KAKARAPARTI BHAVANARAYANA COLLEGE: PG CENTRE
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Semester - I

Course Code	Name of the Course	Hours			Credits	
YEAR/SUB/PAPER		L	T	P		
					Theory	Practical's
R20MCA101	Discrete Mathematics	3	-	-	3	-
R20MCA102	Data Structures	3	-	-	3	-
R20MCA103	Programming and Problem Solving using Python	3	-	-	3	-
R20MCA104	Probability and Statistics	3	-	-	3	-
R20MCA105	Operating Systems	3	-	-	3	-
R20MCA106	Computer organization	3	-	-	3	-
R20MCA107	Programming and Problem Solving using Python lab	-	-	6	-	3
R20MCA108	Data Structures Lab	-	-	6	-	3
		18	**-**	**12**	**18**	**6**
	Total	**30s hours per week**			**24 Credits per semester**	

L - Lecture, T- Tutorial & P – Practical's

Semester -II

Course Code	Name of the Course	Hours			Credits	
YEAR/SUB/PAPER		L	T	P		
					Theory	Practical's
R20MCA201	Design and Analysis of Algorithms	3	-	-	3	-
R20MCA202	Software Engineering	3	1	-	3	-
R20MCA203	Database Management Systems	3	-	-	3	-

R20MCA204	Computer Networks	3	-	-	3	-
R20MCA205	Web Technologies	3			3	-
R20MCAOE206	Open Elective-1	4	-	-	4	-
R20MCA207	Web Technologies lab	-	-	6	-	3
R20MCA208	Database Management Systems lab	-	-	6	-	3
	Sub-Total	**19**	**1**	**12**	**19**	**6**
	Total	**32 hours per week**			**25 Credits per semester**	

Semester -III

Course Code	**Name of the Course**	**Hours**			**Credits**	
YEAR/SUB/PAPER		**L**	**T**	**P**		
					Theory	**Practical's**
R20MCA301	Big Data Analytics	3	-	-	3	-
R20MCA302	Mobile Computing	3	-	-	3	-
R20MCA303	Artificial Intelligence	3	-	-	3	-
R20MCA304	Core Elective-I a. Cloud Computing b. Internet of things c. Machine learning d. Distributed Computing	3	-	-	3	-
R20MCA305	Core Elective-II a. Software Testing and Fault Analysis b. DNA Computing c. Software Project Management	3	-	-	3	-

R20MCAOE306	Open Elective-II	4	-	-	4	-
R20MCA307	Big Data Analytics Lab	-	-	6	-	3
R20MCA308	Technical Report Writing and Mining Project	-	-	6	-	3
	Sub-Total	**19**	**-**	**12**	**19**	**6**
	Total	**31 hours per week**			**25 Credits per semester**	

Semester - IV

Course Code	**Name of the Course**	**Hours**			**Credits**		
		L	**T**	**P**			
					Theory	**Practical's**	**Field/Project work**
R20MCA401	* MOOCS	-	4	-	4	-	-
R20MCA402	Mobile Applications	3	-	-	3	-	-
R20MCA403	Data Science Using Python	3	-	-	3	-	-
R20MCA404	Internet of Things	3	-	-	3	-	-
	PROJECT	-	-	12	-	-	6
	Sub-Total	9	4	12	-	-	6
	Total	**25**			**19 Credits per semester**		

Open Electives

Course Code	**Name of the Course**	**Semester**	**Credits**
R20MCAOE206	**Open Elective-1**	**II**	**4**
R20MCA3OE06	**Open Elective-1**	**III**	**4**
		TOTAL	**8**

OPEN ELECTIVES-I

1. Cybersecurity
2. Computer Fundamentals and Problem solving using python
3. Social Network Analytics
4. Bioinformatics
5. Database Management Systems

OPEN ELECTIVES-II

1. Cybersecurity
2. Computer Fundamentals and Problem solving using python
3. Social Network Analytics
4. Bioinformatics
5. Database Management Systems

Total Number of Credits at the end of the course

S.no	Semester	Credits
1	**I**	**24**
2	**II**	**25**
3	**III**	**25**
4	**IV**	**20**
	TOTAL	**94**

Note: *Open Elective/Non-core 8 Credits will not be considered for division / percentage.

I Semester Marks
1. Six theory papers 6X100 = 600
2. Programming and problem solving using python =100
3. Data Structures Lab =100
Total = 800 M

II Semester Marks
1. Six theory papers 6X100 = 600
2. Web Technologies Lab = 100
3. Database Management Systems Lab = 100
Total = 800 M

III Semester Marks
1. Six theory papers 6X100 = 600
2. Big Data Analytics Lab = 100
3. Technical Report Writing and Mini Project = 100
Total = 800 M

IV Semester Marks
1. 4 theory papers 4X100 = 100
2. Project work = 200
Total = 600 M

Grand total Marks = 800+800+800+600= 3000

1. Open Elective / Non-core I of student choice from other departments 100M Total = 200M

2. Open Elective / Non-core II of student choice from other departments **100M**

Note: Open Elective/Non-core 200 marks will not be considered for division / percentage. The total markswill be 2800 only.

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Couse:	Semester:	Title of The Course:	Course Code:	V
MCA	I	Discrete Mathematics	R20MCA101	20

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	-	3 Hours	30	70	3

Course Objectives:

- To make the students understand the basics of Computer Science and Mathematics.
- To expose students to the logical arguments and verify the mathematical proofs.
- To make the students understand the skills in solving problems on permutations and combinations, Principle of Inclusion and Exclusion.
- To make the student understand the concepts of graph theory.

Course Outcomes:

- The student will be able Validate the arguments, verify the proofs and draw inferences.
- The student's would be able to solve complex problems using mathematical inductions and apply the binomial theorem to solve mathematical expressions.
- The student would be able to apply different types of counting techniques.
- The students would gain knowledge about trees, graphs and applications of graph coloring.

DETAILED SYLLABUS

Unit-1: (12hrs):
The Foundations: Logic and Proofs: Proposotional Logic, Propositonal Equivalences, Predicates and Quantifiers, Connectives, Well-formed formulas, Truth Tables, tautology, equivalence implication,
Predicates : Predicative logic, Free & Bound variables, Rules of inference, Consistency, proof of contradiction
Basic Structures: Sets , Functions.
Unit-2: (12 Hrs):
The Fundamentals: Algorithms, the Integers and Matrices: Algorithms, The growth of Functions, complexity of algorithms, Integers and Division, Primes and Greatest Common Divisors, Mathematical Induction
Counting: Basis of counting, Pigeon hole Principle, Combinations & Permutations, with Repetitions, Constrained repetitions, Binomial Coefficients, Binomial Multinomial theorems, Generalized Permutations & Combinations.
Unit-3: (12 Hrs):
Advanced Counting Techniques: Recurrence Relation, Solving Linear Recurrence Relations, Generating Functions, Inclusion –Exclusion Principle and its applications.
Relations: Relations and its properties, Representing Relations, Closure of Relations, Equivalence Relations, Partial Ordering.
Unit-4: (12 Hrs):
Graphs: Graphs and Graph models, Graph terminology and special types of graphs, Graph Isomorphism, Euler and Hamilton path, shortest path problems, planar graphs, Graph Coloring.
Unit-5: (12 Hrs):
Trees: Tree Terminology , Tree traversal, Spanning Trees , Minimum Spanning trees - Krushkals , Prims Algorithm
Boolean Algebra: Boolean Functions, Representing Boolean functions, Logic gates, Minimization of Circuits.

Text Books:

1. Discrete Mathematics and Its Applications by KennethH Rosen from McGrawHill.
2. Discrete mathematics Structures with applications to computer science by J.P.Tremblay ,R Manohar from McGraw Hill

Reference Books

1. Discrete Mathematics with Applications by Thomas Koshy, Elsevier from 1st Edition.
2. Discrete Mathematical Structures by BernandKolman, Roberty C. Busby, Sharn Cutter Ross from Pearson Education/PHI

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MODEL QUESTION PAPER (w.e.f: 2020-21)

I MCA: I Semester

R20MCA101: Discrete Mathematics

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

Answer All Questions

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

UNIT – I

2. 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

3. 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 an = 5an-1-6an-2+7n

UNIT – III

4. A) Find the transitive closure of relation R on the set {a,b,c}, whose relation Matrix is given as

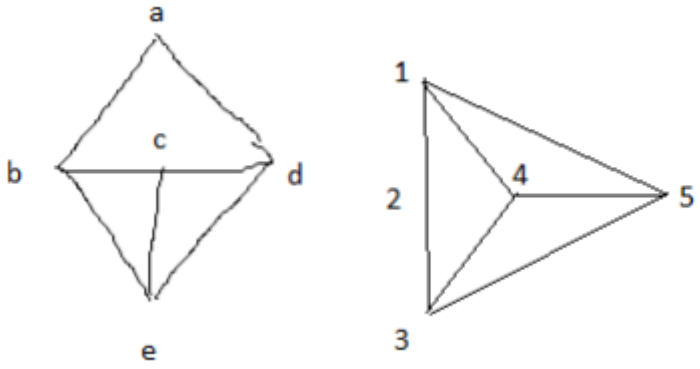
1 0 1
1 1 0
1 1 1
.

(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

5. A) Show that the following two graphs are isomorphic.



(OR)

B) Explain graph coloring with an example.

UNIT – V

6. A) Explain Trees and their properties.

(OR)

B) Explain minimization of circuits.

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Couse:	Semester:	Title of The Course:	Course Code:	V
MCA	I	Data Structures	R20MCA102	20

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	6	3 Hours	30	70	6

Course Objectives:

- Programmers looking for jobs
- Programmers wanting to write efficient code
- Computer Science students having Data Structures as part of their curriculum
- Non Computer science students wanting to enter IT industry

Course Outcomes:

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

- Understand the purpose of programming.
- Download and understand the role of IDE in writing "C" programs.
- Gain knowledge about how one can write Software Programs.
- Write interactive programs to perform input and output operations.
- Apply logic using programming techniques & decision making statements.
- Understand the advantage of using Arrays and Pointers for handling large data.
- Learn how to break up a big task into smaller units using functions.
- Understand how memory can be dynamically allocated and de-allocated for pointers.
- Persist data of the program into data files for using at later point of time.
- Create and process data in files using file I/O functions.
- Read and consume command like arguments in a program.

DETAILED SYLLABUS

Unit-1: (12Hrs)

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

Preliminaries: Mathematical Notations and Functions, Algorithmic Notation, Control Structures, Complexity of Algorithms. Other Asymptotic Notations, Sub algorithms, Variables, Data Types

Unit-2: (12Hrs)

String Processing: Storing Strings, Character Data Type, String Operations, Word Processing, Pattern Matching Algorithms.

Arrays, Records and Pointers: Linear Arrays, Representation and Traversing Linear Arrays, Inserting and Deleting, Bubble Sort, Linear Search, Binary Search

Unit-3: (12Hrs)

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

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

Unit-4: (12Hrs)

Trees : Binary trees, Representing and traversing binary trees, Traversal algorithms using stacks, Header nodes, 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-5: (12Hrs)

Graphs: Terminology, Sequential representation of Graphs, Wars hall's Algorithm, Linked representation of Graphs, Operations on Graphs, Traversing a Graph, Topological Sorting. **Sorting and Searching:** Insertion Sort, Selection sort, Merging, Merge sort, Radix sort, Searching and Data modification, Hashing.

TEXT BOOK

- Data Structures by Seymour Lipschutz from McGraw Hill (Schaum'sOutlines)

REFERENCE BOOKS:

- Theory and Problems of DataStructures by Seymour Lipschutz from McGraw Hill (Schaum'sOutlines)
- Data Structures with Java by John R Hubbard,Second Edition from McGraw Hill (Schaum'sOutlines)
- Data Structures & Algorithms in Java by Robert Lafore from Second edition, PearsonEducation

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MODEL QUESTION PAPER (w.e.f: 2020-21)
I MCA: I Semester
R20MCA102: Data Structures

Time: Three Hours **Max Marks: 70M** **Answer ALL Questions**

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

UNIT - I

1. A) Explain about elementary data organization.

OR

B) Discuss about various asymptotic notations.

UNIT - II

2 A) Discuss about pattern matching algorithms

OR

B) Explain Bubble sort and Binary search.

UNIT - III

3 A) Discuss about Quick sort with example.

OR

B) Explain about two way list with example.

UNIT - IV

4 A) Explain about binary search tree operations

OR

B).Explain insertion and deletion operation in AVL Tree.

UNIT - V

5 A). Explain about Graph Traversals.

OR

B) Discuss about Merge sort with example.

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Couse:	Semester:	Title of The Course:	Course Code:	W
MCA	I	Programming and Problem Solving using Python	R20MCA103	20

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	6	3 Hours	30	70	6

Course Objectives:

- To understand and be able to use the basic programming principles such as data types, variable, conditionals, loops, recursion and function calls.
- To learn how to use basic data structures such as List, Dictionary and be able to manipulate text files and images.
- To understand the process and will acquire skills necessary to effectively attempt a programming problem and implement it with a specific programming language – Python

Course Outcomes:

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

- Gain knowledge about the basic concepts of python programming.
- Solve the basic design problems using object and Classes .
- Understand the principles of File operation
- Obtain knowledge about Lists, Dictionarys,Tuples
- Create and process data in files using file I/O functions.
- Read and consume command like arguments in a program.

DETAILED SYLLABUS

Unit-1: (12Hrs)

Introduction: History of Python – Getting Started with Python – Programming Style – Writing a Simple Program – Reading Input from the Console – Identifiers – Variables, Assignment Statements, and Expressions Numeric Data Types and Operators – Type Conversions and Rounding–Introduction – Boolean Types, Values, and Expressions– if Statements – Two-Way if-else Statements – Nested if and Multi-Way if-elif-else Statements – Logical Operators – Conditional Expressions – Operator Precedence and Associativity.

Unit-2: (12Hrs)

Arrays in Python: Creating an Array, Types of Arrays, Attributes of an Array Strings and Characters, Python functions: Defining a Function – Calling a Function –Functions with/without Return Values – Positional and Keyword Arguments –Passing Arguments by Reference Values, lambda expressions generators, modules, packages**.**

Unit-3: (12Hrs)

Classes and objects: Introduction to Object – Oriented Programming – Basic principles of Object – Oriented Programming in Python – Classes and Objects, Inheritance and Polymorphism, Abstract Classes and Interfaces.

Unit-4: (12Hrs)

Files: Files, Exception Handling and Network Programming: Introduction –Text Input and Output – File Dialogs –Exception Handling – Raising Exceptions – Processing Exceptions Using Exception Objects – Defining Custom Exception Classes.

Unit-5: (12Hrs)

Lists and Tuples, Dictionaries, Threads: Creating lists, aliasing and cloning in lists, sorting list elements, nested lists, Creating tuples, nested tuples, inserting, deleting, modifying elements in tuple. Dictionary methods, loops with dictionary, Converting lists in to dictionary and passing dictionary's as functions, Single and multi-tasking in Threads, creating threads in python, thread synchronization, daemon threads**.**

TEXT BOOKS:

- Core Python Black book Dream Tech Publishers Dr R. Nageswara Rao
- Mark Lutz, “Learning Python, Powerful OOPs”, O’Reilly, 2011.
- Guttag, John, “Introduction to Computation and Programming Using Python”, MIT Press, 2013

REFERENCES:

- Jennifer Campbell, Paul Gries, Jason montajo, Greg Wilson, “Practical Programming
- An Introduction To Computer Science Using Python” The Pragmatic Bookshelf ,
- 2009.
- Wesley J Chun “Core Python Applications Programming”, Prentice Hall, 2012.

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MODEL QUESTION PAPER (w.e.f: 2020-21)
I MCA: I Semester
R20MCA103: Programming and Problem Solving using Python

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

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

1. A) Explain types of operators in python.

(or)

B) Explain Control statements in python?

2. A) Explain Functions in python?

(or)

B) Explain the concept of arrays in python.

3. A) Explain the inheritance concept in python?

(or)

B) Explain the concept of polymorphism in python.

4. A) Explain Exception handling in python?

(or)

B) Explain concept of Files in python?

5. A) Explain aliasing and cloning of lists in python.

(Or)

B) Explain Dictionary methods in python.

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Couse:	Semester:	Title of The Course:	Course Code:	W.E.F
MCA	I	Probability and Statistics	R20MCA104	2020-21

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 Objectives:

- To revise fundamental concepts and techniques in probability
- To introduce new techniques for identifying probability distributions

- To develop the skills for applying the probability and statistical techniques in computer science.

Course Outcomes:

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

- The student would be able to understand the basic probability axioms and rules and the moments of discrete and continuous random variables as well as be familiar with common named discrete and continuous random variables
- The student develops an ability to design and conduct experiments, as well as to analyze and interpret data
- The student can calculate probabilities, and derive the marginal and conditional distributions of bivariate random variables.

DETAILED SYLLABUS

Unit-1: (12Hrs)

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, poison distribution.

Unit: 2 (12Hrs)

Continuous distribution: continuous densities, expectation and distribution parameters, exponential distribution, normal distribution. Estimation: point estimation, interval estimation, criteria of good estimator

Unit:**3 (12Hrs)**

Correlation: meaning, definition and types of correlation. Measures: scatter diagram method, Karl Pearson correlation coefficient, spearman rank correlation coefficient. Probable error and coefficient of determination. Regression analysis: meaning, definition, regression lines, equations and properties

Unit:4 (12 Hrs)

Large sample test: test of significance for mean, difference of means, test of Significance for standard deviation, tests on single proportion and two proportions. Small sample test: t-test for single mean, difference of means and paired t-test.

Unit 5: (12 Hrs)

Analysis of variance: One way Couseification fixed effect model, two way Couseification. (Problems only) Time series analysis: meaning, definition, components of time series. Moving averages method, least square method for estimating trend values.

TEXTBOOKS

- Fundamentals of Mathematical statistics by sultan Chand & Sons, New Delhi.S C Gupta & VK Kapoor from Sulthanchand and sons
- Fundamentals of Applied statistics by sultan Chand & Sons, New Delhi.S C Gupta & VK Kapoor from Sulthanchand and sons

REFERENCE BOOKS

- Outlines of statistics Vol II by Goon Gupta & Das Gupta.
- Introduction to mathematical statistics by Hogg & Craig

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MODEL QUESTION PAPER (w.e.f: 2020-21)
I MCA: I Semester
R20MCA104: Probability and Statistics

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

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

UNIT - I

1. A) Define binomial distribution, its properties and applications

OR

B) State and prove Bayes' thorem

UNIT - II

2. A) Define normal distribution. Explain its properties and applications.

OR

B) Explain the criteria of good estimator

UNIT - III

3. A) Define correlation explain various types of correlation

OR

B) Calculate the two regression lines for the following data

X 67 69 72 65 64 63 61 64

Y 35 39 36 42 41 38 29 33

UNIT - IV

4. a) i)Explain the procedure of testing two means in large sample theory

ii) Two random sample gave the following information

Sample Size Sample mean Sum of squares of deviation from mean

1 100 68 1500

2 120 72 1800

Test wheather the samples have came from the same normal population at 5% l.o.s

OR

B) i) explain the procedure for testing paired means

ii) Below are given the gain in weights(in k.gs)of pigs fed on two diets A and B

Diet A 25 32 30 34 24 14 32 25 30 31 35 25

Diet B 44 34 22 10 47 31 40 30 32 35 18 21 35 29

Test, if the two diets differ significantly as regads their effect on increase in weight

UNIT - V

5. a) a test was given to students taken at random from three schools of a town. The individual scores are

School – 1 9 7 6 5 8

School - 2 7 4 5 4 5

School - 3 6 5 6 7 6

Carry out analysis of anova and state your conclusions.

OR

B) Define time series. Explain various components of time series.

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Couse:	Semester:	Title of The Course:	Course Code:	W.E.F
MCA	I	Operating Systems	R20MCA105	2020-21

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 Objectives:

- Have a fundamental understanding of the general architecture of computers.
- Describe, contrast and compare different structures for operating systems.
- Understand and analyze theory and implementation of: processes, resource control (concurrency etc.), physical and virtual memory, scheduling, I/O and files.
- The trade-offs in design and implementation concepts used in the development of Operating Systems

Course Outcomes:

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

- To make the students aware of features and functionalities of an operating system .
- The students would be able to recognize the importance of scheduling algorithms.
- The students would be able to understand the concept of deadlock handling.
- To make the students understand memory management techniques and virtual memory concepts.

DETAILED SYLLABUS

Unit 1: (12 Hrs)

Introduction: What Operating Systems Do, Computer-System Organization, Computer-System Architecture, Operating System Structure, Operating-System Operations, Process Management, Memory Management, Storage Management, Protection and Security.

System Structures: Operating-System Services, User and Operating-System Interface, System Calls, Types of System Calls, System Programs, Operating-System Design and Implementation, Operating System Structure.

Unit 2: (12 Hrs)

Process Concept: Process Concept, Process Scheduling, Operations on Processes, Inter process Communication. Multithreaded Programming: Overview, Multithreading Models, Thread Libraries. Process Scheduling: Basic Concepts, Scheduling Criteria, Scheduling Algorithms

Unit 3: (12 Hrs)

Synchronization: Background, The Critical-Section Problem, Peterson's Solution, Semaphores, Classical Problems of Synchronization, Monitors.

Deadlocks: System Model, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock. Memory-Management Strategies: Background, Swapping, Contiguous Memory Allocation, Structure of page table, Segmentation, Paging..

Unit 4: (12 Hrs)

Virtual-Memory Management: Background, Demand Paging, Page Replacement, Thrashing. File System: File Concept, Access Methods, Directory and Disk Structure, File-System Mounting, File Sharing, Protection.

Unit 5: (12 Hrs)

Implementing File Systems: File system structure, file system implementation, directory implementation, and allocation methods. **Secondary Storage structure**: Overview of Mass storage structure, Disk structure, Disk scheduling, Raid structure

Text Books:

1. Abraham Silberschatz, Peter B Galvin, Gerg Gagne, "Operating System Principles",

Seventh Edition, Wiley, India Edition.

Reference Books:

1. William Stallings, "Operating Systems – Internals and Design Principles", Fifth Edition, Pearson Education (2007)
2. Deitel & Deitel, "Operating Systems", Third Edition, Pearson Education (2008).

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MODEL QUESTION PAPER (w.e.f: 2020-21)

I MCA: I Semester

R20MCA105: Operating Systems

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

Answer ALL Questions

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

UNIT - I

1. a) What is an Operating System? Explain Operating Structure?
   b) Explain About Computer System architecture?

(Or)

   c) Explain The Following Concepts?
   (i) Memory Management?
   (ii) Storage Management?
   (iii)Types of system calls?

UNIT - II

2. a) Explain Inter Process Communication with example?

(Or)

   b) What is Multithreading and explain thread libraries?
   c) Explain about 3 scheduling algorithms?

UNIT - III

3. a) Define a Dead Lock? What are Methods for Handling Dead Locks?

(Or)

   b) What is Critical Section Probelm ?
   c) Explain the Concepts of The Following
   (i) Semaphores
   (ii) Monitors.

UNIT - IV

4.a) Explain about paging and Demand paging?

(Or)

   b) Describe the concept of filesystem in O.S.

UNIT - V

5. a) Write about file allocation methods in OS

(Or)

   c) Briefly Explain About RAID Structure in O.S?

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Couse:	Semester:	Title of The Course:	Course Code:	W.E.F
MCA	I	Computer Organization	R20MCA106	2020-21

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 Objectives:

- To make the students aware of basic hardware and software concepts of computer organization.
- To make the students understand the different circuits.
- To make the students learn multiplexers and decoders.
- To discuss the memory hierarchy and memory types

Course Outcomes:

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

- The student will be able to simplify the Boolean expressions using K-maps.
- The student will be able to design combinational and sequential circuits,
- The student would have good exposure with concepts like addressing modes and instruction cycles
- The student would be familiar with the performance of CPU and memory operations

DETAILED SYLLABUS

Unit-1: (12Hrs)

Digital Logic Circuits: Digital Computers, Logic Gates, Boolean algebra, Map Simplification, Combinational Circuits, Flip-flops, Sequential Circuits. Digital Components: Integrated Circuits, Decoders,Multiplexers, Registers, ShiftRegisters, Binary Counters, Memory Unit.

Unit: 2 (12Hrs)

Data Representation: Data types, Complements, Fixed-point Representation, Floating-point representation, other binary codes, Error detection Codes. Register Transfer and Micro operations: Register transfer language, Register transfer, Bus memory Transfers, Arithmetic micro operations, logic microoperations,Shiftmicrooperations,ArithmeticLogicShiftUnitBasic Computer Organization and Design: Instruction Codes, Computer registers, Computer Instructions, Timing and Control, Instruction Cycle, Memory-Reference Instructions, Input-output Interrupt.

Unit:**3 (12Hrs)**

Micro programmed Control: Control memory, Address Sequencing, MicroprogramExample, and Design of control Unit.

Central Processing Unit: GeneralRegisterOrganization, Stack Organization, Instruction Formats, Addressing Modes, Data Transfer and Manipulation, Program Control.

Unit:4 (12 Hrs)

Computer Arithmetic: Introduction, Additionandsubtraction, Multiplication algorithm, Floating Point and Arithmetic Operations. Decimal Arithmetic Unit and Decimal Arithmetic Operations.

Unit 5: (12 Hrs)

Input-Output Organization: Peripheral Devices, Input-Output Interface, Asynchronous Data Transfer, Modes of Transfer, Priority Interrupt Memory Organization: Memory Hierarchy, Main Memory, Auxiliary Memory, Associative Memory, and Cache Memory.

TEXTBOOKS

- Computer System Architecture by Morris Mano 3rd Edition Pearson Education

  Chapters: 1, 2, 3, 4, 5.1to5.7, 7, 8.1 to8.7, 10.2to10.5, 11.1 To 11.5, 12.1 to 12.5

REFERENCE BOOKS

- Computer Organization and Architetcure by V Rajaraman T and Radha Krishna through PHI Publications.
- Computer Architetcure by Behrooz Parhami from Oxford (2007)

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MODEL QUESTION PAPER (w.e.f: 2020-21)
I MCA: I Semester
R20MCA106: Computer Organization

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

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

UNIT - I

1. A) Explain the operation of 4×1 multiplexer with logic diagram and truth table.

Simplify F together with its don't care condition d in

i. sum of products form ii. Products of sums form

$F(A,B,C,D)=\sum(0,1,2,8,9,12,13)$

$d(A,B,C,D)= \sum(10,11,14,15)$

OR

B). Discuss the operation of SR flip flop with logic diagram and Explain about fixed point and floating point data representation

UNIT - II

2. A) What is register? Explain register transfer using block diagram and Timing diagram. And explain the memory reference instruction

OR

B) Draw the block diagram of an ALU and explain the operations performed by it and What is an interrupt? Explain the interrupt cycle with diagram

UNIT - III

3. A) Describe the organization of Micro programmed control with block diagram and Explain about instruction format

OR

B) Explain about different types of addressing model and Explain about control memory in detail

UNIT - IV

4. A) What is BCD adder? Explain with block diagram and Explain about Booth's multiplication algorithm

OR

B) With a flow chart explain Hardware algorithm Explain about Floating point arithmetic operations

UNIT - V

5. A) What is an input-output interface? What is the difference between isolated i/o and Memory-mapped I/O and Write a note on memory-hierarchy

OR

B) What is Asynchronous data transfer? and Explain locality of reference? Discuss various organizations of cache memory

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Couse:	Semester:	Title of The Course:	Course Code:	W.E.F
MCA	I	Programming and Problem Solving using Python Lab	R20MCA107	2020-21

1. Write a python program to demonstrate Operators?
2. Write a python program to demonstrate Conditional statements?
3. Write a python program to demonstrate Two dimensional Array?
4. Write a python program to demonstrate Functions with passing arguments by reference?
5. Write a python program to demonstrate lambda Expressions?
6. Write a python program to demonstrate Object oriented Programming?
7. Write a python program to demonstrate Inheritance?
8. Write a python program to demonstrate Polymorphism?
9. Write a python program to demonstrate abstract Classes?
10. Write a python program to demonstrate Interfaces?
11. Write a python program to demonstrate Exception Handling?
12. Write a python program to demonstrate Files concept?
13. Write a python program to demonstrate Lists?
14. Write a python program to demonstrate Dictionary Methods?
15. Write a python program to demonstrate Multithreading concept?
16. Write a python program to demonstrate Tuples?

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Couse:	Semester:	Title of The Course:	Course Code:	W.E.F
MCA	I	Data Structures lab	R20MCA108	2020-21

1. Write a program to implement Stack operations using Arrays

2. Write a program to implement Queue operations using Arrays

3. Write a program to implement linked list operations using Arrays

4. Write a Program to implement tree traversal techniques

5. Write a program to convert infix expression to postfix expression

6. Write a program to evaluate postfix expression

7. Write a program to implement Binary search.

8. Write a program to implement Selection sort

9. Write a program to implement Insertion sort

10. Write a program to implement quick sort

11. Write a program to implement Merge Sort.

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Couse:	Semester:	Title of The Course:	Course Code:	W.E.F
MCA	II	Design and Analysis of Algorithms	R20MCA201	2020-21

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 Objectives:

- To make the students understand the time and space complexities of an algorithm.
- To make the students compare design techniques like divide and conquer, greedy algorithms and dynamic programming to solve algorithmic problems.
- To make the students understand the computability concepts NP-hard and NP complete.
- To make the students understand different ways to analyze randomized algorithms (expected running time, probability of error).

Course Outcomes:

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

- Apply and analyze the complexity of certain divide and conquer, greedy, and dynamic programming algorithms.
- Differentiate between various algorithms for sorting, searching and selection and when to use them.
- Describe the Cousees P, NP, and NP-Complete and be able to prove that a certain problem is NP - Complete.
- Explain and apply backtracking and branch and bound techniques to deal with some hard problems.
- It is expected that the students are able to understand the techniques used for designing graph theory algoritms.

DETAILED SYLLABUS

Unit-1: (12 Hrs):

IntroductiontoAlgorithm,Algorithmdefinition,properties,Differentareastostudyabout Algorithms, Pseudo code expressions for an algorithm, Performance Analysis, Time complexity& Space complexity, Asymptotic notations, Introduction to Divide and Conquer-Binarysearch,Binarysearchanalysis,Quicksort,Quicksortanalysis,Mergesort,Mergesort Analysis, Strassen‘s matrix multiplication, Finding Maximum and minimum.

Unit-2: (12 Hrs):

Greedy Method introduction, General method, Job sequencing with deadlines, Single source shortest path problem, Example problems, Optimal storage on tapes.

Knapsack problem, Minimum cost spanning trees–Prim‘s Algorithm, Kruskal‘s Algorithm, Basic search and Traversal Techniques, Tree Traversals, Bi-connected components, DFS,BFS.

Unit-3: (12 Hrs):

Dynamic programming, Single source shortest path problem, Multistage graphs, All pairs shortest path, Optimal Binary search tree, 0/1 knapsack problem, Example problem Travelling sales person problem, Flow shop scheduling.

Unit-4: (12 Hrs.)

Introduction to backtracking, General method, sum of subsets, N-queens problem, Sum of sub sets problem, Graph coloring, Hamiltonian cycles, knapsack problem.

Unit-5: (12 Hrs.)

Introduction to BranchandBound,Travellingsalespersonproblem,0/1Knapsackproblem,LCBB, FIFOBB, Introduction to NP HARD &NP COMPLETE, Example problem, Basic concepts, Nondeterministic Algorithms, Np-hard Couse, NP–complete Couse, Cooks theorm.

Text Books:

1. Fundamentals of Computer Algorithms by SartajSahni from Second Edition , University press(2008).Chapters1–8 &11.

Reference Books:

1. Design and analysis of Algorithms by L.ChandraMohan, from PHIPublications.
2. Design and analysis of Algorithms by PrabhakarGupta, VineethAgarwal from PHI Publications.
3. Introduction to Design and analysis of Algorithms by Anany Leviton from Pearson Education.

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MODEL QUESTION PAPER (w.e.f: 2020-21)

I MCA: II Semester

R20MCA201: Design and Analysis of Algorithms

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

Answer ALL Questions

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

Unit-1

1. A. Define an Algorithm. Explain the properties of an Algorithm.
   B. Write the pseudo code for Binary search Technique

   (OR)

   C. Explain how the performance of an algorithm is measured with examples.
   D. Discuss about general method of Divide and Conquer. Explain Quick Sort Problem.

Unit-2

2. A. Write the Greedy method of Kruskal's and Prim's Algorithms.

   (OR)

   B. What is Binary Tree? Discuss about Binary Tree traversals.
   C. Discuss about Bi-Connected components with suitable examples.

Unit-3

3. A. Write the general method of dynamic programming. Discuss about OBST problem.

   (OR)

   B. Discuss about Travelling Sales Person Problem using Dynamic programming Method.

Unit-4

4. A. Describe the Algorithm for Sum of Subsets Problem using Backtracking. Explain with an example.

   (OR)

   B. Describe the Algorithm for Knapsack Problem using Backtracking. Explain with an example.

Unit-5

5. **A.** Explain about FIFO Branch and Bound principle.
   B**.** Describe the abstractions of LC search.

   (OR)

   C. Describe Cook's Theorem.
   D. Discuss about NP Hard and NP complete problem

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Couse:	Semester:	Title of The Course:	Course Code:	W.E.F
MCA	II	Software Engineering	R20MCA202	2020-21

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	3

Course Objectives:

- To provide the students with an overall view over Software Engineering as an engineering discipline and with insight into the processes of software development.
- To gain students in-depth knowledge in Software Engineering, Software Life-cycle Models, Software Requirements, Software Integration and Testing and Software Quality.
- Different Process Models and Software Development Life Cycle.
- To understand the various Testing Strategies

Course Outcomes:

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

- Have knowledge about software development models
- Through knowledge about methods and process to develop software
- The student would be able to implement Software Requirement Analysis
- Understanding of Testing strategies implemented in development process and able to do Risk analysis
- The student can develop good coding practices and also can build a career as a software tester or analyzer

DETAILED SYLLABUS

Unit 1: (12 Hrs)

Introduction to Software Engineering: The evolving role of software, Changing Nature of Software, Software myths.A Generic view of process: Software engineering- A layered technology, a process framework, The Capability Maturity Model Integration (CMMI), Process patterns, process assessment, personal and team process models.Process models: The waterfall model, Incremental process models, Evolutionary process models, The Unified process, Agile process models.

Unit 2: (12 Hrs)

Software Requirements: Functional and non-functional requirements, User requirements, System requirements, Interface specification, the software requirements document. Requirements engineering process: Feasibility studies, Requirements elicitation and analysis, Requirements validation, Requirements management. System models: Context Models, Behavioral models, Data models, Object models, structured methods.

Unit 3: (12 Hrs)

Design Engineering: Design process and Design quality, Design concepts, the design model. Creating an architectural design: Software architecture, Data design, Architectural styles and patterns, Architectural Design. Object-Oriented Design: Objects and object Cousees, An Object-Oriented design process, Design evolution. Performing User interface design: Golden rules, User interface analysis and design, interface analysis, interface design steps, Design evaluation.

Unit 4: (12 Hrs)

Testing Strategies: A strategic approach to software testing, test strategies for conventional software, Black-Box and White-Box testing, Validation testing, System testing, the art of Debugging. Product metrics: Software Quality, Metrics for Analysis Model, Metrics for Design Model, Metrics for source code, Metrics for testing, Metrics for maintenance. Metrics for Process and Products : Software Measurement, Metrics for software quality.

Unit 5: (12 Hrs.)

Risk management: Reactive vs. Proactive Risk strategies, software risks, Risk identification, Risk projection, Risk refinement, RMMM, RMMM Plan. Quality Management: Quality concepts, Software quality assurance, Software Reviews, Formal technical reviews, Statistical Software quality Assurance, Software reliability, The ISO 9000 quality standards

Text Books:

1. Software Engineering A practitioner's Approach, Roger S Pressman, 6th edition. McGrawHill International Edition.
2. Software Engineering, Ian Sommerville, 7th edition, Pearson education.

REFERENCE BOOKS :

1. Software Engineering, A Precise Approach, PankajJalote, Wiley India, 2010.
2. Software Engineering: A Primer, Waman S Jawadekar, Tata McGraw-Hill, 2008
3. Fundamentals of Software Engineering, Rajib Mall, PHI, 2005
4. Software Engineering, Principles and Practices, Deepak Jain, Oxford University Press.
5. Software Engineering1: Abstraction and modelling, Diner Bjorner, Springer International edition, 2006.
6. Software Engineering2: Specification of systems and languages, Diner Bjorner, Springer International edition 2006.

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MODEL QUESTION PAPER (w.e.f: 2020-21)
I MCA: II Semester
R20MCA202: Software Engineering

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

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

UNIT - I

1. a)What is Software? Discuss about evolving the role of the Software.

OR

b) What is process model? Discuss about Waterfall model with its advantages and disadvantages.

UNIT - II

2. a) Discuss about functional and non-functional requirements for development of Software.

OR

b) Discuss about requirements engineering process.

UNIT - III

3. a)What is Design? Discuss about the concepts of Design.

OR

b) Discuss about Software Architecture?

UNIT - IV

4. a) What is testing? Discuss about testing strategies for conventional software.

OR

b) What are the various metrics for Software Quality? Discuss.

UNIT - V

5. a) Discuss about ISO 9000 Quality standards.

OR

b) Discuss about the Formal technical reviews.

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Couse:	Semester:	Title of The Course:	Course Code:	W.E.F
MCA	II	Database Management Systems	R20MCA203	2020-21

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	6	3 Hours	30	70	6

Course Objectives:

- To understand need of DBMS,models and functions of DBMS.
- To make the students learn the architecture of DBMS.
- To expose the students learn the advantages of normalization.
- To make the students understand the RAID strategies.
- To make the students understand the need for transaction processing,
- Indexing techniques for physical implementation of databases.

Course Outcomes:

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

- The student would be able to understand Database Architecture, Client Server architecture.
- The student develops an ability to write Queries in Database languages and design database Using SQL
- The student would be able to apply the concepts of relational algebra, calculus on Databases.
- The student would be able to normalize the relations while designing a data base.
- Understand the issues in transaction processing and implement them to maintain data reliability and integrity.

DETAILED SYLLABUS

Unit1: (12 Hrs)

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 Couseification of Database Management Systems Data Modelling Using the ER Model: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 than Two, Refining the ERDesign for the COMPANY Database the Enhanced Entity-Relationship Model: SubCousees, Super Cousees and Inheritance, Specialization and Generalization, Constraints and Characteristics of Specialization and Generalization Hierarchies, Modeling of Types using Categories An Example University ERR Schema, Design Choices and Formal Definitions.

Unit 2: (12 Hrs)

Relational Model Concepts, Relational Model Constraints and Relational Database Schemas, Update Operations, Transactions and Dealing with Constraint Violations.

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.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.

Unit 3: (12 Hrs)

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.

Relational Database Design Algorithms and Further Dependencies: Properties of Relational Decompositions, Algorithms for Relational Database Schema Design, Multivalued Dependencies and Fourth Normal Form, Join Dependencies and Fifth Normal Form, Inclusion Dependencies, Other Dependencies and Normal Forms**.**

Unit -4: (12 Hrs)

Disk Storage, Basic File Structures and Hashing:

Introduction, Secondary Storage Devices, Buffering of Blocks, Placing file Records on Disk, Operations on Files, Files of Unordered Records, Files of Ordered Records, Hashing Techniques, Other Primary File Organizations, Parallelizing Disk Access using RAID Technology.

Indexing Structures for Files: Types of Single-Level Ordered Indexes, Multilevel Indexes, Dynamic Multilevel Indexes Using B- Trees and B+Trees, Indexes on Multiple Keys, Other Types of Indexes.

Unit -5 (12 Hrs.)

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, Multisession Concurrency control techniques, Validation concurrency control Techniques, Granularity of Data Items and multiple Granularity Locking.

Text Books:

- Fundamentals of Database Systems by RamezElmasri, ShamkantB. Navathe, from Fifth Edition, Pearson Education (2007).

Reference Books:

- DataBase Systems Design Implementation and Management by Peter Rob,Carlos Coronel from Eight Editon Thomson(2008).
- An Intorduction to Data Base Systems by C.J.Date, A.KannanS.Swamynanatha from VII Edition Pearson Education (2006).

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MODEL QUESTION PAPER (w.e.f: 2020-21)
I MCA: II Semester
R20MCA203: Data Base Management Systems

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

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

UNIT - I

1. a) Write Advantages of using the Database Approach.
   b) Explain Three Schema Architecture with neat diagram and Data Independence.

OR

   c) Explain Entity, types of Attributes and Keys relationship with an ER-diagram
   d) Explain Specialization and Generalization with Examples

UNIT - II

2. a) Explain about Relational Model Constraints and Relational Database Schemas.
   b) Write about Relational Algebra Operations.

OR

   c) Write about Attribute Data Types and Domains in SQL.
   d) Explain JOIN Operations

UNIT - III

3. a) What is Functional Dependency ? Explain the Informal Design Guidelines.
   b) What is Normalization? Explain 1NF and 2NF.

OR

   c) Define and BCNF. How BCNF in difference from3NF?
   d) Explain properties of Relational Decompositions.

UNIT - IV

4. a) Explain Hashing Techniques in File Organization.
   b) Write about Operations on Files.

OR

   c) Write types of Single level Ordered Indexes.
   d) Explain about B+ Trees

UNIT - V

5. a) Write the Desirable Properties of Transactions.
   b) Explain about serializability.

OR

   c) What is Concurrency Control? Explain Two Phase Locking Techniques.
   d) Explain Validation Concurrency Control Techniques.

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Couse:	Semester:	Title of The Course:	Course Code:	W.E.F
MCA	II	COMPUTER NETWORKS	R20MCA204	2020-21

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	-	3 Hours	30	70	3

Course Objectives:

- To make the students familiarize with the fundamentals of communication, computer networks, types, application of networks.
- To make the students learn OSI reference model and services offered by the seven layers.
- To make the students understand the different error detection and correction techniques.
- To compare the various routing algorithms.

Course Outcomes:

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

- The students would be able to know the necessity of Reference Models.
- The students would become aware of guided and unguided transmission Media and their performance.
- The students would be able to understand the congestion problem during the transmission of data.
- The student would become familiar with blue tooth and multimedia applications

DETAILED SYLLABUS

Unit1: Introduction: Uses of Computer Networks: Business Application, Home Applications, Mobile Users– Social Issues. Network Hardware: Local Area Networks – Metropolitan Area Networks – Wide Area Networks– Wireless Networks – Home Networks – Internet works. Network Software: Protocol Hierarchies –Design Issues for the Layers – Connection Oriented and Connectionless Services – Service Primitives – The relationship of

Services to Protocols. Reference Models: The OSI Reference Model – The TCP/IP Reference Model –A Comparison of OSI and TCP/IP reference Model.

Physical Layer: **Guided Transmission Media**: Magnetic Media – Twisted Pair – Coaxial Cable – Fiber Optics. Data Link Layer: Data Link Layer Design Issues: Services Provided to the Network Layer – Framing – Error Control – Flow Control. Error Detection and Correction: Error correcting Codes – Error Detecting Codes. Elementary Data Link Protocols: An unrestricted Simplex Protocol – A simplex Stop-and–wait Protocol – A simplex Protocol for a Noisy channel. Sliding Window Protocols: A one-bit sliding Window Protocol – A Protocol using Go Back N – A Protocol using selective Repeat. Example Data Link Protocols: HDLC–The Data Link Layer in the Internet. **(Total hours: 12)**

Unit2: **The Medium Access Control Sub layer**: Ethernet: Ethernet Cabling – Manchester Encoding – The Ethernet MAC sublayer Protocol – The Binary Exponential Backoff Algorithm – Ethernet Performance – Switched Ethernet – Fast Ethernet – Gigabit Ethernet – IEEE 802.2: Logical Link Control – Retrospective on Ethernet. Wireless Lans: The 802.11 Protocol Stack – The 802.11 Physical Layer – The 802.11 MAC sublayer Protocol – The 802.11 Frame Structure. Bluetooth: Bluetooth Architecture – Bluetooth Applications –The Bluetooth Protocol Stack. Data Link Layer Switching: Bridges from 802.x to 802.y – Local Internet working – Spanning Tree Bridges – Remote Bridges –Repeaters, Hubs, Bridges, Switches, Routers and Gateways –Virtual LANs. **(Total hours: 12)**

Unit3: The Network Layer: 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 VectorRouting–Link State Routing–Hierarchical Routing – Broadcast Routing–Multicast Routing–Routing for Mobile Hosts. Internet Working:How Networks Differ–How Networks can be connected–Concatenated Virtual Circuits–Connectionless Internet working –Tunnelling– Internet work Routing–Fragmentation.The NetworkLayerintheInternet:TheIPProtocol–IPaddress– InternetControlProtocols–OSPF– TheInternetGatewayRoutingProtocol– BGP–The Exterio Gateway Routing Protocol**. (Total hours: 12)**

Unit4: The Transport Layer: 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. The Internet Transport Protocols: UDP Introduction toUDP–RemoteProcedureCall– TheRealTimeTransportProtocol.TheInternetTransport Protocols: TCP Introduction to TCP–The TCP Service Model–the TCP Protocol–The TCP segment header – TCP connection establishment – TCP connection release – Modeling TCP connection management-TCP Transmission Policy–TCP congestion Control–TCP Timer Management–Wireless TCP and UDP–Transactional TCP.**(Total hours: 12)**

Unit5: **The Application Layer: 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– DynamicWebDocuments–HTTP–TheHyperTextTransferProtocol– Performance Enhancements–The Wireless Web. **Multimedia**: Introduction to Digital Audio– Audio Compression–Streaming Audio– Internet Radio– VoiceOverIP–IntroductiontoVideo–VideoCompression–VideoonDemand.

Text Books:

1. Computer Networks by Andrew S.Tanenbaum from Fourth Edition, PHI.

Reference Books:

1. Computer Networking by James F. Kurose Keith W.Ross from 3rd Edition Pearson.
2. Data Communications and networking by Behrouz A Forouzan from TMH 4th edition.

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MODEL QUESTION PAPER (w.e.f: 2020-21)

I MCA: II Semester

R20MCA204: Computer Networks

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

Answer ALL Questions

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

UNIT-I

1) a) Explain different sliding window Protocols
   b) Explain in detail about error detecting codes

(OR)

   c) Explain about different types of guided transmission media
   d) Explain about data link layer design issues.

UNIT-II

2) a) Explain in detail about Binary Exponential Back off algorithm.
   b) Explain the following.
      i) Blue tooth ii) Routers and gateways iii) switches iv) Bridges

(OR)

   c) Write about Bluetooth applications
   d) What is Ethernet? Explain various IEEE 802.11 MAC sub layer Protocol

UNIT-III

3) a) Explain various services provided by the network layer to the transport layer.
   b) Write short notes on BGP

(OR)

   c) Explain in detail about following routing algorithms.
      i) Flooding ii) Link state routing ii) Optimality Principle

UNIT-IV

4) a) Briefly explain the transport layer services and primitives.

(OR)

   b) Explain in detail about UDP?

UNIT- V

5) a) Explain the architecture and services of E-mail.
   b) Explain about message formats in E-mail

(OR)

   c) Explain about
      i) Video compression ii) Internet Radio ii) Static web documents.

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Couse:	Semester:	Title of The Course:	Course Code:	W.E.F
MCA	II	Web Technologies	R20MCA205	2020-21

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	6	3 Hours	30	70	6

Course Objectives:

- Developing the web sites which are secure and dynamic in nature and writing scripts which get executed on server as well.
- The web page site planning, management and maintenance.
- Developing Internet based applications using Java Technologies.

Course Outcomes:

At the End of the Course Student will

- Understand, analyze and apply the role languages like HTML, CSS, XML, JavaScript and protocols in the workings of web and web applications.
- Understand about network and security programming using Java and know about the application of dynamic page functionality in web pages using CGI, Servlets, JSP, and ASP.
- Create and communicate between client and server using Php
- Develop a dynamic webpage by the use of Angular JS.
- Understand and write a well formed Angular JS File.

DETAILED SYLLABUS

Unit -1 (12 Hrs.):

HTML – Basic Web Concepts – Client/Server model What is HTML – Basic Structure of HTML Page –Tags describe the content of HTML, Anchor Tag, Hyperlink , Marquee, – Tables, Image Tag, Form tag, Frameset,

Div tag**.**

Unit-2 (12 Hrs.):

STYLE SHEETS: Cascading Style Sheet: Internal, External, Embedded. **JAVASCRIPT**: Client side scripting, what is JavaScript, How to develop JavaScript, simple JavaScript, Variables, Functions.

Unit-3 (12 Hrs.):

Servlets: What is Servlet, Session handling in Servlets, Cookies in servlets, Servlet Chaining, life cycle of Servlet **JAVA SERVER PAGES**: Anatomy of a JSP Page, Syntax, JSP Components, and MVC Architecture.

Unit -4 (12 Hrs.):

PHP PROGRAMMING: Introducing PHP: Creating a PHP script, Running PHP script. Working with variables and constants: Using variables, Using constants, Data types, Operators, control Statements and Looping in PHP

Unit -5 (12 Hrs.):

AngularJs: Intro to AngularJS, Need of AngularJS in real web sites, Downloading AngularJS, AngularJS first example, AngularJS built-in directives, AngularJS expressions

Text Books:

- Deitel H.M. and Deitel P.J., ―Internet and World Wide Web How to program‖, Pearson International, 2012, 4th Edition. (Ch-1,4,5,6,12,14,26,27)
- Learning Angular JS by Ken Williamson from Oreilly.
- Programming PHP 3rd Edition from Oreilly by Kevin Tatroe and Peter MacIntyre

Reference Books:

Web Technologies Black Book

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MODEL QUESTION PAPER (w.e.f: 2020-21)

I MCA: II Semester

R20MCA205: Web Technologies

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

Answer ALL Questions

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

UNIT-1

1. A) Explain Html and explain Marquee,Table,Div Tags..

(or)

B) Explain Forms, Frameset Tag with example?

UNIT-2

2. A) Explain the types of CSS?

(or)

B) Explain Control Statements in java script.

UNIT-3

3. A) Explain Servlet Life Cycle?

(or)

B) Explain JSTL.

UNIT-4

4. A) Explain Control Statements in PHP?

(or)

B) Explain the types of operators in PHP?

UNIT-5

5. A) Explain the modules of Angular JS?

(or)

B) Explain about Angular JS Directives.

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Couse:	Semester:	Title of The Course:	Course Code:	W.E.F
MCA	II	Open Elective	R20MCAOE206	2020-21

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	-	3 Hours	30	70	4

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Couse:	Semester:	Title of The Course:	Course Code:	W.E.F
MCA	II	Web Technologies Lab	R20MCA207	2020-21

1. Write a HTML Program to use Table Tag, Form tag and Frame Set.
2. Write a HTML Program on Div. Tag and Marquee tags
3. Write a Java Script Program to demonstrate CSS
4. Write a Servlet Program to implement Login page by using JDBC.
5. Write a Servlet Program to implement Cookies.
6. Write a JSP Program to Demonstrate MVC Architecture.
7. Write a PHP Program to demonstrate Operators.
8. Write a PHP Program to demonstrate Control Statements
9. Write a basic angular js Program and run it in web browser
10. Write an angular js to demonstrate directives.

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Couse:	Semester:	Title of The Course:	Course Code:	W.E.F
MCA	II	Database Management Systems Lab	R20MCA208	2020-21

1. Create customer scenario.
2. Write a query to create customer details table.
3. Write a query to create item details table.
4. Write a query to create order details table.
5. Write a query to inserting customer values
6. Write a query to inserting item values
7. Write a query to inserting order values
8. Write a query to displays the customer details
9. Write a query to displays the item details
10. Write a query to displays the order details
11. Write a query to displays the particular customer details
12. Write a query to displays the particular item details
13. Write a query to displays the particular customer details of order details
14. Write a query to displays the particular item details of order details
15. Write a query to displays the order details based on order date
16. Write a query to displays the order details between two particular dates.
17. Write a query to create view.
18. SQL FUNCTIONS

a. Number Functions

b. Character Functions

c. Date Functions

d. Group Functions.

19. Write the query's for relational set operators.

20. Write about joins.

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Couse:	Semester:	Title of The Course:	Course Code:	W.E.F
		Programming and Problem Solving using Python (Open Elective)		2020-21

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		3 Hours	30	70	4

Course Objectives:

- To understand and be able to use the basic programming principles such as data types, variable, conditionals, loops, recursion and function calls.
- To learn how to use basic data structures such as List, Dictionary and be able to manipulate text files and images.
- To understand the process and will acquire skills necessary to effectively attempt a programming problem and implement it with a specific programming language – Python

Course Outcomes:

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

- Gain knowledge about the basic concepts of python programming.
- Solve the basic design problems using object and Classes.
- Understand the principles of File operation
- Obtain knowledge about Lists, Dictionarys,Tuples
- Create and process data in files using file I/O functions.
- Read and consume command like arguments in a program.

DETAILED SYLLABUS

Unit-1: (12Hrs)

Introduction: History of Python – Getting Started with Python – Programming Style – Writing a Simple Program – Reading Input from the Console – Identifiers – Variables, Assignment Statements, and Expressions Numeric Data Types and Operators – Type Conversions and Rounding–Introduction – Boolean Types, Values, and Expressions– if Statements – Two-Way if-else Statements – Nested if and Multi-Way if-elif-else Statements – Logical Operators – Conditional Expressions – Operator Precedence and Associativity.

Unit-2: (12Hrs)

Arrays in Python: Creating an Array, Types of Arrays, Attributes of an Array Strings and Characters, Python functions: Defining a Function – Calling a Function –Functions with/without Return Values – Positional and Keyword Arguments –Passing Arguments by Reference Values, lambda expressions generators, modules, packages**.**

Unit-3: (12Hrs)

Classes and objects: Introduction to Object – Oriented Programming – Basic principles of Object – Oriented Programming in Python – Classes and Objects, Inheritance and Polymorphism, Abstract Classes and Interfaces.

Unit-4: (12Hrs)

Files: Files, Exception Handling and Network Programming: Introduction –Text Input and Output – File Dialogs –Exception Handling – Raising Exceptions – Processing Exceptions Using Exception Objects – Defining Custom Exception Classes.

Unit-5: (12Hrs)

Lists and Tuples, Dictionaries, Threads: Creating lists, aliasing and cloning in lists, sorting list elements, nested lists, Creating tuples, nested tuples, inserting, deleting, modifying elements in tuple. Dictionary methods, loops with dictionary, Converting lists in to dictionary and passing dictionary's as functions, Single and multi-tasking in Threads, creating threads in python, thread synchronization, daemon threads**.**

TEXT BOOKS:

- Core Python Black book Dream Tech Publishers Dr R. Nageswara Rao
- Mark Lutz, “Learning Python, Powerful OOPs”, O’Reilly, 2011.
- Guttag, John, “Introduction to Computation and Programming Using Python”, MIT Press, 2013

REFERENCES:

- Jennifer Campbell, Paul Gries, Jason montajo, Greg Wilson, “Practical Programming
- An Introduction To Computer Science Using Python” The Pragmatic Bookshelf ,
- 2009.
- Wesley J Chun “Core Python Applications Programming”, Prentice Hall, 2012.

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MODEL QUESTION PAPER (w.e.f: 2020-21)

Programming and Problem Solving using Python

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

Answer ALL Questions

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

1. A) Explain types of operators in python.

(or)

B) Explain Control statements in python?

2. A) Explain Functions in python?

(or)

B) Explain the concept of arrays in python.

3. A) Explain the inheritance concept in python?

(or)

B) Explain the concept of polymorphism in python.

4. A) Explain Exception handling in python?

(or)

B) Explain concept of Files in python?

5. A) Explain aliasing and cloning of lists in python.

(Or)

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Couse:	Semester:	Title of The Course:	Course Code:	W.E.F
MCA	III	BIG DATA ANALYTICS	R20MCA301	2020-21

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	6
	3	3		30	70	

Course Objectives

- The main goal of this course is to help students learn, understand, and practice big data analytics and machine learning approaches, which include the study of modern computing big data technologies and scaling up machine learning techniques focusing on industry applications.
- Mainly the course objectives are: conceptualization and summarization of big data and machine learning, trivial data versus big data, big data computing technologies, machine learning techniques, and scaling up machine learning approaches
- It helps students to learn about NOSQL Data Bases.

Course Outcomes

• Ability to identify the characteristics of datasets and compare the trivial data and big data for various applications.
• Ability to select and implement machine learning techniques and computing environment that are suitable for the applications under consideration.
• Ability to solve problems associated with batch learning and online learning, and the big data characteristics such as high dimensionality, dynamically growing data and in particular scalability issues
• Ability to understand and apply scaling up machine learning techniques and associated computing techniques and technologies.

Details of the Syllabus

Unit 1	Types of Digital data: Classification of Digital Data. Introduction to Big Data: Characteristics of data, Evolution of Big Data, Definition of big data, Challenges with Big data, What is Big Data?, Why Big Data?, Traditional Business Intelligence versus Big Data, A typical Data Warehouse Environment, A typical Hadoop Environment
Unit 2	Big data analytics: What is Big Data Analytics?, Top challenges facing Big Data Analytics, Why Big Data Analytics is important?, Data Science, Terminologies used in Big Data Environments
Unit 3	The Big Data Technology Landscape: NoSQL, Hadoop, Why Hadoop?, Why not RDBMS?, RDBMS versus Hadoop, Hadoop Overview, HDFS, Processing Data with Hadoop, Interacting with Hadoop Ecosystem.
Unit 4	Introduction to MongoDB: What is MongoDB?, Why MongoDB?, Terms used in RDBMS and MongoDB, Data types in MongoDB, MongoDB query language.Introduction to Mapreduce programming: Introduction, Mapper, Reducer, Combiner, Partitioner, Searching, Sorting and Compression
Unit 5	Introduction to Pig: What is Pig?, Pig on Hadoop, Pig Latin Overview, Data Types in Pig, Running Pig, Execution Modes of Pig, HDFS commands, Relational Operators, Eval function, Complex Data Types, User-Defined Fucntions, Parameter Substitution, Word Count Example using Pig. JasperReport using Jaspersoft: Introduction to Jasper Reports, Connecting to MongoDB NoSql Database.

Text Books:

	thor	le	blihser
	Seema Acharya and Subhashini ellappan	g Data and Analytics	iley India Pvt. Ltd., 2016

Reference Books

1. Big Data, Black Book from Dream Tech Publications.

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Couse:	Semester:	Title of The Course:	Course Code:	W.E.F
MCA	III	MOBILE COMPUTING	R20MCA302	2020-21

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

COURSE OBJECTIVES:

- To understand the architectures, the challenges and the Solutions of wireless Communication those are in use.
- To learn the basic concepts, aware of the GSM, SMS, and GPRS Architecture.
- To know about different types of wireless Communication Networks and their functionalities.
- To understand the concepts of Adhoc and wireless sensor networks.
- Able to develop simple Mobile Application Using Android

COURSE OUTCOMES:

- Students will be able to analyse modelling and simulation of various communication networks.
- Students will be able to generate test and estimate parameters.
- Students will apply this knowledge for detection estimation and simulation of various communication networks.
- Gain the knowledge about various types of Wireless Data Networks and wireless Voice Networks

Details of the Syllabus

Unit-1	**Mobile Computing:** Architecture of Mobile Computing, Mobile Computing Applications, Limitations of Mobile Computing, and Issues related to Mobile Computing Systems. **Operating Systems and its Features:** Apple iOS, Android & Blackberry OS
Unit-2	**Wireless Transmission:** Frequencies for radio transmission, multiplexing. Medium Access Control (MAC): Motivation for a specialized MAC (Hidden and exposed terminals, Near and far terminals),SDMA, FDMA, TDMA, CDMA
Unit-3	**Global system for mobile communications (GSM):** GSM Architecture, GSM Entities, Call routing in GSM, network aspects in GSM. General packet radio service (GPRS):GPRS and packet data network, GPRS network architecture and operations, data services in GPRS**.**
Unit-4	**Mobile Network Layer:** Mobile IP- Goals, assumptions, entities and terminology, IP packet delivery, tunneling and encapsulation. Mobile Transport Layer:Traditional TCP, Indirect TCP, Snooping TCP, Mobile TCP, Transaction oriented TCP**.**
Unit-5	**Wireless LAN:** Introduction, wireless LAN advantages, IEEE 802.11 standards, wireless LAN Architecture, mobility in wireless LAN. **Forthcoming Technologies**: UMTS, 4G-LTE, 5G, Wireless Personal Area Networks (WPAN), Future Networks (FN).

Text books

	Author	Title	Publisher
1	Jochen Schiller	Mobile Communications.	Addison-Wesley, 2nd edition, 2004

Reference books

	Author	**Title**	**Publisher**
1	Rajkamal	Mobile computing	Second Edition ,Oxford University Press

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Couse:	Semester:	Title of The Course:	Course Code:	W.E.F
MCA	III	ARTIFICIAL INTELLIGENCE	R20MCA303	2020-21

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

COURSE OBJECTIVES:

- To make the students understand problem solving, knowledge Representation, reasoning, decision making, planning.
- Given a search problem, analyse and formalize the problem (as a State space, graph, etc.), select the appropriate search method, and write the algorithm for it.
- Explain important search concepts, such as the difference between Informed and uninformed search, the definitions of admissible and consistent heuristics and completeness and optimality. Algorithms.
- Develop small rule -based and search -based expert systems, predict performance characteristics.
- Describe the role of rule chaining and search in intelligent system engineering

COURSE OUTCOMES:

- Find appropriate idealizations for converting real world problems into AI search problems formulated using the appropriate search algorithm. .
- Implement A* and iterative deepening search. Derive Heuristic functions for A* search that are appropriate for a given problem.
- It is expected that the learners select and apply a variety of graph search algorithms underpinning AI applications.
- It is expected that the students to apply techniques to design expert systems.

Details of the Syllabus

Unit-1	**What is AI? :** The AI Problems, The Underlying Assumption, What is AI Technique?, The level of the Model, Criteria for Success. Problems, Problem spaces & Search: Defining the Problem as a State Space Search, Production

	Systems, Problem Characteristics, Production System Characteristics, Issues in the design of Search Programs, Additional Problems**.** **Heuristic search techniques:** Generate and Test, Hill Climbing, Best First Search, Problem Reduction, Constraint Satisfaction, Means Ends Analysis.
Unit-2	**Knowledge Representation Issues:** Representations and Mappings, Approaches to Knowledge Representation, Issues in Knowledge Representation, The Frame Problem Using Predicate Logic: Representing Simple Facts in Logic, Representing Instance and Isa Relationships, Computable Functions and Predicates, Resolution, Natural Deduction Representing knowledge using Rules: Procedural versus Declarative Knowledge, Logic Programming, Forward versus Backward Reasoning, Matching, Control Knowledge
Unit-3	Symbolic Reasoning under Uncertainity: Introduction to Nonmonotonic Reasoning, Logics for Nonmonotonic Reasoning, Implementation Issues, Augmenting a Problem Solver, Implementation: Depth-First Search, Implementation: Breadth-First Search Weak slot & filler Structures: Semantic Nets, Frames
Unit-4	Planning : Overview, An Example Domain : The Blocks World, Components of a Planning System, Goal Stack Planning, Nonlinear Planning Using Constraint Posting, Hierarchical Planning, Reactive Systems, Other Planning Techniques Natural Language Processing: Introduction, Syntactic Processing, Semantic Analysis, Discourse and Pragmatic Processing
Unit-5	Commonsense: Qualitative Physics, Commonsense Ontologies, Memory Organisation, Case Based Reasoning Expert Systems: Representing and Using Domain Knowledge, Expert System Shells, Explanation, Knowledge Acquisition

Text books

	Author	**Title**	**Publisher**
1	Kenneth C. Louden	Aritficail Intelligence	SecondEdition,Cengage Learning(2008). Chapters:1through 14

Reference books

	Author	**Title**	**Publisher**
1	Terrence W. Pratt & Mervin V. Zelkowitz	Programming Languages Design and Implementation in AI	Fourth Edition, Pearson Education (2008)
2	Robert W. Sebesta	Concepts of AI	Pearson Education 2001

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Couse:	Semester:	Title of The Course:	Course Code:	W.E.F
MCA	III	CLOUD COMPUTING	R20MCA304a	2020-21

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	-	3 Hours	30	70	3

COURSE OBJECTIVES:

- The objective of this course is to provide graduate students about Information Systems with the comprehensive and in-depth knowledge of Cloud Computing concepts, technologies, architecture and applications by introducing and researching state-of-the-art in Cloud Computing fundamental issues, technologies, applications and implementations.
- Another objective is to expose the students to frontier areas of Cloud Computing and information systems, while providing sufficient foundations to enable further study and research.

COURSE OUTCOMES:

- Articulate the main concepts, key technologies, strengths, and limitations of cloud computing and the possible applications for state-of-the-art cloud computing
- Identify the architecture and infrastructure of cloud computing, including SaaS, PaaS, IaaS, public cloud, private cloud, hybrid cloud, etc.
- Explain the core issues of cloud computing such as security, privacy, and interoperability.
- Choose the appropriate technologies, algorithms, and approaches for the related issues.

Details of the Syllabus

Unit-1	**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 – Open Source Virtualization Technology – Binary Translation with Full Virtualization – Virtualization of CPU, Memory and I/o Devices – Hardware support for Virtualization in Intex x86 Processor
Unit-2	**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-3	**Application Architecture for Cloud**: Cloud Application Requirements – Recommendations for Cloud Application Architecture – Fundamental Requirements for Cloud Application Architecture – Relevance and use of Client-server architecture for Cloud Applications – 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-4	**Risks, Consequences and Costs for Cloud Computing** : Introducing Risks in Cloud Computing – Risk Assessment and Management – Risk of Vendor Lock-in– Risk of Loss Control – Risk of Not Meeting Regulatory Compliances – Risk of Resource Scarcity – Risk in Multi Tenant Environment – Risk of Failure – Risk of Failure of Supply Chain – Risk of Malware and Internet attacks – Risk of Inadequat SLA – Risk of Management of Cloud Resources – Risk of Network Outages – Risks in the Physical Infrastructure – Legal Risk due to Legislation – Risks with Software and Application Licensing – Security and Compliance Requirements in a Public Cloud – Direct and Indirect Cloud Costs – Calculating Total cost of Ownership for Cloud Computing – Cost Allocations in a Cloud . AAA administration for clouds : The AAA Model, Single Sign-on for Clouds – Industry Implementations for AAA- Authentication management in the Cloud – Authorization management in the Cloud .
Unit-5	**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– Cloud Applications : What Not to do - 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 – Mobile Cloud Computing Challenges.

TextBooks

	Author	Title	Publisher
1	Kailash Jayaswal, Jagannath Kallakurchi, Donald J. Houde Dr. Deven Shahh	Cloud Computing, Black Book	Dreamtech press

Reference Books

	Author	Title	Publisher
1	Thomas Erl, Zaigham Mahmood, Ricardo Puttini	Cloud Computing - Concepts Technology and Architecture	Pearson

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Couse:	Semester:	Title of The Course:	Course Code:	W.E.F
MCA	III	INTERNET OF THINGS	R20MCA304b	2020-21

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	-		30	70	

Course Objectives:

1. To interconnect and integrate the physical world and the cyber space.
2. To design & develop IOT Devices.
3. To Identify the Components that forms part of IoT Architecture
4. To Determine the most appropriate IoT Devices and Sensors based on Case Studies.
5. To Setup the connections between the Devices and Sensors

Course Outcomes:

1. Evaluate the appropriate protocol for communication between IoT
2. Analyse the communication protocols for IoT
3. Able to understand the application areas of IOT ·
4. Able to realize the revolution of Internet in Mobile Devices, Cloud & Sensor Networks ·

Details of the Syllabus

Unit-1	**IoT Ecosystem Concepts and Architectures :** Internet of Things Definition Evolution : IoT Emergence – Internet of Everything – Industrial IoT – Smartness in IoT; IoT Architectures:SOA based architecture, API Oriented Architecture; Resource Management: Resource Partitioning – Computation Offloading – Identification and Resources/Service discovery; IoT Data Management and Analytics: IoT and the Cloud – Real time analysis in IoT and Fog Computing ; Communication Protocols : Network Layer (RFID, IEEE 802.11, WPAN, M2M, IPV4, IPV6)– Transport and Application Layer(UDP,TCP); Internet of Things Applications- Monitoring and Actuating - Business process and Data Analysis – Information Gathering and collaborative consumption . Open Source Semantic Web Infrastructure for Managing IoT Resources in the Cloud : Open IoT Architecture for IoT/Cloud Convergence, Scheduling process and IoT life cycle, Scheduling and Resource Management
Unit-2	**Fog Computng :** Introduction – Definition and Characteristics – Reference Architecture – Applications : Health Care – Augmented Reality – Caching and Reprocessing. IoT Enablers and Solutions : Embedded Device Programming Languages (nesC ,Keil C ,Dynamic C, B#) – Message Passing in Devices(RPC, REST, CoAP) – Coordination Languages(Linda and Elinda , Orc, Jolie) – Polyglot Programming – IoT Approaches –Existing IoT Frameworks.
Unit-3	**IoT Data Knowledge and Management :** The Foundations of Stream Processing in IoT , Continuous Logic Processing SystemFramework for Distributed Data Analysis : Preliminaries - Anomaly Detection– Problem statement and Definitions – Distributed Anomaly Detection – Efficient Incremental Local Modelling).
Unit-4	**Governing IoT: IoT Governance :** Overview - An Integrated Governance Idea – Governance Models – Important Governance Issues – Existing Approaches – New Paradigms . IoT Applications: Applied Internet of Things : Scenario – Architecture Overview – Sensors – The Gateway – Data Transmission.
Unit-5	**Case Study :** Socket Programming , Developing a simple Math Server; Internetof Things: Programming IoT Devices, Web Services and IoT Clients

TextBooks

	Author	**Title**	**Publisher**
1	Rajkumar Buyya	Internet of Things , Principles and Paradigms	Elsevier

	& Amir Vahid Dastjerdi Morgan Kaufmann	(Topics : 1.2.1,1.2.2,1.2.3,1.2.4,1.3,1.4,1.5,1.6,1.7,2.3,2.4,2.5, 4.1,4.3,4.4,4.5, 5.2.2, 5.2.3, 5.2.4,5.2.5,5.3.2, 5.3.3, 8.2,8.3, 9.2,9.3,9.4,9.5,9.6, 12.3,15.2, 15.3,15.4,15.5,15.6).	

Reference Books

	Author	**Title**	**Publisher**
1	Socket Programming	Raj kumar buyya	Pearson

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Couse:	Semester:	Title of The Course:	Course Code:	W.E.F
MCA	III	MACHINE LEARNING	R20MCA304c	2020-21

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	-	3 Hours	30	70	3

COURSE OBJECTIVES:

- Be able to formulate machine learning problems corresponding to different applications.
- Understand a range of machine learning algorithms along with their strengths and weaknesses.
- Understand the basic theory underlying machine learning.
- Be able to apply machine learning algorithms to solve problems of moderate complexity.
- Be able to read current research papers and understand the issues raised by current research.

COURSE OUTCOMES:

- Have a good understanding of the fundamental issues and challenges of machine learning: data, model Selection, model complexity, etc.
- Have an understanding of the strengths and weaknesses of many popular machine learning approaches.
- Appreciate the underlying mathematical relationships within and across Machine Learning algorithms and the paradigms of supervised and un-supervised learning.
- Be able to design and implement various machine learning algorithms in a range of real-world applications

Details of the Syllabus

Unit-1	**Introduction-** Association, Supervised Learning – Classification – Regression, Unsupervised Learning, Reinforcement Learning**.**
Unit-2	**Decision Tree** - Divide and Conquer - Classification Trees (ID3, CART, C4.5) - Best Split - Regression Trees - Pruning Trees - Rule Extraction from Trees - Learning Rules - Multivariate Trees, Naive Bayes Classifier. **Neural networks** - Perceptron - Training a Perceptron: Regression - Learning

	Boolean AND – XOR - Multilayer Perceptrons – Backpropagation - Multiple Hidden Layers - and support vector machines
Unit-3	**Clustering** - Semiparametric Density Estimation- Mixture Densities - Classes vs. Clusters - k-Means Clustering - Expectation-Maximization (EM) – Hierarchical Clustering - Agglomerative Clustering. Dimensionality Reduction - Feature Selection vs Extraction - Subset Selection - Principal Components Analysis (PCA) - Factor Analysis - Multidimensional Scaling - Linear Discriminant Analysis - Fisher's Linear Discriminant - Isomap, kernel methods
Unit-4	**Parametric learning** - Maximum Likelihood Estimation - Gaussian (Normal) Distribution - Bias and Variance - Bayes' Estimator - Parametric Classification - Regression - Linear Regression - Polynomial Regression - Bayesian Model Selection, Nonparametric learning - Density Estimation - Kernel Estimator - k-Nearest Neighbor Estimator**.** .
Unit-5	**Case Study :** Socket Programming , Developing a simple Math Server; Internetof Things: Programming IoT Devices, Web Services and IoT Clients

TextBooks

	Author	**Title**	**Publisher**
1	Rajkumar Buyya & Amir Vahid Dastjerdi Morgan Kaufmann	Internet of Things , Principles and Paradigms (Topics : 1.2.1,1.2.2,1.2.3,1.2.4,1.3,1.4,1.5,1.6,1.7,2.3,2.4,2.5, 4.1,4.3,4.4,4.5, 5.2.2, 5.2.3, 5.2.4,5.2.5,5.3.2, 5.3.3, 8.2,8.3, 9.2,9.3,9.4,9.5,9.6, 12.3,15.2, 15.3,15.4,15.5,15.6).	Elsevier

Reference Books

	Author	**Title**	**Publisher**
1	Socket Programming	Raj kumar buyya	Pearson

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Couse:	Semester:	Title of The Course:	Course Code:	W.E.F
MCA	III	DISTRIBUTED COMPUTING	R20MCA304d	2020-21

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	-	3 Hours	30	70	3

Course Objectives:

1. To provide hardware and software issues in modern distributed systems.
2. To get knowledge in distributed architecture, naming, synchronization.
3. To get understanding about consistency and replication, fault tolerance, security, and distributed file systems.
4. To analyze the current popular distributed systems such as peer-to-peer (P2P) systems will also be analyzed.
5. To know the distributed services such as world wide web.

Course Outcomes:

1. Able to provide hardware and software issues in modern distributed systems.
2. Get knowledge in distributed architecture, naming, synchronization, consistency and replication, fault tolerance, security, and distributed file systems.
3. Analyse the current popular distributed systems such as peer-to-peer (P2P) systems will also be analyzed.
4. Know about Shared Memory Techniques.
5. Able to research and commercial distributed systems.

Details of the Syllabus

Unit-1	**Process Synchronization-** Design Approaches, Types of Advanced Operating Systems. Distributed Resource Management- Mechanisms for Building Distributed File Systems, Design Issues
Unit-2	**Distributed Scheduling-** Issues in Load Distributing, Components of a Load Distributing Algorithms, Load Distributing Algorithms**.**
Unit-3	**Multiprocessor System Architecture**- Basic Multiprocessor System Architectures, Interconnection Networks for Multiprocessor Systems. **Multiprocessor Operating Systems**- Structures of Multiprocessor Operating Systems, Operating System Design Issues, Threads, Issues in Process Synchronization, Issues in Processor Scheduling.
Unit-4	**Database Operating Systems**- Database systems, A Concurrency Model of Database Systems, The Problem of Concurrency Control, Distributed Database Systems
Unit-5	**Concurrency Control Algorithms**- Basic Synchronization Primitives, Lock Based Algorithms, Timestamp Based Algorithms.

TextBooks

	Author	**Title**	**Publisher**
1	Mukesh Singhal, Niranjan G. ShivaRatri	Advanced Concepts in Operating Systems	Mc Graw Hill Education, Indian Edition

Reference Books

	Author	**Title**	**Publisher**
1	Andrew S. Tanenbaum	Distributed Operating Systems	Prentice Hall

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Couse:	Semester:	Title of The Course:	Course Code:	W.E.F
MCA	III	SOFTWARE TESTING AND FAULT ANALYSIS	R20MCA305a	2020-21

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	-	3 Hours	30	70	3

Course Objectives

1. To study fundamental concepts in software testing, including software testing objectives, process, criteria, strategies, and methods.
2. To discuss various software testing issues and solutions in software unit test; integration, regression, and system testing.
3. To learn how to planning a test project, design test cases and data, conduct testing operations, manage software problems and defects, generate a testing report.
4. To expose the advanced software testing topics, such as object-oriented software testing methods, and component-based software testing issues, challenges, and solutions.

Course Learning Outcomes

At the end of this course student will:

1) List a range of different software testing techniques and statergies and be able to apply specific(automated) unit testing method to the projects.

2) Distinguish characterstics of structural testing methods.

3) Demonstrate the integration testing which aims to uncover interaction and compatibility problems as early as possible

Details of the Syllabus

Unit-1	**Introduction :** Some Software Failures, Testing Process, Terminologies, Limitations of Testing, The V Shaped Software Life Cycle Model Software Testing Activities : Levels of Testing : Unit Testing, Integration Testing, System Testing, Acceptance Testing; Debugging, Software Testing Tools, Software Test Plan
Unit-2	**Software Verification :** Verification Methods, SRS Document Verification, SDD Document Verification, Source Code Reviews, User Documentation Verification Metrics and Models in Software Testing: Software Metrics, Categories of Metrics, Object Oriented Metrics used in Testing, What should we measure during Testing.
Unit-3	**Functional Testing :** Boundary Value Analysis, Equivalence Class Testing, Decision Table Based Testing, Cause-Effect Graphing Technique.
Unit-4	**Structural Testing :** Control Flow Testing, Data Flow Testing, Slice Based Testing, Mutation Testing
Unit-5	**Object Oriented Testing:** What is Object Orientation? , What is Object Oriented Testing? , Path Testing, State based Testing, Class Testing

TextBooks

	Author	**Title**	**Publisher**
1	Yogesh Singh	Software Testing	Cambridge University

Reference Books

	Author	**Title**	**Publisher**
1	Aditya P.Mathur	Foundations of Software Testing	2nd Edition, Pearson Education

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Couse:	Semester:	Title of The Course:	Course Code:	W.E.F
MCA	III	DNA COMPUTING	R20MCA305b	2020-21

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	-		30	70	

Course Objectives:

- To learn how bioinformatics data is stored and organised
- To learn about the different types of data found at the NCBI and EBI resources ●
- To learn about to DNA,and RNA Sequencing.

Course Outcomes:

At the End of the Course Student will

- Able to provide hardware and software issues in modern distributed systems.
- Get knowledge in DNA,RNA, naming, synchronization, consistency and replication, fault tolerance, security, and distributed file systems.
- Analyse the current popular distributed systems such as peer-to-peer (P2P) systems will also be analyzed.
- Know about Shared Cryptography Techniques.
- Able to research and commercial distributed systems.

Details of the Syllabus

Unit-1	**Computing Paradigms:** High Performance computing, Parallel Computing, Distributed Computing, Grid Computing, Cloud Computing, Quantum Computing, DNA Computing
Unit-2	Introduction to DNA, Structure of DNA, Introduction to RNA, difference between DNA and RNA, Splicing System, Polymerase chain reaction, Gel Electophoresis, Protein Synthetization- Codons, Proteins, DNA Codon table
Unit-3	**Introduction to DNA Computing,** NP Hard and NP Complete Problems, Adelman Hamiltonian Problem, 3-SAT Problem. Theoretical Development: Splicing systems, Sticker Systems, Watson Crick Automata.
Unit-4	Cryptography, Traditional Cryptography advantages & disadvantages, quantum Cryptography advantages & disadvantages, DNA Cryptography advantages & disadvantages.
Unit-5	Symmetric Key Cryptography using DNA, Public Key. Implementation of DESusing DNA, DNA ASCII Table Cryptography using DNA

TextBooks

	Author	**Title**	**Publisher**
1	W. Stallings2009	Cryptography and Network Security: Principles and Practices	4thedition, Pearson Education, Prentice Hall, NJ

Reference Books

	Author	**Title**	**Publisher**
1	J.D.Watson2004	Foundations of Software Testing	2nd Edition, Pearson Education

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Couse:	Semester:	Title of The Course:	Course Code:	W.E.F
MCA	III	SOFTWARE PROJECT MANAGEMENT	R20MCA305c	2020-21

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	-	3 Hours	30	70	3

Course Objectives

1. To make them understand the concepts of Project Management for planning to execution of projects.
2. To make them understand the feasibility analysis in Project Management and network analysis tools for cost and time estimation.
3. To enable them to comprehend the fundamentals of Contract Administration, Costing and Budgeting.
4. Make them capable to analyze, apply and appreciate contemporary project management tools and methodologies in Indian context.

Course Outcomes:

1. Identify the different project contexts and suggest an appropriate management strategy.
2. Practice the role of professional ethics in successful software development.
3. Identify and describe the key phases of project management.
4. Determine an appropriate project management approach through an evaluation of the business context and scope of the project.

Details of the Syllabus

Unit-1	**Managing Software Project**: Process & Project Management, Project Management and the CMM, Project Management at Infosys, Introduction toCMMI, PCMM.The Project Planning Infrastructure: The process data base, The process capability Baseline, Process Assets and the Body of Knowledge System
Unit-2	**Process Planning**: The Infosys Development Process, Requirement Change Management **Effort Estimation & Scheduling**: Estimation and Scheduling Concepts, Effort – Estimation, Scheduling.

Unit-3	**Quality Planning:** Quality Concepts, Quantitative quality Management Planning, Defect Prevention Planning**.** **Risk Management:** Concepts of Risks and Risk Management, Risk Assessment, Risk Control, Examples**..**
Unit-4	**Measurement and Tracking Planning**: Concepts in measurement, Measurements, Project tracking. **Project Management Plan**: Team Management, Customer Communication and Issue Resolution, Structure of the Project Management Plan. .
Unit-5	**Configuration Plan**: Concepts in Configuration Management, Configuration Management Process. **Reviews**: The Reviews, Review process Data Collection, Monitoring & Control, Introduction of Reviews & the NAH Syndrome

	Author	**Title**	**Publisher**
1	Pankaj Jalote	Software Project Management in Practice	Pearson Education, New Delhi, 2002

Reference Books

	Author	**Title**	**Publisher**
1	B.Huges and M.Cotterell	Software Project Management, 3/e	Tata Mcgraw Hill, New Delhi

OPEN ELECTIVE

Class:	Semester:	Title of The Paper:	Paper Code:	W.E.F
MCA	III	WATER ANALYSIS (OPEN ELECTIVE-II)	R20MCAOE306	2020-21

Syllabus

Total No of Hours for Teaching - Learning	Instructional Hours Per 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 Learning Objective(S):
The main objective of this paper is to give a basic and updated knowledge for the students on water analysis.
Course Learning Outcome(S): After studying this paper, students will acquire the knowledge of water analysis.

Unit-I

Water quality parameters and their determination: Physical, chemical and biological standards significance of these contaminants over the quality and their determinations - Electrical conductivity - turbidity - pH, total solids, TDS - alkalinity - hardness - chlorides - DO - BOD- COD - TOC - nitrate –sulphate-fluoride - iron - arsenic - mercury/Algal analysis plankton analysis - biomass and chlorophyll estimation – microbial examination -standard plate count - MPN of coliforms - estimation of MPN – bioassay - requirements of bioassay.

Unit-II

Ground water and surface water pollution and control measures: Surface water and ground water pollution - Harmful effects-pollution of major rivers – protecting ground water from pollution - ground water pollution due to Fluoride, Iron, Chromium and Arsenic sources, ill effects and treatment methods. Water pollution control-stabilization of the ecosystem – waste treatment reclamation - various approaches to prevent and control water pollution.

Unit-III

Water treatment methods: Treatment for community supply - screening, sedimentation, coagulation, filtration - removal of microorganisms - chlorination, adding bleaching powder, UV irradiation and ozonation. Demineralization of water for industrial purposes - boiler problems - scale and sludge formation - prevention of scale formation, internal and external treatment - lime soda - zeolite process.

Unit-IV

Sewage and industrial effluent treatment: Sewage - characteristics – purpose of sewage treatment - methods of sewage treatment - primary - secondary and tertiary – Role of algae in sewage treatment. Types of industrial wastes - treatment of effluents with organic and inorganic impurities - treatment of waste waters from specific industries - pulp and paper - chemical industry - food processing-water hyacinth in the treatment of industrial effluents.

Unit-V

Water Management: Water resources management - rain water harvesting methods - percolation ponds - check darns - roof top collection methods – water management in industries - recycling and reuse of waste water - metal recovery from metal bearing waste water - recovery of zinc and nickel.

Reference books:

1. Chemical and Biological Methods for Water Pollution Studies, R.K. Trivedy and P.K. Goel, Environmental Publications, 1986.
2. Engineering Chemistry, P.C. Jain and Monica Jain, Dhanpat Rai & Sons, 1993.
3. Environmental Chemistry, B.K. Sharma, Goel Publishing House, 2001.
4. Water Quality and Defluorination Techniques, Rajiv Gandhi National Drinking Water Mission Publication, 1994.

MCA Semester: III

Paper Title with paper code: R20MCA 307: BIG DATA ANALYTICS LAB

List of Experiments

1. Installation of Hadoop modes.
2. File Management tasks in Hadoop.
3. Run a basic word count Map Reduce program to understand Map Reduce Paradigm.
4. Write a Map Reduce program that mines weather data.
5. Implement matrix multiplication with Hadoop Map Reduce.
6. Installation of PIG.
7. Write Pig Latin scripts sort, group, join, project, and filter your data.
8. Run the Pig Latin Scripts to find Word Count.
9. Run the Pig Latin Scripts to find a max temp for each and every year.

MCA Semester: III

Paper Title with paper code: R 20MCA 308: SCIENTIFIC AND TECHNICAL WRITING LAB AND MINI PROJECT

List of Experiments

1. Study and prepare General Writing
2. Study and prepare Scientific/technical Writing
3. Study the role of language in writing technical papers
4. Study the different styles of technical writing
5. Study of literature review in writing technical papers
6. Prepare scientific reports based on an experiment.
7. Prepare different standards to recognize a technical document
8. Prepare a sample article for publication
9. Study and Prepare the process of writing and publishing an article or paper
10. Study and Prepare Sample abstract of a research paper source
11. Study and Prepare aspects of various types of scientific/technical document
12. Study and Prepare samples of different scientific and technical reports

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MODEL QUESTION PAPER (w.e.f: 2020-21)

MCA: III Semester

R 20MCA 301: BIG DATA ANALYTICS

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

Answer All Questions

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

1. A)Explain different Types of digital data: Unstructured, Semi-structured and Structured.

(OR)

B) Explain Need and Challenges in Big Data Environment?

UNIT – II

2. B) What is Business Intelligence? List different business Intelligence applications with a suitable example.

(OR)

B) Explain Classification of Analytics with suitable example.

UNIT – III

3. A) Describe characteristics of a NoSQL database.

(OR)

B) Explain the types of NoSQL Data Stores in detail.

UNIT – IV

4. A) Explain Hadoop architecture and its components with proper Diagram

(OR)

B) Explain the essentials of Hadoop Ecosystem.

UNIT – V

5. A) Explain working of the following phases of Map Reduce with one common example (i) Map Phase (ii) Combiner phase (iii) Shuffle and Sort Phase (iv) Reducer Phase.

(OR)

B) Explain HDFS commands

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MODEL QUESTION PAPER (w.e.f: 2020-21)

MCA: III Semester

R 20MCA 302: MOBILE COMPUTING

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

Answer All Questions

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

1. A) Explain limitations of Mobile Computing and issues related to Mobile Computing Systems.

(OR)

B) Explain about Android and Blackberry OS and its features?

UNIT – II

2. B) Explain about Multiplexing..

(OR)

B) Explain briefly about CDMA.

UNIT – III

3. A) Explain GSM Architecture in detail..

(OR)

B) Explain data services in GPRS.

UNIT – IV

4. A) Explain about Snooping TCP and Mobile TCP.

(OR)

B) Explain about Selective retransmission and Transaction oriented TCP

UNIT – V

5. A) Explain advantages of wireless LAN

(OR)

B) Explain HDFS commands

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MODEL QUESTION PAPER (w.e.f: 2020-21)
MCA: III Semester
R 20MCA 303: ARTIFICIAL INTELLIGENCE

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

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

UNIT-1

1. A) What are the Problem Characteristics of Artificial Intelligence?

(OR)

B) Explain the state space search representation of water jug problem

UNIT – II

2. B) Explain Resolution in predict logic with suitable example..

(OR)

B) Differentiate between Forward Reasoning and Backward Reasoning. Explain with a suitable example.

UNIT – III

3. A) Write different advantages and disadvantages of Depth First Search and Breath First Search..

(OR)

B) Provide relational structures for weak slot and filler structures. Compare their merits and demerits.

UNIT – IV

4. A) Explain Goal stack planning with Block world problem example.

(OR)

B) Explain different steps in Natural Language Processing

UNIT – V

5. A) What is an Expert system? What are the main advantages in keeping the knowledge base separate from the control module in the knowledge base system?

(OR)

B) Explain about Case based reasoning with a suitable example

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MODEL QUESTION PAPER (w.e.f: 2020-21)
MCA: III Semester
R 20MCA 304a: CLOUD COMPUTING

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

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

UNIT-1

1. A) Explain virtualization mechanisms?

(OR)

B) Write about peer-to-peer network families

UNIT – II

2. B) Explain cloud computing services..

(OR)

B) Explain open-source Eucalyptus Cloud Architecture.

UNIT – III

3. A) Explain NOSQL system..

(OR)

B) Explain fundamental requirements for Cloud Application Architecture.

UNIT – IV

4. A) Explain Authentication management in the cloud.

(OR)

B) What is utility computing? Explain utility model for cloud web services

UNIT – V

5. A) Explain how to manage a Cloud Application?

(OR)

B) Write about Mobile Cloud Computing Challenges

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MODEL QUESTION PAPER (w.e.f: 2020-21)
MCA: III Semester
R 20MCA 304b: INTERNET OF THINGS

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

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

UNIT-1

1. A) Discuss the role of open IOT Architecture for IOT/Cloud convergence?

(OR)

B) Distinguish between SOA based and API oriented IOT Architectures.

UNIT – II

2. B) Briefly explain about Fog Computing..

(OR)

B) Describe the embedded device programming languages. Explain message passing in devices.

UNIT – III

3. A) Explain in detail about continuous logic processing system..

(OR)

B) What is Distributed Anomaly Detection? Write the efficient incremental local modeling process.

UNIT – IV

4. A) Briefly discuss about various IOT Governance models..

(OR)

B) Write short note on IOT-scenario, sensors and the gateway.

UNIT – V

5. A) Explain all the basic operations of a system that handles communication between web services and IOT clients?

(OR)

B) How to develop a simple Math server?

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MODEL QUESTION PAPER (w.e.f: 2020-21)

MCA: III Semester

R 20MCA 304c: MACHINE LEARNING

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

Answer All Questions

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

UNIT-1

1. A) What are classifications Models? Explain in detail.?

(OR)

B) What are the elements of Reinforcement learning?.

UNIT – II

2. A) Write ID3 decision tree algorithm and explain with a suitable example..

(OR)

B)What is a Neural Network? Explain hidden layer with a suitable example

UNIT – III

3. A) Explain K-means clustering with a suitable example..

(OR)

B) Explain in detail about Principal Component Analysis for dimensionality reduction.

UNIT – IV

4. A) Explain in detail about the following

(i) Linear Regression (ii) Polynomial Regression..

(OR)

B) Discuss about the K-nearest neighbor estimator.

UNIT – V

5. A) Explain about Model based learning with Example?

(OR)

B) Discuss learning task and Q learning in the context of reinforcement learning

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MODEL QUESTION PAPER (w.e.f: 2020-21)
MCA: III Semester
R 20MCA 304d: DISTRIBUTED COMPUTING

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

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

UNIT-1

1. A) Classify the Advanced Operating Systems and explain the salient features of each.?

(OR)

B) Briefly explain the design issues of Distributed File Systems?.

UNIT – II

2. A) Explain different issues of load Distribution..

(OR)

B) Discuss various components of Load Distributing Algorithms

UNIT – III

3. A) Explain Multiprocessor System Architecture..

(OR)

B) Explain issues in Processor Scheduling

UNIT – IV

4. A)Explain Distributed Database Systems

(OR)

B) Explain briefly Concurrency control model of Database Systems

UNIT – V

5. A) Explain Timestamp based and Optimistic Algorithms for concurrency control.?

(OR)

B) Explain basic primitives of Synchronization

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MODEL QUESTION PAPER (w.e.f: 2020-21)
MCA: III Semester
R 20MCA 305a: SOFTWARE TESTING AND FAULT ANALYSIS

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

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

UNIT-1

1. A) List various software faults, failures and their consequences

(OR)

B) Explain the V-Shaped software life cycle model in detail.

UNIT – II

2. A) How to verify the SDD document? Discuss issues involved in verification of SDD document..

(OR)

B) List and explain various object oriented metrics used in testing

UNIT – III

3. A) Discuss about decision table based testing with an example..

(OR)

B) Consider a program for determination of largest among three numbers X,Y,Z where thevalues of X, Y, Z lies in the interval [1,300]. Prepare the test cases for robustness testing

UNIT – IV

4. A) What is path testing? Explain with an example

(OR)

B) Describe the strategies of data flow testing in detail

UNIT – V

5. A) What is object oriented testing? Explain various techniques used to test object oriented software.?

(OR)

B) Explain state based testing ad class based testing with examples

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MODEL QUESTION PAPER (w.e.f: 2020-21)
MCA: III Semester
R 20MCA 305b: DNA COMPUTING

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

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

UNIT-1

1. A) Explain the components in Cloud Computing

(OR)

B) Explain the Computing Paradgims.

UNIT – II

2. A) Explain the concept of Protein Synthetization..

(OR)

B) Explain the structured Codon Table

UNIT – III

3. A) Explain the theoretical model of Hamiltonian Path Problem solved by Adleman..

(OR)

B) Explain about NP Hard and NP Complete Problems

UNIT – IV

4. A) Differentiate between Traditional Cryptography and DNA Cryptography

(OR)

B) Describe the strategies of data flow testing in Differentiate between Quantum Cryptography and DNA Cryptographydetail

UNIT – V

5. A) Explain the concept of Public Key Cryptography

(OR)

B) Explain about the implementation of DES using DNA

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MODEL QUESTION PAPER (w.e.f: 2020-21)
MCA: III Semester
R 20MCA 305c: SOFTWARE PROJECT MANAGEMENT

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

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

UNIT-1

1. A) Explain process and project management in detail

(OR)

B) Explain process assets and the body of knowledge system..

UNIT – II

2. A) Explain Infosys development process.

(OR)

B) Briefly explain estimation and scheduling concepts

UNIT – III

3. A) Explain Defect prevention planning..

(OR)

B) Write a short note on risk assessment and risk control

UNIT – IV

4. A) Explain in detail the concepts in measurement.

(OR)

B) Explain the structure of the project management plan

UNIT – V

5. A) Briefly explain Configuration Management Process

(OR)

B) Explain NAH Syndrome

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Couse:	Semester:	Title of The Course:	Course Code:	W.E.F
MCA	IV	MOBILE APPLICATIONS	R20MCA402	2020-21

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	-		30	70	

Course Objectives:

- To make the students understand the basics of Mobile Applications.
- To expose students to the Mobile Android APPs.
- To make the students understand the skills in augmenting different types of OS.

Course Outcomes:

- The Student will be able to design Android APP
- The Student will develop J2me Code

R20MCA402: MOBILE APPLICATIONS

Details of the Syllabus

Unit 1	**Getting Started with Android Programming:** The Android Versions, Features of Android, Architecture of Android, Android Devices in the Market, Android Studio, Android SDK, Creating Android Virtual Devices, The Android Developer Community, Launching your first Android Application. Using Android Studio for Android Development: Exploring the IDE, using code completion, Debugging your Application, Publishing your application.
Unit 2	**Understanding Activities**: Life cycle of an Activity, Applying Styles and Themes to activity, Hiding Activity Title, Displaying Dialog window, Progress Dialog. Link Activities using Intents: Returning results from an Intent, Passing data using Intent object Fragments: Adding Fragments Dynamically, Life cycle of fragments, Interactions between fragments, understanding the Intent object, Intent filters.
Unit 3	**Getting to know the Android User Interface**: Understanding components of a screen, Adapting to display orientation, Managing changes to screen orientation, Utilizing the Action Bar, Creating the user interface programmatically, and Listening for UI notifications. Designing User Interface with Views : Using Basic Views, Picker Views, List Views, List Fragment, Dialog Fragment, Preference Fragment , using Image Views, using Menus, using web view
Unit 4	**Data Persistence** : Saving and Loading user preferences, Persisting data to Files, Creating and Using Databases Content Providers : Sharing Data In Android, Using Content Provider, Creating And Using Your Own Content Providers Multimedia : Playing Audio and Video, Recording Audio, Recording Video
Unit 5	**Telephony Exploring Telephony background and terms** — Accessing telephony information — Interacting with Phone - working with SMS Messaging Notifications and Alarms : Introducing Toast, Placing your Toast message, Making a custom toast, Introducing Notifications, Making custom Notifications, Introducing Alarms — Creating a simple alarm example. Email and Location Based Services — Sending Email , Displaying Maps , Getting Location Data, Monitoring a Location

Text books:

	Author	Title	Publishers
1	Beginning Android Programming With Android Studio	J.F.Dimarzio (Chapters 1,2,3,4,5,6,7,8,9,1)Wrox Fourth edition	John wiley &sons inc
2	W.Frank,Ableson,Robisen,Chrisking,C.Enrique Ortiz.	Android in action (Chapters :7,8,10)	Manning publications

Reference books:

	Author	Title	Publisher
1	MuratYener,OnurDundar, wrox edition	Expert Android Studio	John Wiley & Sons Inc,
2	J.Paul Cradle	Android App Development in Android Studio , Java + Android Edition for Be innners	Manchester Academic Publishers

KAKARAPARTI BHAVANARAYANA COLLEGE: PG CENTRE
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Couse:	Semester:	Title of The Course:	Course Code:	W.E.F
MCA	IV	DATA SCIENCE USING PYTHON	R20MCA403	2020-21

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	-		30	70	

Course Objectives:

- To make the students understand the basics of Numpy.
- To make the students understand the basics of Pandas.
- To make the students understand the basics of Matplotlib.
- To make the students understand the basics of Sklearn.
- To make the students understand the basics of Scipy.

Course Outcomes:

- The Student will understand the objects and Data Interpretation using Numpy
- The Student will understand the objects and Data Interpretation using Pandas
- The Student will understand Graphs using Matplotlib
- The Student will understand the Machine learning models using sklearn

R20MCA403: DATA SCIENCE USING PYTHON

Details of the Syllabus

Unit 1	**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 2	**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, Pivot Tables, Vectorized String operations, High-Performance Pandas.
Unit 3	**Visualization with Matplotlib** — General Matplotlib Tips, Simple Line Plots, Simple Scatter Plots, Visualizing Errors, Density and Contour Plots, Histograms, Binnings, and Density.
Unit 4	**Customizing Matplotlib** — Customizing Plot Legends, Customizing Colorbars, Text and Annotation, Customizing Matplotlib, Three-Dimensional Plotting in Matplotlib, Visualization with Seaborn.
Unit 5	**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

	Author	Title	Publisher
I	Jake VanderPIas	Python Data Science Handbook	OReilly

Reference books

	Author	Title	Publisher
I	Peters Morgan	Data Analysis From Scratch WithPython:Beginner Guideusing Python ,Pandas, NumPy,Scikit-Learn, IPython,TensorFIowand Matplotlib	Al Sciences LLC

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Couse:	Semester:	Title of The Course:	Course Code:	W.E.F
MCA	IV	INTERNET OF THINGS	R20MCA404	2020-21

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	-		30	70	

Course Objectives:

- To make the students understand the basics of IOT.
- To make the students understand the basics of Network Protocols
- To make the students understand the basics of Fog Computing

Course Outcomes:

- The student will be able to Case Study on Socket Programming
- To make the students understand the basics of Rest Web Services
- To make the students understand the Integration of IOT with Programming Languages

R20MCA404: INTERNET OF THINGS

Details of the Syllabus

Unit I	**IOT Ecosystem Concepts and Architectures**: internet of Things Definition Evolution : IOT Emergence — Internet of Everything — Industrial IOT — Smartness inIOT; 10T Architectures:SOA based architecture, API Oriented Architecture; Resource Management: Resource Partitioning — Computation Offloading Identification and Resources/Service discovery; IOT Data Management and Analytics: 10T and –tlw Cloud — Real time analysis in IOT and Fog Computing Communicatior Ñrotocols . Network Layer (RFD, IEEE 802.1 1, WPAN, M2M, IPV4, IPV6)— Transport and Application Layer(UDP,TCP); Internet of Things Applications- Monitoring and Actuating - Business process and Data Analysis — Information Gathering and collaborative consumption **Open Source Semantic Web Infrastructure for Managing 10T Resources in the Cloud :** Open IOT Architecture for loT/Cloud Convergence, Scheduling process and 10T life cycle, Scheduling and Resource Management
Unit 2	**Fog Computing** Introduction — Definition and Characteristics — Reference Architecture — Applications : Health Care — Augmented Reality — Caching and Reprocessing. **IOT Enablers and Solutions** : Embedded Device Programming Languages (nesc ,Keil C Dynamic C, - Message Passing in Devices(RPC, REST, CoAP) Coordination Languages(Linda and Elinda , Orc, Jolie) — Polyglot Programming — IOT Approaches —Existing IOT Frameworks.
Unit 3	**IOT Data Knowledge and Management :** The Foundations of Stream Processing in 10T , Continuous Logic Processing System **Framework for Distributed Data Analysis :** Preliminaries - Anomaly Detection Problem statement and Definitions Distributed Anomaly Detection Efficient Incremental Local Modelling

Unit 4	**Governing IOT:** 10T Governance : Overview - An Integrated Governance Idea — Governance Models — Important Governance Issues — Existing Approaches — NewParadigms . **IOT Applications: Applied Internet of Things** : Scenario — Architecture Overview — Sensors — The Gateway — Data Transmission.
Unit 5	**Case Study** : Socket Programming , Developing a simple Math Server; Internet of Things: Programming IOT Devices, Web Services and IOT Clients

Text Books

	Author	Title	Publisher
	Rajkumar Buyya & Amir Vahid Dastjerdi Morgan Kaufmann	Internet of Things , Principles and Paradigms (Topics : 1.2. I , I 4.1,4.3,4.4,4.5, 5 .2.2, 5,1.6,1.7,2.3,2.4,2.5, 5.2.4,5.2.5,5.3.2, 1.2.3, I 9.2,9.3,9.4,9.5,9.6, .2.4, I .3, I .4, I .5, 1.6, I 52.2, 5.2.3, 5.3.3, 8.2,8.3, 12.3,15.2 15.3, 15.4, 15.5, 15.6 .	Elsevier
2.	**Web Reference :** https://www.codeproject.com/Articles/853183/1nternet-of-ThingsProgramming-IoT-Devices-Web-Ser		
3.	**Socket Programming** - Raj kumar buyya (Chapter 13)		

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MODEL QUESTION PAPER (w.e.f: 2020-21)
I MCA: IV Semester
R20MCA402: Mobile Applications

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

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

5*14=70

Unit-1

1) A) Explain the Android Architecture in detail.

(Or)

B) Explain how to debug and publish an application in Android.

Unit-2

2) A) Explain the life cycle of an activity.

(Or)

B) Explain the procedure to create a login form using linear layout.

Unit-3

3) A) Explain various picker views with an example.

(Or)

B) Explain how to use preference fragment and list fragment with an example.

Unit-4

4) A) With a neat procedure, explain how to play audio and video files in Android Application.

(Or)

B) What is a content provider? Explain with an example.

Unit-5

5) A) What is Notification? Explain various techniques to implement Notifications.

(Or)

B) With neat procedure, explain how to obtain the current location of user in Android Application.

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MODEL QUESTION PAPER (w.e.f: 2020-21)

I MCA: IV Semester

R20MCA403: Data Science Using Python

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

Answer All Questions

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

5*14=70

Unit-1

1) A) What are the features of Numpy Library?

(Or)

B) What are the advantages of Numpy arrays over python arrays and lists?

Unit-2

2) A) Explain data index and selection in pandas.

(Or)

B) Explain string operations in pandas with examples.

Unit-3

3) A) How to create a Simple Line Plots with Matplotlib.

(Or)

B) Explain the steps to create Histograms with Matplotlib.

Unit-4

4) A) Explain three-dimensional plotting.

(Or)

B) How to use seaborne Data Visualization in Matplotlib.

Unit-5

5) A) Briefly explain categories of Machine Learning.

(Or)

B) Explain Naïve Bayes classification.

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MODEL QUESTION PAPER (w.e.f: 2020-21)
I MCA: IV Semester
R20MCA404: Internet of Things

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

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

5*14=70

Unit-1

1) A) Discuss the role of open IOT architecture for IOT/cloud convergence.

(Or)

B) Distance between SOA based and API oriented IOT architecture.

Unit-2

2) A) Briefly Explain about fog computing.

(Or)

B) Describe the embedded device programming languages, Explain message passing in devices.

Unit-3

3) A) Explain in detail about continuous logic processing system.

(Or)

B) What is distributed Anomaly detection? Write the efficient incremental local modeling processing.

Unit-4

4) A) Briefly discuss about various IOT governance models.

(Or)

B) Write shot note on IOT-Scenario, sensors and gateway.

Unit-5

5) A) Explain all the basic operations of a system that handles communication between web services IOT clients.

(Or)

B) How to develop a simple Math sever?