questions

All Questions carry equal marks (5 X 14 = 70)

UNIT - I

1. A) Explain about Linear Search, Binary Search.

(OR)

B) Discuss about Matrices, Sparse Matrices..

UNIT - II

2 A) Discuss about Priority Queues

(OR)

B) Explain Two Way Lists.

UNIT – III

3 A) Discuss about Insertion and Deletion in Binary Search Trees.

(OR)

B) Explain about Heap Sort.

UNIT – IV

4 A) Explain about Insertion into B-Tree, Deletion from a B-Tree

(OR)

B).Explain Insertion into B+-tree, Deletion from a B+-Tree.

UNIT – V

5 A). Explain about Floyd-Warshall’s Algorithm.

(OR)

B) Discuss about Dijkstra’s algorithm with example.

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Couse:	Semester:	Title of The Course:	Course Code:	W.E.F
MCA	I	Mathematical and Statistical Foundations	R22MCA103	2022-23

MODEL QUESTION PAPER (w.e.f: 2022-23)

Time: Three Hours **Max Marks: 70M**

Answer ALL Questions

All Questions carry equal marks (5 X 14 = 70)

UNIT – I

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

(OR)

B) Use mathematical induction to show that 1+2+22+ ....+2n=2n+1-1

UNIT – II

2. A) How many solutions does the equation x1+x2+x3=11 have, where x1, x2 and x3 are non-negative integers?

(OR)

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

UNIT – III

3. A) Explain about Euler and Hamiltonian Paths

(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)}.

UNIT – IV

4. A) Explain about Binomial distribution, Poisson distribution

(OR)

B) Explain about Bayes' theorem .

UNIT – V

5. A) Explain about Hypothesis Testing.

(OR)

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

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Couse:	Semester:	Title of The Course:	Course Code:	W.E.F
MCA	I	Operating Systems	R22MCA104	2022-23

MODEL QUESTION PAPER (w.e.f: 2022-23)

Time: Three Hours **Max Marks: 70M**

Answer ALL Questions

All Questions carry equal marks (5 X 14 = 70)

UNIT - I

1. a) Explain about Operating System Structure and Services

(Or)

b) Explain about Process Control block and process scheduling

UNIT - II

2. a) Explain about Critical-Section Problem and Peterson's Solution ?

(Or)

b) Explain about Dead Lock Prevention, Detection and Avoidance.

UNIT - III

3. a) Explain about Paging and structure of the Page Table

(Or)

b) Explain about Page-Replacement Algorithms

UNIT - IV

4.a) Explain about File-System mounting and Files Sharing?

(Or)

b) Describe the concept of Disk Structure and Disk Scheduling.

UNIT - V

5. a) Explain about Features of Android Operating Systems

(Or)

c) Explain about Types of network based Operating systems?

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Couse:	Semester:	Title of The Course:	Course Code:	W.E.F
MCA	I	Personality Development through Life Enlightenment Skills	R22MCA105	2022-23

MODEL QUESTION PAPER (w.e.f: 2022-23)

Time: Three Hours **Max Marks: 70M**

Answer ALL Questions

All Questions carry equal marks (5 X 14 = 70)

UNIT - I

1. a) Explain about Dimensions of Personality & Theories of Personality development

(Or)

b) Explain about the Factors responsible for Success and Hurdles in achieving Success and Overcoming Hurdles

UNIT - II

2. a) Explain about Types of Attitudes & Attitude Formation?

(Or)

b) Explain about Theories of Motivation & Importance of self- motivation.

UNIT - III

3. a) Explain about Decision-making skills & Leadership and qualities of a successful leader

(Or)

b) Explain about Dimensions of Emotional Intelligence & Building Emotional Intelligence.

UNIT - IV

4.a) Explain about Holistic Development of Personality Verses?

(Or)

b) Describe the concept of Personality of Role Model.

UNIT - V

5. a) Explain about Anulom and Vilom Pranayama

(Or)

c) Explain about Quick Relaxation Technique (QRT) & Deep Relaxation Technique (DRT)?

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Couse:	Semester:	Title of The Course:	Course Code:	W.E.F
MCA	II	Software Engineering and Design Patterns	R22MCA201	2022-23

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:

Almost every computer science and computer engineering curriculum now includes a required team- based software development project. In some cases, the project is only one semester or quarter in length, but a year-long team based software development project is fast becoming the norm.In present world, every student would complete a course in software engineering before starting his or her team-based project. In practice, however, many students have to start their projects partway through their software engineering course.

Course Objectives:

Specific objectives include:

•To understand the basic concepts of Software Engineering and its concepts.

•To understand various life cycle models.

•To grasp the knowledge software process and requirements workflow.

•To apprehend the knowledge of software metrics.

•To gain the knowledge of Object Oriented Paradigm.

Course Learning Outcomes:

Upon successful completion of the course, the student will be able to:

•Gain knowledge on the concepts of Software Engineering requirements, analysis and design.

•Understand different life cycle models.

•Known the concept of object oriented paradigm .

•Understand the working of software Architecture and their design patterns

Course Content:

Unit-I

The Scope of Software Engineering- Requirements, Analysis and Design Aspects, Object Oriented Paradigm, Iteration and incrementation, Risks and other aspects of Iteration and Incrementation, Managing Iteration and Incrementation. Code and fix life cycle model, Waterfall life cycle model, Open source life cycle model, Agile processes, spiral life cycle model. Comparison of life cycle models.

Unit-II

The software process- The unified process Iteration and incrementation with in the Object-Oriented Paradigm, The requirements workflow, The Analysis Workflow, The design Workflow, The Implementation workflow, The phases of the Unified Process, Capability Maturity Models.

Unit-III

Software Metrics, CASE, Taxonomy of CASE, Scope of CASE, Software Versions, Configuration Control. Testing quality issues, Non Execution Based Testing, Execution based testing.

Unit-IV

Modules to Objects- What is a Module?, Cohesion, Coupling, Data Encapsulation, Abstract Data Types, Information Hiding, Objects, Inheritance, Polymorphism, and Dynamic Binding, Object-Oriented Paradigm.

Unit-V

Reuse concepts, Objects and Reuse, during design and implementation, Design Reuse, Application Frameworks, Design Patterns, Software Architecture, More on Design patterns.

Reference Books:

1. Stephen. R. Schach, Object-oriented and classical software Engineering, Eight Edition.

2. Software Engineering: A Practitioner's Approach, Roger S. Pressman, 10th ed, Mc Graw Hill.

3. Erich Gamma, Richard Helm, Ralph Johnson, John Vlissides, Design patterns: Elements of Reusable object-oriented software, Addison-Wesley, 1995.

4. James W Cooper, Java Design Patterns - A Tutorial, Addison-Wesley.

5. Software Engineering, 8/e, Sommerville, Pearson.

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Couse:	Semester:	Title of The Course:	Course Code:	W.E.F
MCA	II	Database Management Systems	R22MCA202	2022-23

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	6	3 Hours	30	70	4

Course Description and Purpose:

This course introduces the core principles and techniques required in the design and implementation of database systems. This course focus on relational database management systems, It also covers essential DBMS concepts such as: Transaction Processing, Concurrency Control and Recovery and various types of databases like distributed database, and intelligent database, Client/Server. It also provides students with theoretical knowledge and practical skills in the use of databases and database management systems in information technology applications.

Course Objectives:

- To understand basic concepts of databases and database users.
- To learn the basics of Functional Dependencies and Normalization for Relational Databases & Transaction Processing Concepts.
- To learn Concurrency Control Techniques and Distributed Database Concepts.
- To know Querying, Creating, Updating & Deleting Documents in Mongo DB, Data Lakes.

Course Learning Outcomes:

Upon successful completion of the course, the student will be able to:

- Learn the concepts of databases and database users.
- Learn the basics of normalization.
- Learn entity relationship models.
- To understand the relational algebra and relational calculus.
- To know Querying, Creating, Updating & Deleting documents in SQL

Course Content:

UNIT-I

Databases and Database Users: Introduction, Characteristics of the Database Approach, Actors on the Scene, Workers behind the scene, Advantages of the using the DBMS Approach. Database System Concepts and Architecture: Data Models, Schemas and Instances, Three Schema architecture and Data Independence, Database Languages and Interfaces, Centralized and Client/Server Architecture for DBMS, Classification of Database Management Systems.

UNIT-II

Data Modeling Using the ER Model: Conceptual Data models, Entity Types, Entity Sets, Attributes and Keys, Relationship types, Relationship sets, roles and structural Constraints, Weak Entity types, Relationship Types of Degree Higher than Two, Refining the ER Design for the COMPANY Database.The Relational Algebra and Relational Calculus: Unary Relational Operations: SELECT and PROJECT, Relational Algebra Operations from set Theory, Binary Relational Operations: JOIN and DIVISION, Additional Relational Operations, Examples, The Tuple Calculus and Domain Calculus.

UNIT- III

Functional Dependencies and Normalization for Relational Databases: Informal Design Guidelines for Relation Schemas, Functional dependencies, Normal Forms Based in Primary Keys, General Definitions of Second and Third Normal Forms, Boyce-Codd Normal Form, Multivalued Dependencies and Fourth Normal Form, Join Dependencies and Fifth Normal Form, Inclusion Dependencies.

UNIT-IV

Introduction to Transaction Processing Concepts and Theory: Introduction to Transaction Processing, Transaction and System Concepts, Desirable Properties of Transactions, Characterizing Schedules Based on Recoverability, Characterizing schedules Based on Serializability. Concurrency Control Techniques: Two Phase Locking Techniques for Concurrency Control, Concurrency Control Based on Timestamp Ordering, Multiversion Concurrency control techniques, Validation concurrency control Techniques,

UNIT-V

SQL-99: Schema Definition, Constraints, Queries and Views: SQL Data Definitions and Data Types, Specifying Constraints in SQL, Schema Change Statements on SQL, Basic Queries in SQL, More Complex SQL Queries, INSERT, DELETE and UPDATE statements in SQL, Triggers and Views. Emerging Database Technologies and Applications- Mobile Databases, Multimedia Databases, Geographic information Systems.

Reference books:

1. Ramez Elmasri & Shamkant B. Navathe, Fundamentals of Database Systems, Pearson, Seventh Edition, 2016.

2. Pramod J.Sadalage & Martin Fowler, No SQL Distilled , Addison-Wesley, Second Edition, 2013

3. Kristina Chodorow, Mongo DB, O'Reilly, Second Edition, 2013

4. Mandy Chessell Ferd Scheepers, Maryna Strelchuk, Ron van der Starre,Seth Dobrin,Daniel Hernandez From Data Lake to Data Driven Organization, IBM-Red Guide,2018

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Couse:	Semester:	Title of The Course:	Course Code:	W.E.F
MCA	II	Computer Networks	R22MCA203	2022-23

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:

This course provides an introduction to computer networks, with a special focus on the Internet architecture and protocols. Topics include layered network architectures, addressing, naming, forwarding, routing, communication reliability, the client-server model, web and email protocols.

Course Objectives:

- Become familiar with layered communication architectures (OSI and TCP/IP).
- Understand the client/server model and key application layer protocols.
- Understand the concepts of reliable data transfer and how TCP implements these concepts.
- Learn the principles of routing and the semantics and syntax of IP.
- Understand the basics of error detection including parity, checksums, and CRC.

Course Learning Outcomes:

Upon successful completion of the course, the student will be able to:

- Understand and describe the layered protocol model.
- Describe, analyse and evaluate a number of datalink, network, and transport layer protocols.
- Program network communication services for client/server and other application layouts.
- Describe, analyse and evaluate various related technical, administrative and social aspects of specific computer network protocols from standards documents and other primary materials found through research.
- Design, analyse, and evaluate networks and services for homes, data centres, IoT/IoE, LANs and WANs

Course Content:

UNIT -I

Uses of Computer Networks, Connection Oriented and Connectionless Services, Reference Models: The OSI Reference Model, The TCP/IP Reference Model, A Comparison of OSI and TCP/IP referenceModel.

Physical Layer: ALOHA, CSMA, CSMA/CA

Data Link Layer Design Issues: Services Provided to the Network Layer, Framing , Error correcting Codes , Error Detecting Codes. An unrestricted Simplex Protocol , A simplex Stop and wait Protocol , Sliding Window Protocols: A one, bit sliding Window Protocol , A Protocol using Go Back N , A protocol using selective repeat.

UNIT-II

Ethernet : Ethernet Cabling, The Ethernet MAC sublayer Protocol , Bluetooth: Bluetooth Architecture, Bluetooth Applications, Remote Bridges , Repeaters, Hubs,Bridges, Switches, Routers and Gateways , Virtual LANs.

UNIT-III

Network Layer Design Issues : Store and Forward Packet Switching ,Services Provided to the Transport Layer , Implementation of Connectionless Services ,Implementation of Connection Oriented Services , Comparison of Virtual Circuit and Datagram subnets.

Routing Algorithms : The Optimality Principle , Shortest Path Routing , Flooding , Distance Vector Routing , Link State Routing , Hierarchical Routing , Broadcast Routing , Multicast Routing , Routing for Mobile Hosts.

The Network Layer in the Internet IP address, IPV6 features and advantages.

UNIT-IV

The Transport Service: Services provided to the Upper Layers , Transport Services Primitives ,Berkeley Sockets. Elements of Transport Protocols : Addressing , Connection Establishment Connection Release , Flow Control and Buffering , Multiplexing , Crash Recovery.

Transport Protocols TCP : Introduction to TCP , The TCP Service Model , the TCP Protocol , The TCP segment header , TCP connection establishment , TCP connection release , TCP congestion Control , Comparison of TCP and UDP..

UNIT-V

DNS : The Domain Name System : The DNS Name Space , Resource Records , Name Servers. Electronic Mail : Architecture and Services , The User Agent , Message Formats , Message Transfer , Final Delivery. The World Wide Web: Architecture Overview , Static Web Documents , Dynamic Web Documents.

Reference books:

1. Andrew S. Tanenebaum, Computer Networks, PHI

2. James F.Kurose, Keith W Ross, Computer Networking, 3rd edition Pearson Edition

3. Michael A. Gallo, William M. Hancock, Data Communications and Networking, 4th edition,TMH.

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Couse:	Semester:	Title of The Course:	Course Code:	W.E.F
MCA	II	Research Methodology & Intellectual Property Rights (IPR)	R22MCA204	2022-23

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:

The aim of this course is to develop research bent of mind (spirit of inquiry) and impart research skills to the all Post graduate students. It also encompasses the series of research methodology contents: from problem formulation, to design, to data collection, analysis, reporting and dissemination. This course also covers intellectual property rights (IPR), and intended to equip students with conceptual understandings of current scenario of IPR, and the practical issues encountered in filing patents, trademarks and copyrights.

Course Objectives:

- To understand some basic concepts of research and its methodologies
- To develop an understanding of the basic framework of research process.
- To develop an understanding of various research designs and techniques.
- To identify various sources of information for literature review and data collection.
- Ability to write a research Proposal, report and thesis
- To demonstrate knowledge and understanding of IPR Filing and Rights

Course Learning Outcomes:

Upon successful completion of the course, the student will be able to:

- Understand some basic concepts of research and its methodologies
- Identify appropriate research topics
- Select and define appropriate research problem and parameters
- Demonstrate the ability to choose methods appropriate to research aims and objectives
- Have adequate knowledge on measurement & scaling techniques
- Have basic awareness of data analysis-and hypothesis testing procedures

- Prepare a project proposal (to undertake a project)
- Write a research report and thesis
- File Patents, Trademarks and Copy Rights

Course Content:

UNIT I

Foundations of Research

Meaning of Research – Definitions of Research – Motivation in Research – General Characteristics of Research– Criteria of Good Research – Types of Research – Research Process – Research Methods vs. Methodology – Defining and Formulating the Research Problem – Review of Literature – Approaches to Critical Literature Review – Importance of Literature Review in Identifying Research Gaps and Defining a Problem – Development of Working Hypothesis.

UNIT II

Research Design, Sampling Concepts, and Data Collection Methods

Meaning, Significance and Characteristics of Good Research Design – Types of Research Design: Exploratory, Conclusive Research and Experimental – Sampling Theory: Types of Sampling and Errors in Sampling – Data Collection: Types of Data – Data Collection Methods and Techniques for Primary and Secondary Data.

UNIT III

Measurement & Scaling Techniques, Hypothesis Formulation and Testing, Overview of Data Analysis and Report Writing

Basic measurement scales – Reliability & Validity – Definition and Types of Hypothesis – Hypothesis Formulation and Testing Procedure – Overview of Data Analysis: Methods, Process and Types – Report Writing: Significance of Report Writing, Different Steps in Writing Report, Layout of the Research Report, Types of Reports, Oral Presentation, Mechanics of Writing a Research Report, Precautions for Writing Research Reports – How to Write a Research Proposal, Research Ethics, Conflict of Interest and Plagiarism.

UNIT IV

Intellectual Property Rights (IPR)

Definition and Nature and Features of Intellectual Property Rights (IPR) – Types of IntellectualProperty Rights – Procedure for Grants of Patents – Rights of a Patent – Scope of a Patent Rights

–Licensing and Transfer of Technology – Why protection of intellectual property is important?

–Enforcement of IPR – Infringement of IPR.

UNIT V

Indian and International Scenario and New Developments in IPR

IPR Developments in India for the past Five Years – Development of IPR Laws in India – International Cooperation on IPR – New Developments in IPR – Administration of Patent System –International Patent protection – Case Studies in Indian and Global Contexts.

PRACTICAL COMPONENTS:

- Students should identify different research problems with examples and describe the characteristics of researchable problems in their academic area/society/community/organization concerned.
- Students are to form in groups (a group consists of 4-6 students) and conduct critical literature survey with regard to the identified research problems and prepare a brief literature review coupled with research gaps and working hypothesis.
- Students are required to identify and develop good research design to address the defined research problems.
- Students are expected to write the research design on Exploratory and DescriptiveResearch.
- Students are required to develop practical experience in writing a research proposal by conducting a thorough critical review of any three research proposals (examples).
- Students are expected to develop templates for technical report writing.
- Students should conduct a team based mini research project, which is a unified and practical case on a topic of their choice, with approximately 4-6 students per group.
- Students are expected to identify types of plagiarism in academic research, and how to avoid plagiarism in research.
- Students are asked to identify and submit a brief report on Indian patents of International repute.
- Students are asked to write on Patent registration procedure, and visit Official website of Intellectual Property India https://ipindia.gov.in to know how to get IPR in India.
- Students are asked to identity and summarize remedies available against the infringement of intellectual property rights in Indian and global contexts.
- Students are asked to submit any five examples of ethical issues in copyright and patents

Reference Text Books:

- Garg, B.L., Karadia, R., Agarwal, F. and Agarwal, U.K., 2002, An introduction to Research Methodology, RBSA Publishers.
- Cohen, L. Lawrence, M., & Morrison, K. (2005), Research Methods in Education (5thedition). Oxford: Oxford University Press.
- Kothari, C.R., 1990, Research Methodology: Methods and Techniques, New AgeInternational.
- Dornyei, Z. (2007). Research Methods in Applied Linguistics. Oxford: Oxford UniversityPress.
- Anthony, M., Graziano, A.M. and Raulin, M.L., 2009, Research Methods: A Process ofInquiry, Allyn and Bacon.
- Fink, A., 2009, Conducting Research Literature Reviews: From the Internet to Paper. Sage Publications.
- Day, R.A., 1992, How to Write and Publish a Scientific Paper, Cambridge University Press.
- Wadehra, B.L. 2000, Law relating to patents, trade marks, copyright designs and geographicalindications. Universal Law Publishing.
- Coley, S.M. and Scheinberg, C. A., 1990, Proposal Writing, Sage Publications.
- Carlos, C.M., 2000. Intellectual property rights, the WTO and developing countries: the TRIPS agreement and policy options, Zed Books, New York.
- Leedy, P.D. and Ormrod, J.E., 2004, Practical Research: Planning and Design, Prentice Hall.
- Satarkar, S.V., 2000. Intellectual property rights and Copy right. Ess Publications.

Important Websites:

- www.ipindia.nic.in - Intellectual Property Office, India
- www.patentoffice.nic.in – Patent office, India
- http://copyright.gov.in/ - Copyright Office, India
- Ipr.icegate.gov.in – Automated Recordation & Targeting for IPR Protection
- http://www.icegate.gov.in- E- Commerce portal of Central Board of Excise and Customs
- www.ipab.tn.nic.in - Intellectual Property Appellate Board, India
- www.mit.gov.in – Department of Information Technology, India
- http://www.mit.gov.in/content/office-semiconductorintegrated-circuits-layout-designregistry
- Semiconductor Integrated Circuits Layout-Design Registry (SICLDR)

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Couse:	Semester:	Title of The Course:	Course Code:	W.E.F
MCA	II	Design and Analysis of Algorithms	R22MCA205E1	2022-23

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:

This course introduces basic methods for the design and analysis of efficient algorithms emphasizing methods useful in practice. Different algorithms for a given computational task are presented and their relative merits evaluated based on performance measures

Course Objectives:

- Analyze the asymptotic performance of algorithms.
- Write rigorous correctness proofs for algorithms.
- Demonstrate a familiarity with major algorithms and data structures.
- Apply important algorithmic design paradigms and methods of analysis.
- Synthesize efficient algorithms in common engineering design situations

Course Learning Outcomes:

Upon successful completion of the course, the student will be able to:

- Understand the basic notation for analyzing the performance of the algorithms.
- Use divide-and-conquer techniques for solving suitable problems
- Use greedy approach to solve an appropriate problem for optimal solution.
- Apply dynamic programming approach to solve suitable problems
- Understand the limitations of algorithm power and study how to cope with the limitations of algorithm power for various problems.

Course Content:

UNIT -I

Introduction to Algorithm : Algorithm definition, properties, Different areas to study about algorithms, Pseudo code expressions for an algorithm, Performance Analysis, Time Complexity & Space Complexity, Asymptotic notations. Elementary Data Structures: Stacks and Queues, Trees: Terminology - Binary Trees, Dictionaries : Binary Search Trees, Heaps, Heapsort, Sets and disjoint set Union: Introduction - union and find operations. ; Graphs: Introduction - Definitions - Graph Representations.

UNIT-II

Introduction to Divide and Conquer : Binary search, Binary search analysis, Quick sort, Quick sort analysis, Merge sort, Merge sort Analysis, Strassen's matrix multiplication, Finding Maximum and minimum. Greedy Method : Introduction, General method, Job sequencing with deadlines, single source shortest pathproblem, Optimal storage on tapes, Knapsack problem, Minimum cost spanning trees : Prim's Algorithm, Kruskal's Algorithm.

UNIT-III

Dynamic Programming : Single source shortest path problem, Multi stage graphs, All pairs shortest path, Optimal Binary search tree, 0/1 Knapsack problem, Reliability design, Travelling person Problem, Flow shop scheduling. Basic Traversal and Search Techniques: Techniques for Binary Trees, Techniques for graphs: Breadth First Search and Traversal-Depth First Search; Connected Components and Spanning Trees -Bi- connected components and DFS

UNIT-IV

Introduction to Backtracking: General method, N-queens problem, sum of sub sets problem, Graph coloring, Hamiltonian cycles, Knapsack problem. Branch and Bound : The Method: Least Cost search -The 15 puzzle - control abstractions for LC search - Bounding - FIFO Branch and Bound - LC Branch and Bound; 0/1 knapsack problem: LC Branch and Bound solution - FIFO Branch and Bound solution; Traveling Sales person.

UNIT-V

NP-Hard and NP-Complete problems: Basic concepts: Non deterministic algorithms -The classes NP hard and NP complex; Cook's theorem.

Reference books:

1. Sartaj Sahni ,Fundamentals of Computer Algorithms, 2nd Edition, University Press.

2. Anany Levitin, Introduction to the Design & Analysis of Algorithms, 2nd Edition, Pearson Education

3. I Chandra Mohan, Design and Analysis of Algorithms, PHI

4. Prabhakar Gupta and Vineet Agarwal, Design and Analysis of Algorithms, PHI

5. Parag Himanshu Dave, Design and Analysis of Algorithms, Pearson Education.

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Couse:	Semester:	Title of The Course:	Course Code:	W.E.F
MCA	II	Data Warehousing and Data Mining	R22MCA205E2	2022-23

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	6	3 Hours	30	70	4

Course Description and Purpose:

This course introduces basic methods for the mathematical foundations of data mining, design patterns, algorithms and web mining concepts

Course Objectives:

- Be familiar with mathematical foundations of data mining tools..
- Understand and implement classical models and algorithms in data warehouses and data mining
- Characterize the kinds of patterns that can be discovered by association rule mining, classification and clustering.
- Develop skill in selecting the appropriate data mining algorithm for solving practical problems.

Course Learning Outcomes:

Upon successful completion of the course, the student will be able to:

- Understand the basics of types of data, quality of data, suitable techniques required for preprocessing and measures required to perform data analysis
- Describe the need of classification, identify suitable technique(s) to perform classification, model building and evaluation
- Identify the requirements and usage of association rule mining on categorical and continuous data.
- Compare and Identify suitable clustering algorithm(s) (apply with open source tools), interpret, evaluate and report the result
- Describe the requirements and the need of web mining

Course Content:

UNIT -I

Introduction to Data mining, types of Data, Data Quality, Data Processing, Measures of Similarity and Dissimilarity, Exploring Data: Data Set, Summary Statistics, Visualization, Data Warehouse, OLAP and multi dimensional data analysis.

UNIT –II

Classification: Basic Concepts, Decision Trees and model evaluation: General approach for solving a classification problem, Decision Tree induction, Model over fitting: due to presence of noise, due to lack of representation samples, Evaluating the performance of classifier. Nearest Neighborhood classifier, Bayesian Classifier, Support vector Machines: Linear SVM, Separable and Non Separable case.

UNIT -III

Association Analysis: Problem Definition, Frequent Item-set generation, rule generation, compact representation of frequent item sets, FP-Growth Algorithms. Handling Categorical, Continuous attributes, Concept hierarchy, Sequential, Sub graph patterns.

UNIT -IV

Clustering: Over view, K-means, Agglomerative Hierarchical clustering, DBSCAN, Cluster evaluation: overview, Unsupervised Cluster Evaluation using cohesion and separation, using proximity matrix, Scalable Clustering algorithm

UNIT -V

Web data mining: Introduction, Web terminology and characteristics, Web content mining, Web usage mining, web structure mining, Search Engines: Characteristics, Functionality, Architecture, Ranking of WebPages, Enterprise search.

Reference books:

1) Introduction to Data Mining, Tan, Steinbach and Vipin Kumar, Pearson Education, 2016

2) Data Mining: Concepts and Techniques, 2ndEdition, Jiawei Han and Micheline Kamber, ELSEVIER

3) Data Mining: The Textbook, Springer, May 2015, Charu C. Aggarwal.

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Couse:	Semester:	Title of The Course:	Course Code:	W.E.F
MCA	II	Cloud Computing	R22MCA205E3	2022-23

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:

To expose the students to frontier areas of Cloud Computing and information systems, while providing sufficient foundations to enable further study and research.

Course Objectives:

- To provide students with the fundamentals and essentials of Cloud Computing.
- To provide students a sound foundation of the Cloud Computing so that they
- are able to start using and adopting Cloud Computing services
- To enable using cloud computing tools in real life scenarios.
- To enable students exploring some important cloud computing driven commercial systems and applications.

Course Learning Outcomes:

Upon successful completion of the course, the student will be able to:

- core concepts of the cloud computing paradigm: how and why this paradigm shift came about, the characteristics.
- advantages and challenges brought about by the various models and services in cloud computing.
- Apply the fundamental concepts in datacenters to understand the tradeoffs in power, Efficiency and cost.
- Identify resource management fundamentals, i.e. resource abstraction, sharing and Sandboxing and outline their role in managing infrastructure in cloud computing.
- Analyze various cloud programming models and apply them to solve problems on the cloud.

Course Content:

UNIT -I

Era of Cloud Computing : Getting to know the cloud - Peer-To-Peer, Client-Server, and Grid Computing – Cloud computing versus Client-server Architecture - Cloud computing versus Peer-To-Peer Architecture - Cloud computing versus Grid Computing - How we got to the Cloud - Server Virtualization versus cloud computing - Components of Cloud computing – Cloud Types – Cloud Computing Service delivery Models. Introducing Virtualization: Introducing Virtualization and its benefits – Implementation levels of Virtualization – Virtualization at the OS Level – Virtualization Structure – Virtualization Mechanisms

UNIT -II

Cloud Computing Services: Infrastructure as a Service – Platform as a Service – Language and Pass – Software as a Service – Database as a Service. Open Source Cloud Implementation and Administration: Open-source Eucalyptus Cloud Architecture – Open-source Openstack Cloud Architecture.

UNIT -III

Data Security in the cloud: Challenges with Cloud Data, Challenge with Data Backup, Challenges with Data Fragmentation, Challenges with Data Transformation, Challenges with data security, Data Confidentiality and Encryption, Data Availability, Data Integrity, Cloud storage Gateways, Advantages of using a CSG, Cloud Firewall, Virtual Firewall.

UNIT –IV

Application Architecture for Cloud: Cloud Application Requirements – Fundamental Requirements for Cloud Application Architecture – Service oriented Architecture for Cloud Applications. Cloud Programming: Programming support for Google Apps Engine – Big Table as Google's NOSQL System – Chubby as Google Distributed Lock Service – Programming support for Amazon EC2 – Elastic Block Store (ESB).

UNIT -V

Application development for cloud: Developing On-Premise Versus Cloud Applications. Modifying. Traditional Applications for Deployment in the cloud , Stages during the development process of cloud application, Managing a Cloud Application, Using Agile software Development for cloud Applications, Static code analysis for cloud Applications, Developing Synchronous and Asynchronous Cloud Applications.

Mobile Cloud Computing: Definition of Mobile Cloud Computing, Architecture of Mobile Cloud Computing, Benefits of Mobile Cloud Computing.

Reference books:

1) Cloud Computing, Kailash Jayaswal, Jagannath Kallakurchi, Donald J.Houde, Dr. Deven Shah,dream tech press, 2014 edition.

2) Cloud Computing: A Practical Approach. Anthony T.Velte. Toby J.VeFte, Robert Elsenpeter. Tata McGraw Hill. rp2Oll.

3) Enterprise Cloud Computing Gautam Shroif, Cambridge University Press. 2010.

4) Cloud Computing: Implementation, Management and Security, John W. Rittinouse, James F Ransome. CRC Press, rp2012.

5) Cloud Application Architectures: Building Applications and Infrastructure in the Cloud. George Reese, O'Really SPD, rp2Oll.

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Couse:	Semester:	Title of The Course:	Course Code:	W.E.F
MCA	II	Data Mining Lab	R22MCA206	2022-23

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	0	6	3 Hours	30	70	4

List of Programs

1. Matrix Operations
2. Linear Algebra On Matrices
3. Understanding Data
4. Correlation Matrix
5. Data Preprocessing – Handling Missing Values
6. Association Rule Mining - Apriori
7. Classification – Logistic Regression
8. Classification - Knn
9. Classification - Decision Trees
10. Classification – Bayesian Network
11. Classification – Support Vector Machines (Svm)

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Couse:	Semester:	Title of The Course:	Course Code:	W.E.F
MCA	II	Database Management Systems Lab	R22MCA207	2022-23

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	0	6	3 Hours	30	70	4

List of Experiments

1. Concept design with E-R Model
2. Relational Model
3. Normalization
4. Practicing DDL Commands
5. Practicing DML Commands
6. Querying (using ANY, ALL, IN, Exists, NOT EXISTS, UNION, INTERSECT, Constraints etc.)
7. Queries using Aggregate functions, GROUP BY, HAVING clauses
8. Creation and dropping of Views
9. Triggers (Creation of insert trigger, delete trigger, update trigger)
10. Procedures
11. Usage of Cursors

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Couse:	Semester:	Title of The Course:	Course Code:	W.E.F
MCA	II	Software Engineering and Design Patterns	R22MCA201	2022-23

MODEL QUESTION PAPER (w.e.f: 2022-23)

Time: Three Hours **Max Marks: 70M**

Answer ALL Questions

All Questions carry equal marks (5 X 14 = 70)

1. A) Explain about spiral life cycle model.

(or)

B) Explain about Waterfall life cycle model?

2. A) Explain the phases of the Unified Process?

(or)

B) Explain about the design Workflow.

3. A) Explain about Software Metrics?

(or)

B) Explain about Execution based testing.

4. A) Explain about Cohesion & Coupling

(or)

B) Explain about Object-Oriented Paradigm

5. A) Explain about Design Patterns.

(Or)

B) Explain about Design Reuse.

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Couse:	Semester:	Title of The Course:	Course Code:	W.E.F
MCA	II	Database Management Systems	R22MCA202	2022-23

MODEL QUESTION PAPER (w.e.f: 2022-23)

Time: Three Hours **Max Marks: 70M**

Answer ALL Questions

All Questions carry equal marks (5 X 14 = 70)

UNIT - I

1. A) Explain about Three Schema architecture of DBMS.

(OR)

B) Discuss about Data Models, Schemas and Instances..

UNIT - II

2 A) Discuss about SELECT and PROJECT

(OR)

B) Explain about JOIN and DIVISION.

UNIT – III

3 A) Discuss about Boyce-Codd Normal Form.

(OR)

B) Explain about Join Dependencies and Fifth Normal Form.

UNIT – IV

4 A) Explain about Two Phase Locking Techniques for Concurrency Control

(OR)

B).Explain Multiversion Concurrency control techniques.

UNIT – V

5 A). Explain about INSERT, DELETE and UPDATE statements in SQL.

(OR)

B) Discuss about Multimedia Databases, Geographic information Systems.

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Couse:	Semester:	Title of The Course:	Course Code:	W.E.F
MCA	II	Computer Networks	R22MCA203	2022-23

MODEL QUESTION PAPER (w.e.f: 2022-23)

Time: Three Hours **Max Marks: 70M**

Answer ALL Questions

All Questions carry equal marks (5 X 14 = 70)

UNIT – I

1. A) Explain about TCP/IP Reference Model

(OR)

B) Discuss about Sliding Window Protocols

UNIT – II

2. A) Explain about Ethernet MAC sublayer Protocol

(OR)

B) Explain about Hubs, Bridges, Switches

UNIT – III

3. A) Explain about Distance Vector Routing

(OR)

B) Explain about Hierarchical Routing

UNIT – IV

4. A) Explain about Flow Control and Buffering

(OR)

B) Explain about TCP congestion Control.

UNIT – V

5. A) Explain about DNS.

(OR)

B) Explain about Electronic Mail its Architecture and Services

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Couse:	Semester:	Title of The Course:	Course Code:	W.E.F
MCA	II	Research Methodology & Intellectual Property Rights (IPR)	R22MCA204	2022-23

MODEL QUESTION PAPER (w.e.f: 2022-23)

Time: Three Hours **Max Marks: 70M**

Answer ALL Questions

All Questions carry equal marks (5 X 14 = 70)

UNIT - I

1. a) Explain about Types of Research

(Or)

b) Explain about Development of Working Hypothesis.

UNIT - II

2. a) Explain about Types of Research Design

(Or)

b) Explain about Dead Lock Prevention, Detection and Avoidance.

UNIT - III

3. a) Explain about Types of Reports

(Or)

b) Describe about How to Write a Research Proposal

UNIT - IV

4. a) Explain about Features of Intellectual Property Rights (IPR)?

(Or)

b) Describe about Infringement of IPR.

UNIT - V

5. a) Explain about IPR Developments in India for the past Five Years

(Or)

b) Explain about International Patent protection?

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Couse:	Semester:	Title of The Course:	Course Code:	W.E.F
MCA	II	Design and Analysis of Algorithms	R22MCA205E1	2022-23

MODEL QUESTION PAPER (w.e.f: 2022-23)

Time: Three Hours **Max Marks: 70M**

Answer ALL Questions

All Questions carry equal marks (5 X 14 = 70)

UNIT - I

1. a) Explain about Heapsort

(Or)

b) Explain about Performance Analysis, Time Complexity & Space Complexity, Asymptotic notations

UNIT - II

2. a) Explain about Strassen's matrix multiplication

(Or)

b) Explain about Kruskal's Algorithm.

UNIT - III

3. a) Explain about 0/1 Knapsack problem

(Or)

b) Explain about Breadth First Search.

UNIT - IV

4.a) Explain about LC Branch and Bound

(Or)

b) Explain about Traveling Sales person.

UNIT - V

5. a) Explain about Cook's theorem

(Or)

c) Explain about NP hard and NP complex

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Couse:	Semester:	Title of The Course:	Course Code:	W.E.F
MCA	II	Data Warehousing and Data Mining	R22MCA205E2	2022-23

MODEL QUESTION PAPER (w.e.f: 2022-23)

Time: Three Hours **Max Marks: 70M**

Answer ALL Questions

All Questions carry equal marks (5 X 14 = 70)

UNIT - I

1. a) Explain about multi dimensional data analysis

(Or)

b) Explain about Data Mining and Data Ware housing

UNIT - II

2. a) Explain about Support vector Machines

(Or)

b) Explain about Decision Tree induction.

UNIT - III

3. a) Explain about FP-Growth Algorithms

(Or)

b) Explain about Frequent Item-set generation.

UNIT - IV

4.a) Explain about DBSCAN

(Or)

b) Explain about K-means algorithm.

UNIT - V

5. a) Explain about Web usage mining

(Or)

c) Explain about Ranking of Web Pages and Enterprise search

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Couse:	Semester:	Title of The Course:	Course Code:	W.E.F
MCA	II	Cloud Computing	R22MCA205E3	2022-23

MODEL QUESTION PAPER (w.e.f: 2022-23)

Time: Three Hours **Max Marks: 70M**

Answer ALL Questions

All Questions carry equal marks (5 X 14 = 70)

UNIT - I

1. a) Explain about Peer-To-Peer, Client-Server and Grid Computing

(Or)

b) Explain about Virtualization and Implementation levels of Virtualization

UNIT - II

2. a) Explain about Platform as a Service – Language and Pass

(Or)

b) Explain about Open-source Eucalyptus Cloud Architecture.

UNIT - III

3. a) Explain about Cloud Firewall and Virtual Firewall

(Or)

b) Explain about Challenges with Data Fragmentation.

UNIT - IV

4.a) Explain about Elastic Block Store (ESB).

(Or)

b) Explain about Programming support for Amazon EC2.

UNIT - V

5. a) Explain about Stages during the development process of cloud application

(Or)

c) Explain about Architecture of Mobile Cloud Computing

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Couse:	Semester:	Title of The Course:	Course Code:	W.E.F
MCA	III	Data Science	R22MCA301	2022-23

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

Course Description and Purpose:

A Data Science course aims to provide learners with an understanding of the fundamentals and core concepts of data science, which are essential for working in any industry. The course covers topics such as data extraction, wrangling, and pre-processing, exploratory data analysis, predictive modeling, machine learning, deep learning, and more

The purpose of a Data Science course is to equip learners with the skills and knowledge required to become proficient in data science. Upon completion of the course, learners will be able to extract insights from raw data using various statistical techniques and tools. They will also be able to build predictive models using machine learning algorithms and communicate their findings effectively through reports and visualizations

Course Objective:

The primary objective of Data Science is to extract useful insights from data that can be profitable to the company's business. It combines math and statistics, specialized programming, advanced analytics, artificial intelligence (AI), and machine learning with specific subject matter expertise to uncover actionable insights hidden in an organization's data1. These insights can be used to guide decision making and strategic planning.

Course Learning Outcomes:

Ipython and **Jupiter**: provide computational environments for data scientists using python

NumPy : includes the ND array for efficient storage and manipulation of dense data arrays in python

pandas: features the Data Frame for efficient storage and manipulation of labeled/columnar data in python

Matplotlib: includes capabilities for a flexible range of data visualizations in python

Scikit-learn: for efficient and clean python implementations of the most important and established machine leaning algorithms

Course Content:

UNIT –I Introduction to Numpy

Introduction to NumPy-Understanding Data Types in Python, The Basics of Numpy Arrays, Computation on NumPy Arrays, Aggregations, Computation on Arrays, Comparisons, Masks and Boolean Logic, Fancy Indexing, Sorting Arrays, Structured Data.

UNIT-II: NumPy

Data Manipulation with Pandas-Installing and Using Pandas, Introducing Pandas Objects, Data Indexing and Selection, Operating on Data in Pandas, Handling Missing Data, Hierarchical Indexing, Combining Datasets, Aggregation and Grouping

UNIT-III: Pandas

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

UNIT-IV: Machine learning in Data Science:

Customizing Matplotlib-Customizing Plot Legends, Customizing Colorbars, Text and Annotation, Customizing Matplotlib, Three Dimensional Plotting in Matplotlib, Visualization with Seaborn

UNIT-V: Data Visualization and Reporting

Machine Learning-What is Machine Learning, Categories of Machine Learning, Qualitative Examples of Machine Learning Applications, Introducing Scikit-Learning, Feature Engineering, Naive Bayes Classification, Linear Regression, Decision Trees and Random Forests.

Text books :

1. Jake VanderPlas- Python Data Science Handbook||OReilly

Reference books :

1. Peters Morgan, Data Analysis From Scratch With Python: Beginner Guide using Python, Pandas, NumPy, Scikit-Learn, IPython, TensorFlow and Matplotlib, AI Sciences LLC

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Couse:	Semester:	Title of The Course:	Course Code:	W.E.F
MCA	III	Principles of Programming Languages ***Domain Specific Elective Course***	R22MCA302E1	2022-23

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 outcomes:

Principles of Programming Languages is a course that introduces the theory and design of programming languages. The course aims to provide learners with an understanding of the fundamental principles and concepts of programming languages, which are essential for working in any industry.

The purpose of a Principles of Programming Languages course is to equip learners with the skills and knowledge required to become proficient in programming languages. Upon completion of the course, learners will be able to understand the syntax and semantics of programming languages. They will also be able to design and implement high-assurance software using formal descriptions of the meaning and behavior of programs.

Course Objective:

- To introduce several different paradigms of programming.
- To gain experience with these paradigms by using example programming languages.
- To understand concepts of syntax, translation, abstraction, and implementation

Course Outcomes:

- Acquire the skills for expressing syntax and semantics in formal notation.

- Identify and apply a suitable programming paradigm for a given computing application.
- Gain knowledge of and able to compare the features of various programming languages.
- Define the semantics of a programming language using a definitional interpreter. Investigate semantic issues in programming languages by studying implementations in an interpreter.

UNIT –I

Preliminary Concepts: Reasons for studying concepts of programming languages, Language categories Imperative, Functional, Logic and Object Oriented. ProgrammingLanguageImplementationMethods. Describing Syntax: General Problem of describing Syntax, Formal methods of describing syntax - BNF, EBNF for common programming languages features, Parse trees, Ambiguous grammars, Attribute grammars

UNIT-II:

Names, Bindings, Type Checking and Scopes: Names, Variables, The Concept of Binding, Type Checking, Strong Typing, Type Compatibility, Scope and Lifetime.

Data types: Introduction, Primitive Data Types, Character String Type, User Defined Ordinal Types, Array Types, Associative Arrays, Record Types, Union Types, Pointer and Reference Types.

UNIT-III:

Statement-Level Control Structures: Selection Statements, Iterative Statements, Unconditional Branching, Guarded Commands.

Subprograms: Fundamentals of Subprograms, Design issues of Subprograms, Local Referencing Environments, Parameter Passing Methods, Parameters that are Subprogram Names, Overloaded Subprograms, Design Issues for Functions, User Defined Overloaded Operators, Co-routines.

UNIT-IV:

Exception Handling and Event Handling: Introduction to exception handling, Exception Handling in Ada, Exception Handling in C++, Exception Handling in Java, Introduction to event Handling, Event Handling with Java, Event Handling in C#.

UNIT-V:

Concurrency: Introduction, Introduction to subprogram-level concurrency, Semaphores, Monitors, Message Passing, Ada Support for Concurrency, Java Threads, C# Threads, Concurrency in Functional Languages, Statement-Level Concurrency

TEXTBOOK:

1.Robert.W. Sebesta –―Concepts of Programming Languages‖ Pearson Education, 10th edition.

REFERENCES

1. Ghezzi,― Programming languages ‖, John Wiley,3rd edition.
2. Pratt and Zelkowitz–―Programming Languages Design and Implementation ‖PHI/PearsonEducation,4th edition.
3. http://nptel.ac.in/courses/106102067/
4. https://perso.telecom-paristech.fr/pautet/Ada95/a95list.html
5. http://www.pascal-programming.info/index.php
6. https://www.fortrantutorial.com/

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Couse:	Semester:	Title of The Course:	Course Code:	W.E.F
MCA	III	Artificial Intelligence ***Domain Specific Elective Course***	R22MCA302E2	2022-23

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:

The course is designed to provide basic knowledge in various topics in AI, including machine learning, deep learning, natural language processing, computer vision, robotics, and data analytics.

Course Objectives:

Specific objectives include:

- To gain a historical perspective of Artificial Intelligence and its foundations
- To familiarize the basic principles of Artificial Intelligence towards problem solving Inference, Perception, Knowledge representation and Learning
- To understand advanced topics of AI such as learning, natural language processing, agents and robotics, expert systems.

Course Learning Outcomes:

Upon successful completion of the course, the student will be able to:

- To Understand the history of Artificial Intelligence and its foundations.

- Apply various Artificial Intelligence Techniques for problem solving.
- Formalization of knowledge using the framework of predicate logic.
- Ability to apply knowledge representation and reasoning to real world problems.
- Derive conclusions from uncertain knowledge and quantify the uncertainty in the conclusions obtained.

Course Content:

UNIT-1:

Introduction, history, intelligent systems, foundations of AI, applications, tic-tac-toe game playing, development of AI languages, current trends.

UNIT-2: Problem Solving:

State-space search and control strategies: Introduction, general problem solving, characteristics of problem, heuristic search techniques, iterative deepening A*, constraint satisfaction.

UNIT-3: Logic Concepts:

Introduction, propositional calculus, proportional logic, natural deduction system, Goal Stack Planning and Non Linear planning.

UNIT-4: Knowledge representation:

Introduction, approaches to knowledge representation, knowledge representation using semantic network, knowledge representation using frames.

UNIT-5: Expert system and applications:

Introduction phases in building expert systems, expert system versus traditional systems. **Uncertainty measure:** probability theory: Introduction, probability theory.

TEXT BOOKS:

1. Artificial Intelligence- Saroj Kaushik|| CENGAGE Learning

REFERENCES:

1. Artificial Intelligence- Deepak Khemani||TMH, 2013
2. Introduction to Artificial Intelligence, Patterson||PHI
3. Artificial intelligence, structures and Strategies for Complex problem solving -George F Lugar|| 5thed, PEA
4. Artificial intelligence, A Modern Approach, 2nded, Stuart Russel, Peter Norvig, PEA

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Couse:	Semester:	Title of The Course:	Course Code:	W.E.F
MCA	III	Block Chain Technology ***Domain Specific Elective Course***	R22MCA302E3	2022-23

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:
Blockchain Technologies is a course that introduces the theory and design of blockchain technology. The course aims to provide learners with an understanding of the fundamental principles and concepts of blockchain technology, which are essential for working in any industry[1]. The course covers topics such as the structure of a blockchain, mining, hashing, proof-of-work, public key cryptography, smart contracts, and more.

The purpose of a Blockchain Technologies course is to equip learners with the skills and knowledge required to become proficient in blockchain technology. Upon completion of the course, learners will be able to understand the structure of a blockchain and why/when it is better than a simple distributed database.

Course Objective:

- To provide conceptual understanding of the function of blockchain as a method of securing distributed ledgers, how consensus on their contents is achieved, and the new applications that they enable.
- To cover the technological underpinnings of blockchain operations as distributed data structures and decision-making systems, their functionality and different architecture types.
- To provide a critical evaluation of existing “smart contract” capabilities and platforms, and examine their future directions, opportunities, risks and challenges.

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Course Outcomes:

- Gain insights about fundamental Blockchain concepts and its underlying mechanism.
- Implement the workflow behind bitcoin and various consensus mechanisms.
- Design and implement smart contracts.
- Develop decentralized applications on the Blockchain.
- Identify and analyse the ongoing application models in industry-wide Blockchain frameworks

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Course Content:

UNIT-I: - Fundamentals of Cryptography

Introduction to Cryptography, Symmetric cryptography – AES, Asymmetric cryptography – RSA, Elliptic Curve Cryptography (ECC), Digital Signatures, Cryptographic hash function, Merkle tree

UNIT-II: -Fundamentals of Block chain Technology

Defining Blockchain and Distributed Ledger, Centralized, Decentralized and Distributed Systems, Decentralization vs Distributed Systems, P2P Architecture, History of Blockchain, Blockchain Properties- Decentralized, Transparent, Immutable, and Secure. Architecture of Blockchain, Elements of Blockchain, Benefits, and Limitations, Types of Blockchain: Public, private, and consortium based blockchain**.**

UNIT-III: -Introduction to Bitcoin

Introduction to Bitcoin, Hash pointer, Bitcoin transaction, Block structure, Proof of Work (PoW)in detail, Mining and reward, Limitations of Bitcoin, Consensus mechanism: Proof of Stake (PoS), Byzantine Fault Tolerance (BFT), Proof of Authority (PoA) and Proof of Elapsed Time (PoET).

UNIT-IV: -Ethereum and Hyperledger Fabric

Public Blockchain: Ethereum Blockchain, Smart Contracts, Ethereum Structure, Operations, Consensus Model, Incentive Model.

Permissioned Blockchain: Hyperledger Fabric, Architecture of Hyperledger Fabric Blockchain. Components: Certificate Authority, Nodes, Chain codes, Channels and Consensus.

UNIT-V: - Use cases of Blockchain

Use cases of Block chain technology –Health care, Finance, Supply chain management. Uses of Blockchain in E-Governance, Land Registration, Agriculture, Voting

Textbooks

1. Imran Bashir, Mastering Block chain: A deep dive into distributed ledgers, consensus protocols, smart contracts, DApps, cryptocurrencies, Ethereum, and more, Packt Publishing, Third edition, 2020.
2. Hyperledger Fabric In-Depth: Learn, Build and Deploy Blockchain Applications Using Hyperledger Fabric, Ashwani Kumar, BPB publications.

Reference Books

1. Bellaj Badr, Richard Horrocks, Xun (Brian) Wu, “Blockchain By Example: A developer's guide to creating decentralized applications using Bitcoin, Ethereum, and Hyperledger”, Packt Publishing Limited, 2018.
2. Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller and Steven Goldfeder, “Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction”, Princeton University Press, 2016.
3. Andreas M. Antonopoulos, Gavin Wood, “Mastering Ethereum: Building Smart Contracts and DApps”, O'Reilly Media, First edition, 2018.
4. Kumar Saurabh, Ashutosh Saxena, “Blockchain Technology: Concepts and Applications”, First Edition, Wiley Publications, First edition, 2020.
5. Chandramouli Subramanian, Asha A George, et al, “Blockchain Technology”, Universities Press (India) Pvt. Ltd, First edition, August 2020.

Online References:

1. NPTEL courses:
a) Blockchain and its Applications,
b) Blockchain Architecture Design and Use Cases
2. Hyperledger Tutorials - https://www.hyperledger.org/use/tutorials
3. Ethereum Development Resources - https://ethereum.org/en/developers
4. Udemy Courses:
a) Blockchain A-Z™: Learn How To Build Your First Blockchain
b) Ethereum Blockchain Developer: Build Solidity Projects (2020)
c) Blockchain 2020 - Complete Blockchain Course for Beginners
5. Coursera Courses:
a) Introduction to Blockchain Technologies
b) Blockchain: Foundations and Use Cases
c) Smart Contracts

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Couse:	Semester:	Title of The Course:	Course Code:	W.E.F
MCA	III	INFORMATION SECURITY ***Domain Specific Elective Course***	R22MCA302E4	2022-23

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:

Information Security is a field that deals with protecting information from unauthorized access, use, disclosure, disruption, modification, or destruction. The primary objective of Information Security is to ensure the confidentiality, integrity, and availability of information. It involves the use of various techniques and technologies to protect information from threats and vulnerabilities.

The purpose of a course in Information Security is to equip learners with the skills and knowledge required to become proficient in Information Security. Upon completion of the course, learners will be able to understand the structure of a secure network and how to design one. They will also be able to identify threats and vulnerabilities in an organization's information systems and implement appropriate countermeasures

Course objectives:

- To provide an understanding of the fundamental principles and concepts of Information Security.
- To teach learners how to identify threats and vulnerabilities in an organization's information systems.
- To equip learners with the skills required to design secure networks.
- To provide hands-on experience with tools such as Python, R, SQL, Tableau, and other data science libraries

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Course Learning Outcomes:

- Gain insights about fundamental Information Security concepts and its underlying mechanism.
- Identify threats and vulnerabilities in an organization's information systems.
- Design secure networks using firewalls, tunnelling, encryption, honeypots, network sniffers, packet capturing.
- Implement cryptography techniques for data protection.
- Secure operating systems using patching, logging, antivirus, antimalware tools

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Course Content:

UNIT -1:

Introduction : History, What is Information Security? Critical Characteristics of Information, NSTISSC Security Model, Components of an Information System, Securing the Components, Balancing Security and Access, The SDLC, The Security SDLC

UNIT-2:

Security Investigation : Need for Security, Business Needs, Threats, Attacks, Legal, Ethical and Professional Issues, Simple Network Management Protocol

UNIT-3:

Security Analysis : Risk Management: Identifying and Assessing Risk, Assessing and Controlling Risk , Approaches of Risk Analysis, Process of Risk transfer

UNIT-4:

Logical Design : Blueprint for Security, Information Security Policy, Standards and Practices, ISO 17799/BS 7799, NIST Models, VISA International Security Model, Design of Security Architecture, Planning for Continuity.

UNIT-5

Physical Design: Security Technology, IDS, Scanning and Analysis Tools, Cryptography, Access Control Devices, Physical Security, Security and Personnel

Text books:

1. Michael E Whitman and Herbert J Mattord, ―Principles of Information Security‖, Vikas Publishing House, New Delhi, 2003.

Reference Books

- Micki Krause, Harold F. Tipton, ― Handbook of Information Security Management‖, Vol 1-3 CRCPress LLC, 2004.
- Stuart McClure, Joel Scrambray, George Kurtz, ―Hacking Exposed‖, Tata McGraw-Hill, 2003.
- Matt Bishop, Computer Security Art and Science, Pearson/PHI, 2002.

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Couse:	Semester:	Title of The Course:	Course Code:	W.E.F
MCA	III	APPLIED DATA ANALYTICS ***Domain Specific Elective Course***	R22MCA302E5	2022-23

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:
Applied Data Analysis is a course that teaches the basic techniques, methodologies, and practical skills required to draw meaningful insights from a variety of data. The course covers topics such as data wrangling, data acquisition, data manipulation, data frames, statistics in practice, machine learning in practice, text mining, social network analysis, and more

The purpose of an Applied Data Analysis course is to equip learners with the skills and knowledge required to become proficient in data analysis. Upon completion of the course, learners will be able to extract insights from raw data using various statistical techniques and tools. They will also be able to build predictive models using machine learning algorithms and communicate their findings effectively through reports and visualizations

Course Objectives:

- To provide an understanding of the fundamental principles and concepts of Data Analysis.
- To teach learners how to extract insights from raw data using various statistical techniques and tools.
- To equip learners with the skills required to build predictive models using machine learning algorithms.

Course Outcomes:

- Gain insights about fundamental Data Analysis concepts and its underlying mechanism.

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- Extract insights from raw data using various statistical techniques and tools.
- Build predictive models using machine learning algorithms.
- Communicate findings effectively through reports and visualizations

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Course Content:

UNIT -1:

Introduction to R: Why use R?, R Environment, Working with R Packages, Understanding Datasets, Data Types, Data Structures (Operations on Data Structures), Missing Values, Sorting Data, Merging Datasets, Sub setting Datasets, Control Flow Statements, Aggregation and Restructurings

UNIT-2:

Descriptive Statistics: Introduction to Descriptive Statistics (Measures of Central Tendency, Measures of Dispersion of Variability, Measures of Shapes (Skewness and Kurtosis)), Introduction to Sampling(Sampling Types), Hypothesis Testing with R(One Sample Test, One Sample Sign Test, Two Samples Test), Parametric Test(Correlations, Z-Test, T-Test), Non Parametric Tests (Wilcoxon Signed- Rank Test, Chi Square Test).

UNIT-3:

Basic Graphs: Bar Plots, Pie Charts, Histograms, Line, Dot Plots, Kernel Density Plots and Dot Plots. The Advanced Graphics: The ggplot2 Package. Analysis of Variance: Fitting ANOVA Models, One-way ANOVA, One-way ANCOVA, Two-way factorial ANOVA, Repeated measures ANOVA, Multivariate Analysis of Variance (MANOVA)

UNIT-4:

Basic Multivariate Analysis: Regression (Simple Linear Regression, Multiple Linear Regression, Logistic Regression), Time Series Analysis (Creating Time Series, Components of Time Series Analysis, Seasonal Decomposition, Exponential Models), Forecasting (Simple Moving Averages, Weighted Moving Averages, Single Exponential Smoothing.)

UNIT-5

Connecting R to External Interfaces: CSV Files (Reading From a CSV File, Writing to a CSV File), Microsoft Excel (Reading from XLSX File, Writing to XLSX File), Databases (Connecting R to MYSQL , Creating Tables, Inserting Rows, Updating Rows, Deleting Rows, Querying Rows, Querying Tables, Dropping Tables), XML Files (Reading From XML Files, JSON Files, Reading From JSON Files), Binary Files (Writing to Binary Files, Reading From Binary Files).

Text Book

1. Dr. Rob Kabacoff - R in Action :Data Analysis and Graphics with R.|| Manning Publications Co, Edition 2011.
2. Dr.Jeeva Jose- A Beginners Guide For Data Analysis Using R Programming. (UNITIV and UNITV)|| Khanna Book Publishing Co.(P) Ltd, Edition 2019.

Reference Text Books

1. Dr.Dhaval Maheta- Data Analysis using R|| Notion Press, September

2. Michael J.Crawley- The R Book|| Wiley, Edition: 2007

3. Ken Black John- Business Statistics for Contemporary Decision Making|| John Wiley & Sons, Inc., Edition 2013

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Couse:	Semester:	Title of The Course:	Course Code:	W.E.F
MCA	III	Dynamic Web Programming	R22MCA302E6	2022-23

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:
The course is designed to provide knowledge of Django . Advanced 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:

- ✓ Develop Django basic Program
- ✓ Developing Forms in Django
- ✓ Developing Models in Django
- ✓ Session Management and Authentication in Django

Course Learning Outcomes:

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

- Understand the Django basic program
- Understand the Django Forms and Models.
- Developing an Application using Forms and Models using Session management.

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Course Content:

UNIT –I

The World's Smallest Django Project

Basic Steps for Installing Django, Creating the View, the URL Patterns, the Settings, Running the Example and Hello World Program in Django .

UNIT-II: Templates in Django

Templates in Django, Static Templates in Django , Dynamic Templates in Django , Integrating Variables in Django , Filters, Dry Url's in Django .

UNIT-III: Databases & Models in Django

MVT Architecture, Databases in Django, Admin Module, Creating Simple Model, Creating Super User in Django , Establish the Connection between Django and MySQL, Program to insert the value in to Database using Models**.**

UNIT-IV: Forms in Django

Forms in Django, Uses of Forms, Develop Student Feedback Form in Django , Django Model Forms, Develop Student Marks Submission Form in Django .

UNIT-V: Session & Authentication

Django Rest api, Session Management, Session Management using Cookies, Develop Page Count application using Session Management, limitations of Cookies, Develop an Authentication and Authorization application in Django .

Reference Books:

1. "Lightweight Django " using Rest and WebSockets & Backbone by Julia Elman & Mark Lavin Oreilly Publictions.

2. 'Django Web Development with python" by Samuel Dauzon,Aidas Bendoraitis

From Packt Publications.

3. The Definitive Guide to Django : Web Development Done Right by Adrian Holovaty and

Jacob Kaplan-

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Couse:	Semester:	Title of The Course:	Course Code:	W.E.F
MCA	III	Data Science Lab	R22MCA303	2022-23

Total No of Hours for Teaching – Learning	Instructional Hours for Week		Duration of Semester End Examination in Hours	Max Marks		Credits
60 Hours	Theory	Practical	3 Hours	CIA	SEE	4
	0	6		30	70	

1. Write a python program to perform various operations and computation on numpy.
2. Write a python program to demonstrate fancy index
3. Write a python program to demonstrate data indexing and selection using pandas
4. Write a python program to demonstrate aggregation and grouping using pandas
5. Write a python program to generate line plots from the given data
6. Write a python program to generate Scatter plots from the given data
7. Write a python program to display plot legends using matplot lib
8. Write a python program to classify given data set using regression
9. Write a python program to demonstrate navy based classification

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

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Couse:	Semester:	Title of The Course:	Course Code:	W.E.F
MCA	III	Dynamic Web Programming Lab	R22MCA304	2022-23

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	0	6	3 Hours	30	70	4

1. Create the Django Project and print Hello World.
2. Basic Steps for Installing Django
3. Write a Django Program to demonstrate templates.
4. Write a Program for Dynamic Templates for Django .
5. Write a Django Program to demonstrate Dry URLs
6. Write a Django Program to demonstrate Database Connection in Django .
7. Write a Django Program to establish the Connection between Django and MySQL.
8. Explain about Forms in Django .
9. Develop Student Feedback Form in Django .
10. Develop Student Marks Submission Form in Django .

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

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Couse:	Semester:	Title of The Course:	Course Code:	W.E.F
MCA	III	Data Science	R22MCA301	2022-23

MODEL PAPER

Time: Three Hours **Max Marks: 70M**

All Questions carry equal marks (5 X 14 = 70)

1) A) Explain about Basics of Numpy Arrays and Computation on NumPy Arrays?

(Or)

B) Explain about Boolean Logic and Fancy Indexing?

Unit-2

2) A) Explain Data Indexing and Selection in pandas.

(Or)

B) Explain about Aggregation and Grouping.

Unit-3

3) A) Explain about Simple Line Plots and Simple Scatter Plots.

(Or)

B) Explain about Histograms, Binnings and Density.

Unit-4

4) A) Explain about three-dimensional plotting in Matplotlib

(Or)

B) Explain about Visualization with Seaborn.

Unit-5

5) A) Explain about categories of Machine Learning.

(Or)

B) Explain about Naïve Bayes classification.

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Couse:	Semester:	Title of The Course:	Course Code:	W.E.F
MCA	III	Principles of Programming Languages	R22MCA302E1	2022-23

MODEL PAPER

Time: Three Hours **Max Marks: 70M**

Answer All Questions

All Questions carry equal marks (5 X 14 = 70)

1.a) Logic and Object Oriented. Programming Language Implementation Methods?

(OR)

b) BNF, EBNF for common programming languages features?

2. a) Explain the Type Checking, Strong Typing, Type Compatibility?

(OR)

b) What is Associative Arrays, Record Types, Union Types, Pointer and Reference Types?

3. a) Explain about Fundamentals of Subprograms, Design issues of Subprograms?

(OR)

b) Explain User Defined Overloaded Operators, Co-routines.

4. a) Explain exception handling, Exception Handling in Ada.

(OR)

b) How ML differ from Haskell Programming language?

5. a) Explain Semaphores, Monitors, Message Passing?

(OR)

b) Explain C# Threads, Concurrency in Functional Language

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Couse:	Semester:	Title of The Course:	Course Code:	W.E.F
MCA	III	Artificial Intelligence	R22MCA302E2	2022-23

MODEL PAPER

Time: Three Hours **Max Marks: 70M**

Answer All Questions

All Questions carry equal marks (5 X 14 = 70)

1. A) Explain tic-tac-toe game ?
   (OR)
   B) Explain the foundations of AI

2. B) Explain propositional calculus.
   (OR)
   B) Explain iterative deepening A*.

3. A) Explain about propositional calculus.
   (OR)
   B) Explain about proportional logic.

4. A) Explain approaches to knowledge representation.
   (OR)
   B) Explain knowledge representation using semantic network.

5. A) Explain about Fuzzy sets and fuzzy logic.
   (or)
   B) Explain about phases in building expert systems

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Couse:	Semester:	Title of The Course:	Course Code:	W.E.F
MCA	III	Block Chain Technology	R22MCA302E3	2022-23

MODEL PAPER

Time: Three Hours **Max Marks: 70M**

Answer All Questions

All Questions carry equal marks (5 X 14 = 70)

1.A) Explain Symmetric cryptography – AES.?

(Or)

B) Explain about Elliptic Curve Cryptography (ECC) ?

2.A) Differentiate Decentralization vs Distributed Systems.?

(or)

B) Explain Types of Blockchain: Public, private, and consortium based blockchain.?

3.A) What is Byzantine Fault Tolerance(BFT) ?

(Or)

B) Explain Authority (PoA) and Proof of Elapsed Time (PoET)?

4.A) Explain about Ethereum Blockchain?

(Or)

B) Write about Architecture of Hyper ledger Fabric Blockchain?

5.A) Explain Use cases of Block chain technology?

(Or)

B) Explain the Uses of Blockchain in E-Governance.

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Couse:	Semester:	Title of The Course:	Course Code:	W.E.F
MCA	III	INFORMATION SECURITY	R22MCA302E4	2022-23

MODEL PAPER

Time: Three Hours **Max Marks: 70M**

Answer All Questions

All Questions carry equal marks (5 X 14 = 70)

Unit-1

1)A) Explain the security system development life cycle in detail.

(Or)

B) Explain the NSTISSC security model and the top down approach to security implementation.

Unit-2

2)A) Briefly Explain Need for Security.

(Or)

B) Explain about Ethical and Professional Issues.

Unit-3

3)A) Explain in detail about Risk Management.

(Or)

B) Explain about Process of Risk transfer.

Unit-4

4)A) Briefly discuss about Blueprint for Security.

(Or)

B) Explain about NIST Models.

Unit-5

5)A) Explain about Access Control Devices.

(Or)

B) Explain about Scanning and Analysis Tools?

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Couse:	Semester:	Title of The Course:	Course Code:	W.E.F
MCA	III	APPLIED DATA ANALYTICS	R22MCA302E5	2022-23

MODEL PAPER

Time: Three Hours **Max Marks: 70M**

Answer All Questions

All Questions carry equal marks (5 X 14 = 70)

1. A) Explain about Outline the different Data Structures used in R?

(or)

B) Explain Control Flow Statements in R?

2. A) Explain the different statistical measures used in Descriptive Statistics?

(or)

B) Explain Non Parametric Testand Wilcoxon Signed-Rank Test in R with example?

3. A) List Various Types of Charts in R?

(or)

B) Analyze One-way ANOVA and Two-way factorial ANOVA?

4. A) Discuss Simple and Multiple Regression in R with Example?

(Or)

B) Elaborate different components used in Time Series Analys is in R with example?

5. A) How do you connect to a database in R using MYSQL? Give one example?

(Or)

B) How to do you import csv file and binary file in R with example?

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Couse:	Semester:	Title of The Course:	Course Code:	W.E.F
MCA	III	Web Technologies	R22MCA302E6	2022-23

MODEL PAPER

Time: Three Hours **Max Marks: 70M**

Answer All Questions

All Questions carry equal marks (5 X 14 = 70)

1.A) Explain Basic Steps for Installing Django?

(Or)

B) Explain about displaying Hello World Program in Django?

2.A) Explain about Templates in Django?

(or)

B) Explain about Integrating Variables in Django?

3.A) Explain about MVT Architecture?

(Or)

B) Explain about Establish the Connection between Django and MySQL?

4.A) Explain about Forms in Django?

(Or)

B) Explain about Develop Student Feedback Form in Django?

5.A) Explain about Session Management using Cookies?

(Or)

B) Develop an Authentication and Authorization application in Django

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Couse:	Semester:	Title of The Course:	Course Code:	W.E.F
MCA	III	OPEN ELECTIVE (Choose One) (R Programming)	R22MCAOE1	2022-23

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	0	3 Hours	30	70	3

Course Descriptive and purpose:

R is a popular programming language used for statistical computing and graphics. It is widely used in data analysis, machine learning, and scientific research. A course in R programming aims to provide learners with an understanding of the fundamental principles and concepts of R programming

purpose of a course in R programming is to equip learners with the skills and knowledge required to become proficient in R programming. Upon completion of the course, learners will be able to write R scripts and execute them. They will also be able to install, load, and deploy the required packages and build new packages for sharing and reusability. Additionally, they will be able to extract data from different sources using APIs and use it for data analysis. Finally, they will be able to visualize and summarize the data.

Course Objectives:

- To provide an understanding of the fundamental principles and concepts of R programming.
- To teach learners how to write R scripts and execute them.
- To equip learners with the skills required to install, load, and deploy the required packages and build new packages for sharing and reusability.

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Course Outcomes:

- Write R scripts and execute them.
- Install, load, and deploy the required packages and build new packages for sharing and reusability.
- Extract data from different sources using APIs and use it for data analysis.
- Visualize and summarize the data
- Gain insights about fundamental R programming concepts and its underlying mechanism.

Syllabus

Unit - I

Introduction, How to run R, R Functions, Basic Math, Variables, Data Types, Vectors, Conclusion, Advanced Data Structures, Data Frames, Lists, Matrices, Arrays, Classes.

Unit - II

R Programming Structures, Loops, Loops, - Looping Over Non vector Sets,- If-Else, Arithmetic and Boolean Operators and values, Default Values for Argument, Return Values, Functions are Objective, No Pointers in R, Recursion

Unit - III

Doing Math and Simulation in R, Math Function, Extended Example Calculating Probability- Cumulative Sums and Products-Minima and Maxima- Calculus, Functions For Statistical Distribution

Unit - IV

Graphics, Creating Graphs, The Workhorse of R Base Graphics, the plot() Function – Customizing Graphs, Saving Graphs to Files.

Unit - V

Probability Distributions, Normal Distribution- Binomial Distribution- Poisson Distributions Other Distribution, Basic Statistics, Correlation and Covariance, T-Tests,-ANOVA.

Text Books

1. The Art of R Programming, Norman Matloff, Cengage Learning
2. R for Everyone,Lander,Pearson
3. The Art of R Programming Norman Matloff, No starch Press

Reference Books

1. R Cookbook, PaulTeetor, Oreilly.
2. R in Action,RobKabacoff, Manning

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Couse:	Semester:	Title of The Course:	Course Code:	W.E.F
MCA	III	R Programming	R22MCAOE1	2022-23

MODEL PAPER

Time: Three Hours **Max Marks: 70M**

Answer All Questions

All Questions carry equal marks (5 X 14 = 70)

1.A) Explain Basic R Functions?

(Or)

B) Explain about Data Frames, Lists?

2.A) Explain about Loops in R?

(or)

B) Explain about Loops?

3.A) Explain about Math and Simulation in R?

(Or)

B) Explain about Functions For Statistical Distribution?

4.A) Explain about Creating Graphs in R?

(Or)

B) Explain about plot() Function – Customizing Graphs?

5.A) Explain about Normal Distribution- Binomial Distribution?

(Or)

B) Develop an Correlation and Covariance, T-Tests,-ANOVA in R

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Couse:	Semester:	Title of The Course:	Course Code:	W.E.F
MCA	III	OPEN ELECTIVE (Choose One) (Mobile Networks)	R22MCAOE2	2022-23

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

Course descriptive and purpose:

The primary objective of the Mobile Network course is to help learners understand the fundamental principles and concepts of mobile computing and telecommunication systems. Upon completion of the course, learners will be able to understand the basics of mobile telecommunication systems, network layer protocols, transport and application layer protocols, and different mobile platforms. They will also be able to develop applications for mobile platforms

Course Objectives:

- To provide an understanding of the basic concepts of mobile computing and telecommunication systems.
- To teach learners about network layer protocols, transport and application layer protocols, mobile platforms, and application development.
- To equip learners with the skills required to develop applications for mobile platforms

Course outcomes:

- Gain insights about fundamental Mobile Network concepts and its underlying mechanism.
- Understand the basics of mobile telecommunication systems, network layer protocols, transport and application layer protocols, and different mobile platforms.
- Develop applications for mobile platforms

I MCA 3rd SEM SYLLABUS

Unit -1 :-Computer networks-LAN, VAN, Network Device, Hubs, Networks tropologier.

Unit 2:- TCP/IP protocol stack, uses & functions of TCP protocols, difference between IPV4 and IPV6

Unit 3 :- Celluar Network 1G, 2G, 3G, 4G and 5G. And features of these networks GSM architecture, GPS architecture.

Unit 4:- MANETS, Examples of MANETS, issues and challenges of MANETS, application of MANETS

Unit 5:-Wireless sensor networks, advantages and uses of wireless sensor networks IOT, Integration of IOT with wireless sensor networks

TEXT BOOKS:

1. Computer Networks, Andrew S.Tanenbaum,5th edition

REFRENCES:

1. Itu -t recommendations networks 2.0-3.0
2. Itu-t recommendation for next network 2030
3. Itu-t recommendation aloha

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Couse:	Semester:	Title of The Course:	Course Code:	W.E.F
MCA	III	Mobile Networks	R22MCAOE2	2022-23

MODEL PAPER

Time: Three Hours **Max Marks: 70M**

Answer All Questions

All Questions carry equal marks (5 X 14 = 70)

1.A) Explain about LAN and VAN?

(Or)

B) Explain about Hubs?

2.A) Explain about TCP/IP protocol stac?

(or)

B) Explain about difference between IPV4 and IPV6?

3.A) Explain about 1G, 2G, 3G, 4G?

(Or)

B) Explain about GSM architecture?

4.A) Explain about MANETS?

(Or)

B) Explain about application of MANETS?

5.A) Explain about Wireless sensor networks?

(Or)

B) Develop an Integration of IOT with wireless sensor networks

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Couse:	Semester:	Title of The Course:	Course Code:	W.E.F
MCA	III	OPEN ELECTIVE (Choose One) (Unix Programming)	R22MCAOE3	2022-23

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

Course descriptive and purpose:

The primary objective of the Mobile Network course is to help learners understand the fundamental principles and concepts of mobile computing and telecommunication systems. Upon completion of the course, learners will be able to understand the basics of mobile telecommunication systems, network layer protocols, transport and application layer protocols, and different mobile platforms. They will also be able to develop applications for mobile platforms

Course objective:

- To provide an understanding of the basic concepts of mobile computing and telecommunication systems.
- To teach learners about network layer protocols, transport and application layer protocols, mobile platforms, and application development.
- To equip learners with the skills required to develop applications for mobile platforms

Course Outcomes:

- Gain insights about fundamental Mobile Network concepts and its underlying mechanism.

- Understand the basics of mobile telecommunication systems, network layer protocols, transport and application layer protocols, and different mobile platforms.
- Develop applications for mobile platforms

Unit-I

Introduction to Unix : Brief History-What is Unix-Unix components-Using Unix-Commands in Unix-Some Basic Commands-command Substitution-Giving Multiple Commands.

The File system –The Basics of Files-What's in a File-directories and File Names-Permissions-INodes-The Directory Hierarchy, File Attributes and Permissions

The File Command knowingtheFileType-TheChmodCommandChangingFilePermissions-TheChownCommandChangingthe Owner of a File-The Chgrp Command Changing the Group of a File.

UNIT -II

Using the Shell-Command Line Structure-Met characters-relating New Commands-Command Arguments and Parameters-Program Output as Arguments-Shell Variables—More on I/O Redirection-Looping in Shell Programs.

UNIT- III

Filters-The Grep Family-Other Filters-The Stream Editor Sed-The AWK Pattern Scanning and processing Language-Good Files and Good Filters

UNIT -IV

Shell Programming-Shell Variables-The Export Command-The Profile File a Script Run During Starting-the first Shell Script-The read Command-Positional parameters-The$?Variable knowing the exit Status-More about the Set Command-The Exit Command-Branching Control Structures-Loop Control Structures-The Continue and Break Statement-The Expr Command: Performing Integer Arithmetic-Real Arithmetic in Shell Programs-The here Document(<<)-TheSleepCommand-DebuggingScripts-TheScriptCommand-TheEvalCommand-The Exec Command

UNIT-V

The Process-The Meaning-Parent and Child Processes-Types of Processes-More about Foreground and Background processes -Internal and External Commands-Process Creation-The Trap Command-The Stty Command-The Kill Command-Job Control

Reference text books:

1. W. Kernighan & RobPike, The Unix programming Environment by Brain, Pearson
2. M.G.Venkatesh murthy, Introduction to Unix Shell Programming, Pearson
3. B.M.Harwani, Unix and shell programming, OXFORD university press

I MCA 3rd SEM SYLLABUS

KAKARAPARTI BHAVANARAYANA COLLEGE: PG CENTRE
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Vijayawada – 520001.

Couse:	Semester:	Title of The Course:	Course Code:	W.E.F
MCA	III	Unix Programming	R22MCAOE3	2022-23

MODEL PAPER

Time: Three Hours **Max Marks: 70M**

Answer All Questions

All Questions carry equal marks (5 X 14 = 70)

1.A) Explain about Unix components?

(Or)

B) Explain about Chgrp Commands in Unix?

2.A) Explain about Program Output as Arguments?

(or)

B) Explain about Looping in Shell Programs.?

3.A) Explain about The Grep Family

(Or)

B) Explain about The AWK Pattern?

4.A) Explain about Loop Control Structures?

(Or)

B) Explain about Continue and Break Statement?

5.A) Explain about The Kill Command-Job Control?

(Or)

B) Explain about Trap Command-The Stty Command

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KAKARAPARTI BHAVANARAYANA COLLEGE: PG CENTRE (Autonomous)
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Vijayawada – 520001.

Couse:	Semester:	Title of The Course:	Course Code:	W.E.F
MCA	III	OPEN ELECTIVE (Choose One) (Office Tools)	R22MCAOE4	2022-23

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

Course Descriptive and purpose:

The primary objective of these courses is to help learners understand the fundamental principles and concepts of office tools. Upon completion of the course, learners will be able to use office tools effectively for their work. They will also be able to develop professional documents, spreadsheets, and presentations using the Microsoft suite of office tools

Courses Objectives:

- To provide an understanding of the fundamental principles and concepts of office tools.
- To teach learners how to use office tools effectively for their work.
- To equip learners with the skills required to develop professional documents, spreadsheets, and presentations using the Microsoft suite of office tools

Course Outcomes:

- Gain insights about fundamental office tool concepts and its underlying mechanism.
- Use office tools effectively for their work.
- Develop professional documents, spreadsheets, and presentations using the Microsoft suite of office tools

I MCA 3rd SEM SYLLABUS

Unit -1

MS word: Word processing-Features-Advantages and Applications-parts of word window-Toolbar, Creating, saving, closing, opening and editing of a document-Moving and Coping a text, Formatting of Text and paragraph-bullets and Numbering-Find and Replace-Insertion of objects, Headers and footers-page formatting-auto correct-spelling and grammar-mail merge-macros

Unit -2

MS Power point: Introduction – Starting-parts-Creating of tables-create presentation-templates-Auto content Wizard-Slide show-Editing of presentation-Inserting objects and charts.

Unit -3

MS-Excel: features of Ms-Excel, Parts of MS-Excel window, entering and editing data in worksheet, number formatting in excel, different cell references, how to enter and edit formula in excel, auto fill and custom fill, printing options

Formatting options: Different formatting options, change row height, formulae and functions, Functions: Meaning and advantages of functions, different types of functions available in Excel.

Unit -4

Charts: Different types of charts, Parts of chart, chart creation using wizard, chart operations, data maps, graphs, data sorting, filtering. Excel sub totals, scenarios, what-if analysis Macro: Meaning and advantages of Macros, creation, editing and deletion of macros - Creating a macro, how to run, how to delete a macro.

Unit -5

MS Access: Creating a Simple Database and Tables: Features of Ms-Access, Creating a

Database, Parts of Access. Tables: table creation using design view, table wizard, data sheet view, import table, link table. Forms: The Form Wizard, design view, columnar, tabular, data sheet, chart wizard.

Finding, Sorting and Displaying Data: Queries and Dynasts, Creating and using select queries, Returning to the Query Design, Multi-level sorts, Finding incomplete matches, showing All records after a Query, saving queries - Crosstab Queries. Printing Reports: Form and Database reports.

Reference text books:

1. Ron Mansfield, Working in Microsoft Office, Tata McGraw Hill(2008)
2. Ed Bott, Woody Leonhard, Using Microsoft Office 2007, Pearson Education(2007)
3. Sanjay Saxena, Microsoft Office, TMH BPBPublications

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Couse:	Semester:	Title of The Course:	Course Code:	W.E.F
MCA	III	Office Tools	R22MCAOE4	2022-23

MODEL PAPER

Time: Three Hours **Max Marks: 70M**

Answer All Questions

All Questions carry equal marks (5 X 14 = 70)

1.A) Explain about Applications-parts of word window-Toolbar,?

(Or)

B) Explain about formatting-auto correct-spelling and grammar-mail merge-macros?

2.A) Explain about Creating of tables-create presentation?

(or)

B) Explain about Wizard-Slide show-Editing of presentation.?

3.A) Explain about Parts of MS-Excel window?

(Or)

B) Explain about different types of functions available in Excel.?

4.A) Explain about Excel sub totals?

(Or)

B) Explain about Creating a macro, how to run, how to delete a macro.?

5.A) Explain about Creating a Simple Database and Tables?

(Or)

B) Explain about Form Wizard, design view

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KAKARAPARTI BHAVANARAYANA COLLEGE: PG CENTRE (Autonomous)
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Couse:	Semester:	Title of The Course:	Course Code:	W.E.F
MCA	III	OPEN ELECTIVE (Choose One) (PYTHON PROGRAMMING)	R22MCAOE5	2022-23

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

Course descriptive and Puropose:

The primary objective of a course in Python programming is to help learners understand the fundamental principles and concepts of Python programming. Upon completion of the course, learners will be able to write Python scripts and execute them. They will also be able to install, load, and deploy the required packages and build new packages for sharing and reusability. Additionally, they will be able to extract data from different sources using APIs and use it for data analysis. Finally, they will be able to visualize and summarize the data

It provides support for automatic memory management, multiple programming paradigms, and implements the basic concepts of object-oriented programming (OOP)

Course Objective:

- To teach learners how to write Python scripts and execute them.
- To equip learners with the skills required to install, load, and deploy the required packages and build new packages for sharing and reusability.
- To provide hands-on experience with tools such as RStudio, ggplot2, dplyr, and other data science libraries
- To provide an understanding of the fundamental principles and concepts of Python programming.

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Course Outcomes:

- Gain insights about fundamental Python programming concepts and its underlying mechanism.
- Write Python scripts and execute them.
- Install, load, and deploy the required packages and build new packages for sharing and reusability.

Unit -1

Basics of Python Programming-Features of Python, History of Python, The Future of Python, Writing and Executing First Python Program, Literal Constants, Variables and Identifiers, Data Types, Input Operation.

Unit -2

Decision Control Statements-Conditional Branching Statements, Basic Loop Structures, Nested Loops, The break statement, The continue statement, The pass statement. The else statement used with loops.

Unit -3

Functions and Modules- Function Definition, Function Call, Variable Scope and Lifetime, The return statement, More on Defining Functions, Recursive functions, Modules, Packages in Python, Standard Library Modules

Unit -4

Python Strings Revisited-Concatenating, Appending and Multiplying Strings, String formatting operator, Built in String Methods and Functions, Comparing Strings, Regular Expressions.

Unit-5

Classes and Objects- Classes and Objects, Class Method and self Argument, Class variables and Object Variables, Public and Private Data Members, Private Methods, Calling a Class Method from Another Class Method, Built-in Class Attributes, Class Methods, Static Methods.

Text books

1. Reema Thareja, Python Programming Using Problem Solving Approach, Oxford University Press

Reference books

1. Wesley Chun, Core Python Programming, Prentice Hall

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Couse:	Semester:	Title of The Course:	Course Code:	W.E.F
MCA	III	PYTHON PROGRAMMING	R22MCAOE5	2022-23

MODEL PAPER

Time: Three Hours **Max Marks: 70M**

Answer All Questions

All Questions carry equal marks (5 X 14 = 70)

1.A) Explain about Features of Python?

(Or)

B) Explain about Datatypes in Python?

2.A) Explain about Decision Control Statements?

(or)

B) Explain about Loops?

3.A) Explain about Functions and Modules?

(Or)

B) Explain about Packages in Python?

4.A) Explain about Python Strings?

(Or)

B) Explain about Regular Expressions.?

5.A) Explain about Classes and Objects?

(Or)

B) Explain about Public and Private Data Members