KRISHNA UNIVERSITY::MACHILIPATNAM

M.Sc. (Computer Science)

COURSE STRUCTURE

Semester - I

Course Code	Name of the Course	Hours			Credits	
YEAR/SUB/PAPER		L	T	P		
					Theory	Practicals
20MCS101	Data Structures	4	-	-	4	-
20MCS102	Programming and Problem Solving using Python	4	-	-	4	-
20MCS103	Computer Organization	4	-	-	4	-
20MCS104	Formal Languages and Automata Theory	4	-	-	4	-
20MCS105	Programming and Problem Solving using Python Lab	-	-	8	-	4
20MCS106	Data Structure Lab	-	-	8		4
		16	**-**	**16**	**16**	**8**
	Total	**32hours per week**			**24 Credits per semester**	

L - Lecture, T- Tutorial & P – Practicals

Semester -II

Course Code	Name of the Course	Hours			Credits	
YEAR/SUB/PAPER		L	T	P		
					Theory	Practicals
20MCS201	Design and Analysis of Algorithms	4	-	-	4	-
20MCS202	Software Engineering	3	1	-	4	-
20MCS203	Operating Systems	4	-	-	4	-
20MCS204	Database Management Systems	4	-	-	4	-
20OEMCS205	Open Elective –I	4			4	-
20MCS206	Unix Operating Systems Lab	-	-	8	-	4

20MCS207	Database Management Systems Lab	-	-	8		4
	Sub-Total	**19**	**1**	**16**	**20**	**8**
	Total	**36 hours per week**			**28Credits per semester**	

Semester -III

Course Code	**Name of the Course**	**Hours**			**Credits**	
YEAR/SUB/PAPER		**L**	**T**	**P**		
					Theory	**Practicals**
20MCS301	Compiler Design	4	-	-	4	-
20MCS302	Computer Networks	4	-	-	4	-
20MCS303	Principles of Programming Language	4	-	-	4	-
20 MCS 304	Artificial Intelligence	4	-	-	4	-
20OEMCS305	Open Elective-II	4	-	-	4	-
20MCS306	Compiler Design Lab	-	-	8	-	4
20MCS307	Computer Networks Lab	-	-	8	-	4
	Sub-Total	**20**	**-**	**16**	**20**	**8**
	Total	**36 hours per week**			**28 Credits per semester**	

Semester - IV

Course Code	**Name of the Course**	**Hours**			**Credits**		
		L	**T**	**P**			
					Theory	**Practicals**	**Field/Project work**
20MCS401	* MOOCS	4	-	-	4	-	-
20MCS402.1 Or 20MCS402.2	Elective-I Big Data Analytics Or Machine Learning	4			4		
20MCS403.1 Or	Elective-II Cloud	4			4		

20MCS403.2	computing Or DNA Computing						
20MCS404	Web Technologies	4			4		
20MCS405	Web Technologies Lab	-	-	4	-	2	
20MCS406	Project	-	-	-	-	-	8
	Sub-Total	**16**		**4**	**16**	**2**	**8**
	Total	**20**			**26 Credits per semester**		

- **Open Electives:**

Course code	Name of the course	Semester	Credits
20OEMCS205	Open Elective -I	II	4
20OEMCS305	Open Elective -II	III	4
		TOTAL	**8**

- **Total number of credits at the end of course:**

S.No	Semester	Credits
1	I Semester	24
2	II Semester	28
3	III Semester	28
4	IV Semester	26
	TOTAL	**106**

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

- **Evaluation**

I Semester **Marks**
1. Four theory papers 4X100 = 400
2. Programming and problem solving using Python lab=100
3. Data Structures Lab =100

} Total = 600 M

II Semester **Marks**
1. Five theory papers 5X100 = 500
2. Unix Operating System Lab = 100
3. Database Management Systems Lab = 100

} Total = 700 M

III Semester **Marks**
1. Five theory papers 5X100 = 500

}

2. Compiler design Lab = 100 Total = 700 M
3. Computer Networks Lab = 100

IV Semester	**Marks**	
1. Four Theory 4X100	= 400	
2. Practical Lab	= 100	Total = 700 M
3. Project work	= 200	

Grand total Marks = 600+700+700+700= **2700**

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 marks will be 2500 only.

20MCS101: DATA STRUCTURES

Details of the syllabus

Unit 1	**Introduction and Overview** : Elementary Data Organization, Data Structures, Data Structure Operations, 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	**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, Multidimensional Arrays, Pointer Arrays, Record Structures, Representation of records in memory, Parallel Arrays, Matrices, Sparse Matrices.
Unit 3	**Linked Lists :** Representation, Traversing, Searching, Memory Allocation: Garbage Collection, Insertion, Deletion, Header Linked Lists Two-Way Lists. **Stacks, Queues, Recursion :** Stacks, Array representation, Linked List representation, Evaluation of Arithmetic Expressions, Quick sort, Recursion, Towers of Hanoi, Queues, Linked representation of Queues, Deques, Priority Queues.
Unit 4	**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, m-way search trees, searching, insertion and deletion in m-way search tree, Heap: Heap Sort, Huffman's Algorithms, General Trees
Unit 5	**Graphs**: Terminology, Sequential representation of Graphs, Warshall'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 books

	Author	Title	Publisher
1	Seymour Lipschutz	Data Structures	McGraw Hill (Schaum's Outlines)

Reference books

	Author	Title	Publisher
1	Seymour Lipschutz	Theory and Problems of Data Structures	McGraw Hill (Schaum's Outlines)
2	John R Hubbard, Second Edition	Data Structures with Java	McGraw Hill (Schaum's Outlines)
3	Robert Lafore	Data Structures & Algorithms in Java	Second edition, Pearson Education

20MCS102: PROGRAMMING AND PROBLEM SOLVING USING PYTHON

Details of the syllabus

Unit 1	**Basics of Python Programming**-Features of Python, History of Python, The Future of Python, Writing and Executing First Python Program, Literal Constants, Variables and Identifiers, Data Types, Input Operation, Comments, Reserved Words, Indentation, Operators and Expressions, Expressions in Python, Operations on Strings, Other Data Types, Type Conversion.
Unit 2	**Decision Control Statements**-Conditional Branching Statements, Basic Loop Structures, Nested Loops, The break statement, The continue statement, The pass statement. The else statement used with loops. **Functions and Modules**- Function Definition, Function Call, Variable Scope and Lifetime, The return statement, More on Defining Functions, Recursive functions, Modules, Packages in Python, Standard Library Modules.
Unit 3	**Python Strings Revisited**-Concatenating, Appending and Multiplying Strings, String formatting operator, Built in String Methods and Functions, Comparing Strings, Regular Expressions. **Data Structures**- Sequence, Lists, Functional Programming, Tuple, Sets, Dictionaries.
Unit 4	**Classes and Objects**- Classes and Objects, Class Method and self Argument, Class variables and Object Variables, Public and Private Data Members, Private Methods, Calling a Class Method from Another Class Method, Built-in Class Attributes, Class Methods, Static Methods.
Unit 5	**Inheritance**- Inheriting Classes in Python, Types of Inheritance, Abstract Classes and Interfaces. **Error and Exception Handling**- Introduction to Errors and Exceptions, Handling Exceptions, Raising Exceptions, Built- in and User defined Exceptions **Operator Overloading**- Concept of Operator Overloading, Advantage of Operator Overloading, Implementing Operator Overloading.

Text books

	Author	Title	Publisher
1	Reema Thareja	Python Programming Using Problem Solving Approach	Oxford University Press

Reference books

	Author	Title	Publisher
1	Wesley Chun	Core Python Programming	Prentice Hall

20MCS103: COMPUTER ORGANIZATION

Details of the syllabus

Unit 1	**Digital Logic Circuits**: Digital Computers, Logic Gates, Boolean algebra, Map Simplification, Combinational Circuits, Flip-flops, Sequential Circuits. **Digital Components**: Integrated Circuits, Decoders, Multiplexers, Registers, Shift Registers, Binary Counters, Memory Unit. **Data Representation**: Data types, Complements, Fixed-point Representation, Floating-point representation, other binary codes, Error detection Codes.
Unit 2	**Register Transfer and Micro operations**: Register transfer language, Register transfer, Bus & memory Transfers, Arithmetic micro operations, logic micro operations, Shift micro operations, Arithmetic Logic Shift Unit **Basic Computer Organization and Design**: Instruction Codes, Computer registers, Computer Instructions, Timing and Control, Instruction Cycle, Memory-Reference Instructions, Input-output Interrupt.
Unit 3	**Micro programmed Control:** Control memory, Address Sequencing, Micro program Example, Design of control Unit. **Central Processing Unit**: General Register Organization, Stack Organization, Instruction Formats, Addressing Modes, Data Transfer and Manipulation, Program Control.
Unit 4	**Pipeline and Vector Processing:** Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, RISC Pipeline, Vector Processing, Array Processors. **Computer Arithmetic**: Introduction, Addition and subtraction, Multiplication Algorithm, Floating point arithmetic operations, Decimal Arithmetic unit, Decimal Arithmetic operations.
Unit 5	**Input-Output Organization**: Peripheral Devices, Input-Output Interface, Asynchronous Data Transfer, Modes of Transfer, Priority Interrupt, Direct Memory Access (DMA). **Memory Organization**: Memory Hierarchy, Main Memory, Auxiliary Memory, Associative Memory, Cache Memory, Virtual Memory.

Text books

	Author	Title	Publisher
1	M. Morris Mano	Computer System Architecture	3rd Edition, Pearson Education (2008).

Reference books

	Author	Title	Publisher
1	V. Rajaraman, T. Radha Krishnan	Computer Organization and Architecture	PHI
2	Behrooz Parhami	Computer Architecture	Oxford (2007)
3	ISRD group	Computer Organization	Ace series, TMH (2007)
4	William Stallings	Computer Organization and Architecture – Designing for Performance	Pearson Education (2005)
5	P.Chakraborty	Computer Architecture and Organization	Jaico Books (2008)

20MCS104: FORMAL LANGUAGES AND AUTOMATA THEORY

Details of the syllabus

Unit 1	**Fundamentals:** Strings, Alphabet, Language, Operations, finite automaton model, acceptance of strings, and languages, FA, transition diagrams and Language recognizers. **Finite Automata:** Deterministic finite automaton, Non deterministic finite automaton and NFA with ε transitions - Significance, acceptance of languages, equivalence between NFA with and without ε transitions, NFA to DFA conversion, minimization of FSM, equivalence between two FSMs, Finite Automata with output- Moore and Mealy machines.
Unit 2	**Regular Languages:** Regular sets, regular expressions, identity rules, construction of finite automata for a given regular expressions and its inter conversion, Pumping lemma of regular sets, closure properties of regular sets (proofs not required).
Unit 3	**Grammar Formalism:** Regular grammars-right linear and left linear grammars, equivalence between regular linear grammar and FA, inter conversion, Context free grammar, derivation trees, sentential forms, right most and leftmost derivation of strings. **Context Free Grammars:** Ambiguity in context free grammars. Minimization of Context Free Grammars. Chomsky normal form, Greibach normal form, Pumping Lemma for Context Free Languages. Enumeration properties of CFL (proofs not required).
Unit 4	**Push down Automata:** Definition, model, design of PDA, acceptance by final state and acceptance by empty stack, equivalence of CFL and PDA, interconversion (proofs not required), Introduction to DCFL and DPDA.
Unit 5	**Turing Machine:** Definition, model, design of TM, recursively enumerable languages and recursive languages, types of Turing machines (proofs not required). **Computability Theory:** Chomsky hierarchy of languages, decidability of problems, undecidability of Posts Correspondence problem, Definition of P and NP problems.

Text books

	Author	Title	Publisher
1	Hopcroft H.E. and Ullman	Introduction to Automata Theory Languages and Computation	J. D. Pearson Education

Reference books

	Author	Title	Publisher
1	John C Martin	Introduction to languages and the Theory of Computation	TMH
2	Lewis H.P. & Papadimitriou C.H	Elements of Theory of Computation	Pearson PHI
3	Mishra and Chandrashekaran	Theory of Computer Science and Automata languages and computation	2nd edition, PHI.
4	Daniel I.A. Cohen	Introduction to Computer Theory	John Wiley

KRISHNA UNIVERSITY, MACHILIPATNAM – 521003
DEPARTMENT OF COMPUTER SCIENCE
MCS, I SEMESTER
20MCS105: PROGRAMMING AND PROBLEM SOLVING USING PYTHON LAB

List of Programs

1. Write Python Program to reverse a number and also find the Sum of digits in the reversed number.
   Prompt the user for input.
2. Write Pythonic code to check if a given year is a leap year or not.
3. Write Pythonic code to check if a given year is a leap year or not.
4. Write Python code to determine whether the given string is a Palindrome or not using slicing.
5. Write Python program to add two matrices and also find the transpose of the resultant matrix.
6. Write Python program to swap two numbers without using Intermediate/Temporary variables.
   Prompt the user for input.
7. Consider a Rectangle Class and Create Two Rectangle Objects. Write Python program to
   Check Whether the Area of the First Rectangle is Greater than Second by Overloading >
   Operator.
8. Write Python program to count the number of times an item appears in the list.
9. Write Python program to convert uppercase letters to lowercase and vice versa.
10. Write Python program to perform a linear search for a given Key number in the list and report
    Success or Failure.
11. Write Python program to sort numbers in a list in ascending order using Bubble Sort by
    passing the list as an argument to the function call.
12. Write Python program to Calculate Area and Perimeter of different shapes using Polymorphism.

KRISHNA UNIVERSITY, MACHILIPATNAM – 521003
DEPARTMENT OF COMPUTER SCIENCE
MCS, I SEMESTER
20MCS106 : DATA STRUCTURES LAB

List of Programs

1. Java program to implement Stack operations using Arrays
2. Java program to implement Queue operations using Arrays
3. Java program to implement linked list operations using Arrays
4. Java Program to implement tree traversal techniques
5. Java program to convert infix expression to postfix expression
6. Java program to evaluate postfix expression
7. Java program to implement Binary search.
8. Java program to implement Selection sort
9. Java program to implement Insertion sort
10. Java program to implement quick sort
11. Java program to implement Merge Sort.

MCS201: DESIGN AND ANALYSIS OF ALGORITHMS

Details of the syllabus

it 1	**Introduction to Algorithm** : Algorithm definition, properties, Different areas to study about Algorithms, Pseudo code expressions for an algorithm, Performance Analysis, Time Complexity & Space Complexity, Asymptotic notations **Elementary Data Structures:** Stacks and Queues, Trees: Terminology - Binary Trees, Dictionaries : Binary Search Trees, Heaps,Heapsort, Sets and disjoint set Union: Introduction - union and find operations. ; Graphs: Introduction - Definitions - Graph Representations.
it 2	**Introduction to Divide and Conquer** : Binary search, Binary search analysis, Quick sort, Quick sort analysis, Merge sort, Merge sort Analysis, Strassen's matrix multiplication, Finding Maximum and minimum. **Greedy Method** : Introduction, General method, Job sequencing with deadlines, single source shortest path problem, Optimal storage on tapes, Knapsack problem, Minimum cost spanning trees : Prim's Algorithm, Kruskal's Algorithm.
it 3	**Dynamic Programming** : Single source shortest path problem, Multi stage graphs, All pairs shortest path, Optimal Binary search tree, 0/1 Knapsack problem, Reliability design, Travelling person Problem, Flow shop scheduling. **Basic Traversal and Search Techniques:** Techniques for Binary Trees, Techniques for graphs: Breadth First Search and Traversal-Depth First Search; Connected Components and Spanning Trees -Bi-connected components and DFS
it 4	**Introduction to Backtracking :** General method, N-queens problem, sum of sub sets problem, Graph coloring, Hamiltonian cycles, Knapsack problem. **Branch and Bound :** The Method: Least Cost search -The 15 puzzle - control abstractions for LC search - Bounding - FIFO Branch and Bound - LC Branch and Bound; 0/1 knapsack problem: LC Branch and Bound solution - FIFO Branch and Bound solution; Traveling Sales person.

it 5	**NP-Hard and NP -complete problems :** Basic concepts : Non deterministic algorithms -The classes NP hard and NP complex; Cook's theorem - NP hard graph problems : Clique Decision Problem -Node cover decision problem chromatic number decision problem - Directed Hamiltonian cycle - Traveling sales person decision problem - and/or graph decision problem; NP-hard scheduling Problems: scheduling identical processors - flow shop scheduling -job shop scheduling; NP-hard code generation problems: code generation with common sub expressions -Implementing parallel assignment instructions; Some simplified NP-hard problems.

Text books

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

Reference books

	Author	Title	Publisher
1	Anany Levitin	Introduction to the Design & Analysis of Algorithms	2nd Edition, Pearson Education
2	I Chandra Mohan	Design and Analysis of Algorithms	PHI
3	Prabhakar Gupta and Vineet Agarwal	Design and Analysis of Algorithms	PHI
4	Parag Himanshu Dave	Design and Analysis of Algorithms	Pearson Education

20MCS202: SOFTWARE ENGINEERING

Details of the syllabus

Unit 1	**Introduction to software Engineering**- The Evolution Role of software, Software, Quality of Software, Software Evolution. Software Engineering Process Models- prescriptive models, waterfall model, Incremental model, RAD model, Evolutionary process model.
Unit 2	**Software Architecture** – Software Architecture, Data design, Architecture styles and patterns, Architectural design, mapping data flow into software architecture. Software Analysis Model- Requirements analysis, Data modeling concepts, Object-oriented modeling, Class- based modeling, flow-oriented modeling.
Unit 3	**Software Design Engineering**- Design within the context of software Engineering, Design process and quality, Design concepts, Design model, Pattern based software design. Software Testing Strategies – Static approach to software testing, Validation testing, System testing, Black-Box testing, White-Box testing, Object oriented testing models, Art of Debugging.
Unit 4	**Software Metrics**- Framework for product metrics, Metrics for analysis, Design, Source code, testing and maintenance, Metrics for process and project domains. Software Re-Engineering- Software Re-Engineering, Reverse Engineering, Restructuring, Forward engineering.
Unit 5	**Project Organization & Responsibilities**-, Project organizations, evolution of organizations. Process Automation- Automation building blocks, project environment. Project control & Process Instrumentation- The seven core metrics, Management indicators, Quality indicators, Life cycle expectations, Programmatic software metrics, Metrics automation, tailoring the process, Process discriminates.

Text books

	Author	Title
1	Roger S. Pressman	Software Engineering-A practitioner's Approach
2	Walker Royce	Software Project Management- A unified Framework

20MCS203: OPERATING SYSTEMS

Details of the syllabus

Unit 1	**Introduction:** Where does an operating system fit in? : System Levels, What Operating Systems do? : Hardware Resources, Resource Management, Virtual Computers, A Virtual Computer: Virtual Processor, Virtual Primary Memory, Virtual Secondary Memory, Virtual I/O. **The Hardware Interface:** The CPU: General- Purpose Registers, Control Registers, Processor Modes, Instruction Set, Machine Instructions in C++ code, Memory and Addressing, Interrupts, I/O Devices: Disk Controller.
Unit 2	**The Operating System Interface:** What are System Calls? : How to Make a System Call, What is a System Call Interface?, An Example System Call Interface: System Call Overview, Hierarchical File Naming System, File and I/O System Calls, open Files, Examples of File I/O, Naming Operating System Objects, Devices as files: Unification of the File and Device Concepts, The Process Concept: Processes and programs, process Management System Calls, Communication between Processes: Communication-Related System Calls, Example of Interprocess Communication, UNIX-Style Process Creation, Standard Input and Standard Output: Communicating with Pipes, Naming of Pipes and Message Queues, Summary of System Call Interfaces.
Unit 3	**Implementing Processes:** The System Call Interface, Implementation of a Simple Operating System: Guide to the Code, The Architecture, Implementation of Processes: Process Creation, process States, Process Dispatching, Flow of Control Through the Operating System.
Unit 4	**Memory Management:** Levels of Memory Management, Linking and Loading a Process: Creating a Load Module, loading a Load Module, Allocating Memory in a Running Process,, Variations in Program Loading: Load Time Dynamic Linking, Run Time Dynamic Linking, Solutions to the Memory Management Design Problem: Static Division into a Fixed Number of Blocks, Buddy Systems, powers-of-two Allocation, Dynamic Memory Allocation, Keeping Track of the Blocks: The List Method, Keeping Allocated Blocks on the Block List, Examples of Dynamic Memory

	Allocation: Logical and Physical Memory, Allocating Memory to Processes, Static Memory Management. **Virtual Memory:** Fragmentation and Compaction, Dealing with Fragmentation: Separate code and Data Spaces, Segments Noncontiguous Address Spaces, page Tables in Hardware Registers, Page Tables in Memory, Using a Page Table Cache, Analysis Models of Paging with Caching, Memory Allocation with Paging, Terminology: Page and Page Frame, Page Tables, Paging Summary.
Unit 5	**Virtual Memory Systems:** Page Replacement, Global Page Replacement Algorithms: Measuring the Performance of a Page Replacement Algorithm, Optimal Page Replacement, Theories of Program paging Behavior, Random Page Replacement, First In First Out FIFO Page Replacement, Least Recently Used Page Replacement, Approximations of LRU, Clock Algorithms, Page Replacement Examples, Local Page Replacement Algorithms: What Is a Working Set?, Program Phases, Variable Resident Set Sizes, The Working Set Paging Algorithm, Approximating the Working Set, WSClock Paging Algorithm.

Text books

	Author	Title	Publisher
1	Charles Crowley	Operating Systems: A Design-Oriented Approach	TATA MCGRA-HILL EDITION.

Reference books

	Author	Title	Publisher
1	Abraham Silberchatz, Peter B. Galvin, Greg Gagne	Operating System Principles	8th Edition, Wiley Student Edition.
2	Naresh Chauhan	Principles of Operating Systems	OXFORD University Press
3	Sumitabhadas	Unix Concept and application	----
4	YashwantKanetkar	Unix Shell Programming	----

20MCS204: DATABASE MANAGEMENT SYSTEMS

Unit 1	**Databases and Database Users**: Introduction, Characteristics of the Database Approach, Actors on the Scene, Workers behind the scene, Advantages of the using the DBMS Approach. **Database System Concepts and Architecture**: Data Models, Schemas and Instances, Three Schema architecture and Data Independence, Database Languages and Interfaces, Centralized and Client/Server Architecture for DBMS, Classification of Database Management Systems.
Unit 2	**Data Modeling Using the ER Model**: Conceptual Data models, Entity Types, Entity Sets, Attributes and Keys, Relationship types, Relationship sets, roles and structural Constraints, Weak Entity types, Relationship Types of Degree Higher than Two, Refining the ER Design for the COMPANY Database. **The Relational Algebra and Relational Calculus:** Unary Relational Operations: SELECT and PROJECT, Relational Algebra Operations from set Theory, Binary Relational Operations: JOIN and DIVISION, Additional Relational Operations, Examples, The Tuple Calculus and Domain Calculus. **The Enhanced Entity-Relationship Model**: Sub classes, Super classes and Inheritance, Specialization and Generalization, Constraints and Characteristics of Specialization and Generalization
Unit 3	**Functional Dependencies and Normalization for Relational Databases:** Informal Design Guidelines for Relation Schemas, Functional dependencies, Normal Forms Based in Primary Keys, General Definitions of Second and Third Normal Forms, Boyce-Codd Normal Form, Multivalued Dependencies and Fourth Normal Form, Join Dependencies and Fifth Normal Form, Inclusion Dependencies. **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 4	**Introduction to Transaction Processing Concepts and Theory:** Introduction to

	Transaction Processing, Transaction and System Concepts, Desirable Properties of Transactions, Characterizing Schedules Based on Recoverability, Characterizing schedules Based on Serializability. **Concurrency Control Techniques:** Two Phase Locking Techniques for Concurrency Control, Concurrency Control Based on Timestamp Ordering, Multiversion Concurrency control techniques, Validation concurrency control Techniques.
Unit 5	**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.

Text books

	Author	Title	Publisher
1	Elmasri.R and Navathe.S	Fundamentals of Database Systems.	Pearson Education (2007) **Chapters:** 1.1 to 1.6, 2, 13.1 to 13.10, 14, 3.1 to 3.6, 3.9, 4.1 to 4.5, 5, 6, 8, 10, 11, 17, 18.1 to 18.5, 25.1 to 25.3, 25.6

Reference books

	Author	Title	Publisher
1	Peter Rob, Carlos Coronel	Database Systems– Design, Implementation and Management	Eigth Edition, Thomson (2008)
2	C.J. Date, A.Kannan, S.Swamynathan	An Introduction to Database Systems	VII Edition Pearson Education (2006).
3	Raman A Mata – Toledo, Panline K. Cushman	Database Management Systems	Schaum's Outlines, TMH (2007)
4	Steven Feuerstein	Oracle PL/SQL – Programming	10th Anniversary Edition, OREILLY (2008)

20MCS206: Unix Operating Systems Lab

List of programs

1. Write programs using the following system calls of UNIX operating system: fork, exec, getpid, exit, wait, close, stat, opendir, readdir
2. Write programs using the I/O system calls of UNIX operating system (open, read, write, etc)
3. Write C programs to simulate UNIX commands like ls, grep, etc.
4. Given the list of processes, their CPU burst times and arrival times, display/print the Gantt chart for FCFS and SJF. For each of the scheduling policies, compute and print the average waiting time and average turnaround time.
5. Given the list of processes, their CPU burst times and arrival times, display/print the Gantt chart for Priority and Round robin. For each of the scheduling policies, compute and print the average waiting time and average turnaround time.
6. Developing Application using Inter Process communication (using shared memory, pipes or message queues)
7. Implement the Producer – Consumer problem using semaphores (using UNIX system calls).
8. Implement some memory management schemes – I
9. Implement some memory management schemes – II
10. Implement any file allocation technique (Linked, Indexed or Contiguous)

20MCS207: Database Management Systems Lab

Cycle-I: Aim: Marketing company wishes to computerize their operations by using following Tables.

Table Name: Client- Master
Description: Used to store client information

Column Name	Data Type	Size	Attribute
CLIENT_ NO	Varchar2	6	Primary key and first letter must start with 'C'
NAME	Varchar2	20	Not null
ADDRESS 1	Varchar2	30	
ADDRESS S	Varchar2	30	
CITY	Varchar2	15	
PINCODE	Varchar2	8	
STATE	Varchar2	15	
BAL_DUE	Number	10,2	

Table Name: Product_ Master
Description: Used to store product information

Column Name	Data Type	Size	Attribute
PRODUCT _NO	Varchar2	6	Primary key and first letter must start with 'P'
DESCRIPTION	Varchar2	15	Not null
PROFIT _PERCENT	Number	4,2	Not null
UNIT _MEASUE	Varchar2	10	
QTY_ ON_ HAND	Number	8	
REORDER_ LVL	Number	8	
SELL _PRICE	Number	8, 2	Not null, cannot be 0
COST _PRICE	Number	8,2	Not null, cannot be 0

Table Name: Salesman_master
Description: Used to store salesman information working for the company.

Column Name	Data Type	Size	Attribute
SALESMAN_ NO	Varchar2	6	Primary key and first letter must start with 'S'
SALESMAN _NAME	Varchar2	20	Not null
ADDRESS1	Varchar2	30	
ADDRESS2	Varchar2	30	
CITY	Varchar2	20	
PINCODE	Number	8	
STATE	Vachar2	20	
SAL_AMT	Number	8,2	Not null, cannot be 0

TGT_TO_GET	Number	6,2	Not null, cannot be 0
YTD _SALES	Number	6,2	Not null
REMARKS	Varchar2	20	

Table Name: SALES-ORDER
Description: Used to store client's orders

Column Name	Data Type	Size	Attribute
ORDER_ NO	Varchar2	6	Primary key and first letter must start with 'S'
CLIENT _NO	Varchar2	6	Foreign Key
ORDER _DATE	Date		
DELY _ADDRESS	Varchar2	25	
SALESMAN_ NO	Varchar2	6	Foreign Key
DELY _TYPE	Char	1	Delivery: part(p)/ full(f) and default 'F'
BILL_ YN	Char	1	
DELY_ DATE	Date		Can't be less than order date
ORDER _STATUS	Varchar2	10	Values ("In Process", " Fulfilled", "Back Order", "Cancelled.

Table Name: SALES_ORDER_DETAILS
Description: Used to store client's order with details of each product ordered.

Column Name	Data Type	Size	Attribute
ORDER _NO	Varchar2	6	Primary key references SALES_ORDER table
PRODUCT_ NO	Varchar2	6	Foreign Key references SALES_ORDER_table
QTY_ ORDERED	Number	8	
QTY_ DISP	Number	8	
PRODUCT _RATE	Number	10,2	Foreign Key

Solve the following queries by using above tables.

1. Retrieve the list of names, city and the state of all the clients.
2. List all the clients who are located in 'Mumbai' or 'Bangalore'.
3. List the various products available from the product_master table.
4. Find the names of sales man who have a salary equal to Rs.3000.
5. List the names of all clients having 'a' as the second letter in their names.
6. List all clients whose Bal due is greater than value 1000.
7. List the clients who stay in a city whose first letter is 'M'.
8. List all information from sales-order table for orders placed in the month of July.
9. List the products whose selling price is greater than 1000 and less than or equal to 3000.
10. Find the products whose selling price is greater than 1000 and also find the new selling price as original selling price 0.50.
11. Find the products in the sorted order of their description.
12. Find the products with description as '540HDD' and 'Pen drive'.
13. Count the total number of orders.
14. Print the description and total qty sold for each product.
15. Calculate the average qty sold for each client that has a maximum order value of 15,000.

16. Find all the products whose quantity on hand is less than reorder level.
17. List the order number and day on which clients placed their order.
18. Find out the products and their quantities that will have to deliver in the current month.
19. Find the names of clients who have placed orders worth of 10000 or more.
20. Find the client names who have placed orders before the month of June,2008.

Cycle-II

Aim: A manufacturing company deals with various parts and various suppliers supply these parts. It consists of three tables to record its entire information. Those are as follows.

Supplier (Supplier_No, Sname, City, status)
Part(Part_no, pname, color, weight, city, cost)
Shipment (supplier_No, Part_no, city)
JX(project_no, project_name, city)
SPJX (Supplier_no, part_no, project_no, city)

1. Get supplier numbers and status for suppliers in Chennai with status > 20.
2. Get project names for projects supplied by supplier S.
3. Get colors of parts supplied by supplier S_1.
4. Get part numbers for parts supplied to any project in Mumbai.
5. Find the id's of suppliers who supply a red or pink parts.
6. Find the pnames of parts supplied by London supplier and by no one else.
7. Get the names of the parts supplied by the supplier 'Mart' and 'Miller'.
8. Get supplier names for suppliers who do not supply part P_2.
9. Get all parirs of supplier numbers such that the suppliers concerned are "colocated".
10. Get suppliers names for the suppliers who supply at least one red part.

Cycle –III Employee Database

Aim: An enterprise wishes to maintain a database to automate its operations. Enterprise divided into a certain departments and each department consists of employees. The following two tables describes the automation schemas.

Emp(Empno, Ename, Job, Mgr, Hiredate, Sal, Comm, Deptno)
Dept(Deptno, Dname, Loc)

1. List the details of employees who have joined before the end of September' 81.
2. List the name of the employee and designation of the employee, who does not report to anybody.
3. List the name, salary and PF amount of all the employees (PF is calculated as 10% of salary)
4. List the names of employees who are more than 2 years old in the organization.
5. Determine the number of employees, who are taking commission.
6. Update the employee salary by 20% , whose experience is greater than 12 years.
7. Determine the department does not contain any employees.
8. Create a view, which contains employee name and their manager names working in sales department.
9. Determine the employees, whose total salary is like the minimum salary of any department.
10. List the department numbers and number of employees in each department.
11. Determine the employees, whose total salary is like the minimum salary of any department.

12. List average salary for all departments employing more than five people.
13. Determine the names of employees, who take highest salary in their departments.
14. Determine the names of employees, who earn more than their managers.
15. Display ename, dname, even if no employee belongs to that department (use outer join)

20MCS301: COMPILER DESIGN

Details of the Syllabus

Unit 1	Introduction to Compiling, A simple One-pass Compiler
Unit 2	Lexical Analysis, Syntax Analysis
Unit 3	Syntax-directed translation, Type checking
Unit 4	Run-time environments, Intermediate code generation
Unit 5	Code generation, Code Optimization

Text Books

	Author	Title	Publisher
1	Alfred V. Aho, Ravi Sethi, Jeffrey D. Ullman	Compilers – Principles, Techniques and Tools	Pearson Education

Reference Books

	Author	Title	Publisher
1	J.P. Bannett	Introduction to Compiling techniques	McGraw Hill
2	Tremblay & Sorenson	Compiler Writing	McGraw Hill
3	Dhamdhere	Compiler Construction	MacMilan

20MCS302: COMPUTER NETWORKS

Details of the Syllabus

Unit 1	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 - lnternetworks. 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.
Unit 2	The Medium Access Control Sublayer: 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 - The Bluetooth Radio Layer – The Bluetooth Baseband Layer -The Bluetooth L2CAP layer - The Bluetooth Frame Structure. Data Link Layer Switching: Bridges from 802.x to 802.y - Local Internetworking - Spanning Tree Bridges -

	Remote Bridges - Repeaters, Hubs, Bridges, Switches, Routers and Gateways - Virtual LANs.
Unit 3	**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 Vector Routing — Link State Routing - Hierarchical Routing — Broadcast Routing — Multicast Routing — Routing for Mobile Hosts. Internetworking : How Networks Differ — How Networks can be connected — Concatenated Virtual Circuits — Connectionless Internetworking — Tunneling — Internet work Routing — Fragmentation. The Network Layer in the Internet: The IP Protocol — IP address — Internet Control Protocols — OSPF — The Internet Gateway Routing Protocol — BGP — The Exterior Gateway Routing Protocol.
Unit 4	**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 to UDP — Remote Procedure Call — The Real Time Transport Protocol. The Internet Transport 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.
Unit 5	**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 — Dynamic Web Documents – HTTP-- The Hyper Text Transfer Protocol — Performance Enhancements The Wireless Web. Multimedia: Introduction to Digital Audio — Audio Compression — Streaming Audio —

	Internet Radio — Voice Over IP —Introduction to Video — Video Compression — Video on Demand.

Text books

	Author	Title	Publisher
1	Andrew S.Tanenbaum	Computer Networks.	PHI

Reference books

	Author	Title	Publisher
1	James F. Kurose, Keith W.Ross	Computer Networking	3rd edition, Pearson Education
2	Michael A. Gallo, William M. Hancock	Computer Communications and Networking Technologies	Cengage Learning (2008)
3	Behrouz A Ferouzan	Data Communications and Networking	4th edition, TMH (2007)

20MCS303: PRINCIPLES OF PROGRAMMING LANGUAGE

Details of the Syllabus

Unit 1	**Introduction :** What is a programming language, Abstractions in programming languages, Computational paradigms, Language definition, Language translation, Language design. **History: T**he first programmer, The 1950s : The first programming languages, The 1960s : An explosion in programming languages, The 1970s : Simplicity, abstraction, study, The 1980s : New directions and the rise of object –orientation, The 1990s : Consolidation, The Internet, libraries and scripting, The future. **Language Design Principles:** History and design criteria, Efficiency, regularity, Further language design principles, C++ : A Case study in language design. **Syntax :** Lexical structure of programming languages, Context-free grammars and BNFs, Parse trees and Abstract syntax trees, Ambiguity, Associativity and precedence, EBNFs and syntax diagrams, Parsing techniques and tools, Lexical vs Syntax vs Semantics
Unit 2	**Basic Semantics:** Attributes, binding and semantic functions, Declarations, blocks and scope, The symbol table, Name resolution and overloading, Allocation, Lifetimes and the environment, Variables and Constants, Aliases, Dangling references and garbage. **Data Types :** Data types and type information, Simple types, Type constructors, Type equivalence, Type Checking, Type conversion, Polymorphic type checking, Explicit polymorphism.
Unit 3	**Control – I:** Expressions and Statements: Expressions, Conditional Statements and Guards, Loops and Variation on "while", The "goto" controversy, Exception handling. **Control – II :** Procedures and Environments : Procedure definition and activation, Procedure semantics, Parameter passing mechanisms, Procedure environments, activations and allocation, Dynamic memory management, Exception handling and environments. **Abstract data types and Modules :** The algebraic specification of abstract data types, Abstract data type mechanisms and modules, Separate compilation in C, C++ name spaces and Java packages, Ada packages, Modules in ML, Modules in earlier languages, Problems with abstract data type mechanisms, The mathematics of abstract data types.
Unit 4	**Object – Oriented Programming :** Software reuse and independence, Java :

	objects, Classes and methods, Inheritance, Dynamic binding, C++, Small Talk, Design issues in object – oriented languages, Implementation issues in object – oriented languages. **Functional Programming:** Programs as functions, Functional programming in an imperative language,Scheme : A Dialect of LISP, ML : Functional programming with static typing, Delayed Evaluation, Haskell – A fully curried lazy language with overloading, The Mathematics of functional programming I : Recursive functions, The Mathematics of functional programming II : Lambda calculus. **Logic Programming :** Logic and Logic programs, Horn clauses, Resolution and Unification, The language Prolog, Problems with logic programming, Extending logic programming : Constraint logic programming and Equational systems.
Unit 5	**Formal Semantics:** A Sample small language, Operational semantics, Denotational semantics, Axiomatic semantics, Proofs of program corrections. **Parallel programming :** Introduction to parallel processing, Parallel processing and programming languages, Threads, Semaphores, Monitors, Message passing, Parallelism in non-imperative languages.

Text books

	Author	Title	Publisher
1	Kenneth C. Louden	Programming Languages Principles and Practice	Second Edition, Cengage Learning(2008). Chapters:1through 14

Reference books

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

20MCS304: ARTIFICIAL INTELLIGENCE

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	Rich & Knight	Artificial Intelligence	TMH (1991)

Reference books

	Author	Title	Publisher
1	Winston. P.H	Artificial Intelligence	Addison Wesley (1993)

KRISHNA UNIVERSITY, MACHILIPATNAM – 521003
DEPARTMENT OF COMPUTER SCIENCE
MCS - III SEMESTER
20MCS306: COMPILER DESIGN LAB

List of Programs

1. Implementation of symbol table.
2. Develop a lexical analyzer to recognize a few patterns in c (ex. Identifers, constants, comments, operators etc.)
3. Implementation of lexical analyzer using lex tool.
4. Generate yacc specification for a few syntatic categories.

    a) Program to recognize a valid arithmetic expression that uses operator +, -, * and /.
    b) Program to recognize a valid variable which starts with a letter followed by any number of letter or digits.
    c) Implementation of calculator using lex and yacc.

5. Convert the bnf rules into yacc form and write code to generate abstract syntax tree.
6. Implement type checking
7. Implement control flow analysis and data flow analysis.
8. Implement any one storage allocation strategies(heap, stack, static)
9. Construction of DAG
10. Implement the back end of the compiler which takes the three address code and produces the 8086nassembly language instructions that can be assembled and run using a 8086 assembler. The target assembly instructions can be simple move , add, sub, jump. Also simple addressing modes are used.
11. Implementation of simple code optimization techniques (constant folding. etc.)

KRISHNA UNIVERSITY, MACHILIPATNAM – 521003
DEPARTMENT OF COMPUTER SCIENCE
MCS - III SEMESTER
20MCS307: COMPUTER NETWORKS LAB

1. Write a program to implement data link layer framing method bit stuffing.
2. Write a program to implement data link layer framing method character stuffing.
3. Write a program to implement data link layer framing method character count.
4. Write a program to implement Cyclic Redundancy Check(CRC 12 ,CRC 16 and CRC CCIR) on a data set of characters.
5. Write a program to implement Dijkstra's algorithm to compute the shortest path through a graph.
6. Write a program to implement subnet graph with weights indicating delay between nodes. Now Obtain routing table art each node using distance vector routing algorithm.
7. Write a program to implement subnet of hosts to obtain Broadcasting
8. Write a program to implement by taking a 64 bit playing text and encrypt the same using DES algorithm.
9. Write a program to implement break DES coding.
10. Write a program to implement RSA algorithm to encrypt a text data and decrypt the same

20MCS402.1: BIG DATA ANALYTICS

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

	Author	Title	Publisher
1	Seema Acharya and Subhashini Chellappan	Big Data and Analytics	Wiley India Pvt. Ltd., 2016

20MCS402.2: MACHINE LEARNING

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	**Reinforcement learning** – Introduction - Single State: K-armed Bandit - Model-Based Learning - Value Iteration - Policy Iteration - Temporal Difference Learning - Exploration Strategies - Deterministic Rewards and Actions - Nondeterministic Rewards and Actions - Q-learning - Sarsa - Eligibility Traces - The Tiger Problem **Combining Multiple Learners –** Rationale – Voting - Fixed Combination Rules - Error-Correcting Output Codes – Bagging – AdaBoost - Mixture of Experts – Stacking - Fine-Tuning an Ensemble – Cascading - Combining Multiple Sources.

Text Books

	Author	Title	Publisher
1	Ethem Alpaydın	Introduction to Machine Learning, Second Edition	The MIT Press Cambridge, Massachusetts London, England.

20MCS403.1: CLOUD COMPUTING

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.

Text Books

	Author	Title	Publisher
1	Kailash Jayaswal, Jagannath Kallakurchi, Donald J. Houde Dr. Deven Shah	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
2	Raj Kumar Buyya, Christen vecctiola, S Tammarai selvi	Mastering Cloud Computing, Foundations and Application Programming	TMH

20MCS403.2: DNA COMPUTING

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 DES using DNA, DNA ASCII Table Cryptography using DNA.

Reference books

	Author	Title	Publisher
1	W. Stallings2009	Cryptography and Network Security: Principles and Practices	4thedition, Pearson Education, Prentice Hall, NJ
2	J.D.Watson2004	Molecular Biology of the Gene	5th edition, The Benjamin/Cummings Publishing Co., Inc

20MCS404: WEB TECHNOLOGIES

Unit 1	**Introduction:** Evolution of the Internet and World Wide Web, Web Basics, Multitier Application Architecture, Client-Side Scripting versus Server-Side Scripting, Object Technology **HTML5:** Introduction, Editing HTML5, First HTML5 Example, W3C HTML5 Validation Service, Headings, Linking, Images, Special Characters and Horizontal Rules, Lists, Tables, Forms, Internal Linking, meta Elements, HTML5 Form input Types, input and datalist Elements and autocomplete Attribute, Page-Structure Elements.
Unit 2	**CSS:** Introduction, Inline Styles, Embedded Style Sheets, Conflicting Styles, Linking External Style, Positioning Elements, Backgrounds, Element Dimensions, Box Model and Text Flow, Media Types, Building a CSS Drop-Down Menu, User Style Sheets, Text Shadows, Rounded Corners, Color, Box Shadows, Image Borders, Animation-Selectors. **JavaScript:** Introduction to Scripting, Control Statements I, Control Statements II, Functions, Arrays, Objects, Document Object Model, Event Handling.
Unit 3	**JQuery Basics**: String, Numbers, Boolean, Objects, Arrays, Functions, Arguments, Scope, Built-in Functions. jQuery – Selectors: CSS Element Selector, CSS Element ID Selector, CSS Element Class Selector, CSS Universal Selector, Multiple Elements E, F, G Selector, Callback Functions. jQuery – DOM Attributes: Get Attribute Value, Set Attribute Value. jQuery – DOM Traversing : Find Elements by index, Filtering out Elements, Locating Descendent Elements, JQuery DOM Traversing Methods.
Unit 4	**JQuery CSS Methods :** Apply CSS Properties, Apply Multiple CSS Properties, Setting Element Width & Height, JQuery CSS Methods. jQuery – DOM Manipulation Methods: Content Manipulation, DOM Element Replacement, Removing DOM Elements, Inserting DOM elements, DOM Manipulation Methods. jQuery – Events Handling: Binding event handlers, Removing event handlers, Event Types, The Event Object, The Event Attributes. jQuery – Effects: JQuery Effect Methods, jQuery Hide and Show, jQuery Toggle, jQuery Slide – slideDown, slideUp, slideToggle, jQuery Fade – fadeIn, fadeOut, fadeTo, jQuery Custom Animations.

Unit 5	**Databases:** SQL, MYSQL. **PHP:** Introduction, Simple PHP Program, Converting Between Data Types, Arithmetic Operators, Initializing and Manipulating Arrays, String Comparisons, String Processing with Regular Expressions, Form Processing and Business Logic, Reading from a Database, Using Cookies, Dynamic Content.

Text books

	Author	Title	Publisher
1	Harvey M. Deitel and Paul J. Deitel	Internet and World Wide Web How To Program, 5e	Prentice Hall; 4th edition
2	Robert W Sebesta	Programming with World Wide Web	Pearson Education; 4th edition.
3	Jon Duckett	JavaScript & jQuery	Wiley

20MCS405: Web Technologies Lab

Web Technologies

1. Write an HTML code to display your education details in a tabular format.
2. Write an HTML code to display your CV on a web page.
3. Write an HTML code to display the name of the University and Department name using inline, internal and external CSS.
4. Write a JavaScript to design a simple calculator to perform the following operations: sum, product, difference and quotient.
5. Write a JavaScript that calculates the squares and cubes of the numbers from 0 to 10 and outputs HTML text that displays the resulting values in an HTML table format.
6. Write a JavaScript code that displays text with increasing font size in the interval of 100ms in RED COLOR, when the font size reaches 50pt it displays in BLUE color. Then the font size decreases to 5pt.
7. Write a PHP program to keep track of the number of visitors visiting the web page and to display this count of visitors, with proper headings.
8. Write a PHP program to display a digital clock which displays the current time of the server.
9. Write the PHP program to multiply two matrices.
10. Write the PHP to find the transpose of the matrix.
11. Write a PHP program to sort the student records which are stored in the database using selection sort.
12. Using jQuery find all text areas, and makes a border. Then adds all paragraphs to the jQuery object to set their borders red.
13. Using jQuery add a new class to an element that already has a class.
14. Using jQuery insert some HTML after all paragraphs.

Open Electives:

Course code	Title of the Paper
20OEMCS205	Fundamentals of Computers And Problem Solving Techniques
20OEMCS305	Basics Of Cyber Security

**** Open Elective Syllabus will be included later.**

KRISHNA UNIVERSITY, MACHILIPATNAM -521003
MCS Semester: I
Paper Title with paper code: 20MCS101: DATA STRUCTURES
(w.e.f admitted batch 2020-21)

Time: 3 Hours **Max. Marks: 70**

Answer ALL questions **(10x2 = 20 Marks)**

1. a) Define data structures.
   b) List out the basic operations on linked list.
   c) What is time complexity?
   d) Define a priority queue.
   e) Define degree of the node with example
   f) Define a binary tree.
   g) What are the tasks performed during inorder traversal?
   h) Define AVL tree.
   i) Define graph.
   j) What is sorting?

Answer Five Questions Choosing One Question from Each Unit. All Questions Carry Equal Marks. **(5x10 = 50 Marks)**

UNIT – I

2. a) Discuss about the data structure operations.

   (OR)

   b) Explain about the control structures.

UNIT – II

3. a) Explain about Binary search process with an example.

   (OR)

   b) Discuss about the pattern matching algorithms.

UNIT – III

4. a) Explain about Double linked list operations.

   (OR)

   b) Explain about the operations of stack and its implementation with example.

UNIT – IV

5. a) Discuss tree traversal techniques in detail.

   (OR)

   b) Briefly discuss about the insertion and deletion of AVL search trees.

UNIT – V

6. a) Explain about the process of Warshall's algorithm.

   (OR)

   b) Discuss about merge sort with an example.

KRISHNA UNIVERSITY, MACHILIPATNAM -521003
MCS Semester: I
Paper Title with paper code: 20MCS102: PROGRAMMING AND PROBLEM SOLVING USING PYTHON
(w.e.f admitted batch 2020-21)

Time: 3 Hours **Max. Marks: 70**

Answer ALL questions (10x2 = 20 Marks)

1. a) Define constant.
   b) How to declare variables and identifiers in Python?
   c) Write about expressions in Python.
   d) Explain continue statement.
   e) Define Recursive function.
   f) What is Regular expression?
   g) Define sets
   h) Define class.
   i) Explain static method.
   j) What is Inheritance?

Answer Five Questions Choosing One Question from Each Unit. All Questions Carry Equal Marks. (5x10 = 50 Marks)

UNIT – I

2. a) Explain the basic data types available in Python with examples.

   (OR)

   b) Describe different operators in detail with examples.

UNIT – II

3. a) Explain Conditional Branching Statements in Python.

   (OR)

   b) How to define and call a function in Python.

UNIT – III

4. a) Explain Built-in String methods and functions in Python.

   (OR)

   b) Discuss the relation between tuples and lists, tuples and dictionaries in detail.

UNIT – IV

5. a) Explain the concept of scope and lifetime of variables in Python programming language with an example.

   (OR)

   b) How to call a class method from another class method in Python.

UNIT – V

6. a) Explain different types of inheritances in Python.

   (OR)

   b) Discuss the advantages of operator overloading.

KRISHNA UNIVERSITY, MACHILIPATNAM -521003
MCS Semester: I
Paper Title with paper code: 20MCS103: COMPUTER ORGANIZATION
(w.e.f admitted batch 2020-21)

Time: 3 Hours **Max. Marks: 70**

Answer ALL questions **(10x2 = 20 Marks)**

1. a) What is computer Architecture?
   b) Explain different logic gates.
   c) Explain Memory unit.
   d) What is memory transfer?
   e) List of registers for a basic computer.
   f) What is stack organization?
   g) Briefly explain program control.
   h) Explain decimal Arithmetic operations.
   i) What is an input-output interrupt?
   j) Write about Auxiliary Memory.

Answer Five Questions Choosing One Question from Each Unit. All Questions Carry Equal Marks.
(5x10 = 50 Marks)

UNIT – I

2. A) What is Flip flop? Explain different types of Flip flops with their logic diagram.

   (OR)

   B) Explain the fixed point representation with an example.

UNIT – II

3. A) Explain about the arithmetic micro operations.

   (OR)

   B) Explain about the instruction cycle.

UNIT – III

4. A) Explain various Addressing modes.

   (OR)

   B) Explain various instruction formats.

UNIT – IV

5. A) Explain floating point arithmetic operations.

   (OR)

   B) Explain multiplication algorithm.

UNIT – V

6. A) Explain different modes of data transfers.

   (OR)

   B) Discuss about memory hierarchy.

KRISHNA UNIVERSITY, MACHILIPATNAM -521003
MCS Semester: I
Paper Title with paper code: 20MCS104: FORMAL LANGUAGES AND AUTOMATA THEORY
(w.e.f admitted batch 2020-21)

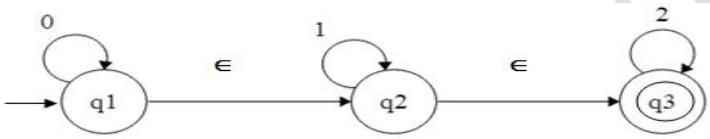
Time: 3 Hours **Max. Marks: 70**

Answer ALL questions **(10x2 = 20 Marks)**

1. a) Draw the transition diagram for the given table and write the language for the same.

Q/∑	0	1
→ q0	q0	q1
q1	q2	q0
q2	q1	q2

b) Find ε-closure of all states for the given transition diagram.



c) Define regular set and regular expression.

d) Write regular expression for all strings which ends with 01 over {0, 1}.

e) Define regular grammar with an example.

f) Show that the following grammar is ambiguous for the string id + id * id

E → E+E | E*E | (E) | id

g) Give the formal definition of Push down automata.

h) Explain the model of PDA.

i) What are recursively enumerable languages?

j) Represent Chomsky hierarchy of languages and their counterpart automata.

Answer Five Questions Choosing One Question from Each Unit. All Questions Carry Equal Marks.
(5x10 = 50 Marks)

UNIT – I

2. A) Design DFA which accepts all the strings with even no. of 0's and even no. of 1's over an alphabet
   {0, 1}.

(OR)

B) Construct a Mealy machine which is equivalent to the Moore machine

Present State	Next State		Output
	A=0	A=1	
→ q_0	q_3	q_1	0
q_1	q_1	q_2	1
q_2	q_2	q_3	0
q_3	q_3	q_0	0

.

UNIT – II

3. A) Construct a finite automata for regular expression 1+00+010*

(OR)

B) Show that $L=\{a^nb^n \mid n>=1\}$ is not regular.

UNIT – III

4. A) Obtain a Right Linear Grammar for the language $L = \{a^n b^m \mid n>=2 , m>=3\}$.

(OR)

B) For the following grammar:

S → ABC | BbB , A→ aA | BaC|aaa , B→ bBb| a|D, C→CA|AC , D→ ε

i) Eliminate ε-productions.

ii) Eliminate any unit productions in the resulting grammar.

iii) Eliminate any useless symbols in the resulting grammar.

.

UNIT – IV

5. A) Convert the following Context Free Grammar to Push Down Automata
   S→AA | a
   A→SA | b

(OR)

B) Write short notes on Post correspondence problem and Undesirability of problems.

UNIT – V

6. A) Design a Turing machine for the language $L=\{a^n b^n c^n | n>=1\}$.

(OR)

B) Determine whether the following PCP problem has a solution or not.
X={b,babbb,ba} Y={bbb,ba,a}.

KRISHNA UNIVERSITY, MACHILIPATNAM -521003

MCS Semester: II

Paper Title with paper code: 20MCS201- DESIGN AND ANALYSIS OF ALGORITHMS

(w.e.f admitted batch 2020-21)

Time: 3 Hours **Max. Marks: 70**

Answer ALL questions **(10x2 = 20 Marks)**

1. a) Define Time Complexity and Space Complexity
   b) What is a binary search tree?
   c) What is the best case search time in binary search?
   d) Differentiate Divide and Conquer and Greedy methods
   e) Define optimal binary search tree.
   f) What is an articulation point of graph?
   g) Explain graph coloring problem.
   h) Explain briefly branch and bound technique
   i) What are non-deterministic algorithms?
   j) When do we say that a problem is NP-Complete?

Answer Five Questions Choosing One Question from Each Unit. All Questions Carry Equal Marks.

(5x10 = 50 Marks)

UNIT – I

2. a) What is Performance analysis and define the asymptotic notations for best, average and worst case analysis of algorithms with suitable example.

   (OR)

   b) Define heap. Explain operations on heap with suitable examples.

UNIT – II

3. a) Explain with an example how divide and conquer approach can be used to sort the numbers in a file using quick sort method

   (OR)

   b) Apply Kruskal's algorithm to find a minimum spanning tree of a graph by taking suitable example.

UNIT – III

4. a) Solve the following 0/1 Knapsack problem using dynamic programming
   P = (11,21,31,33), W=(2,11,22,15), C=40, n=4

   (OR)

   b) Explain in detail about BFS and DFS of a graph with an example.

UNIT – IV

5. a) Explain 8-queens problem with an algorithm

   (OR)

   b) State Travelling salesman problem. Solve the travelling salesperson problem given below using branch and bound approach

∞	7	3	12	8
3	∞	6	24	9
5	8	∞	6	18
9	3	5	∞	11
18	14	9	8	∞

UNIT – V

6. a) Explain satisfiability problem and write the algorithm for the same.

(OR)

b) Explain NP-hard scheduling problems.

KRISHNA UNIVERSITY, MACHILIPATNAM -521003
MCS Semester: II
Paper Title with paper code: 20MCS202: SOFTWARE ENGINEERING
(w.e.f admitted batch 2020-21)

Time: 3 Hours **Max. Marks: 70**

1. **Answer ALL questions** **(10x2 = 20 Marks)**
   a) Define the term software engineering.
   b) Differentiate between functional and non functional requirements.
   c) What are the merits of waterfall model?
   d) What is reusability in software engineering?
   e) What is cyclomatic complexity?
   f) Explain the term project planning and project control in brief?
   g) Differentiate between white box and black box testing
   h) What do you mean by software maintenance?
   i) What are software reliability metrics? Explain.
   j) Explain the term software test case.

Answer Five Questions Choosing One Question from Each Unit. All Questions Carry Equal Marks. **(5x10 = 50 Marks)**

UNIT – I

2. A) What are the five levels of CMM? List important features of each of these levels.

(OR)

B) Explain the following life cycle models in detail
(i) Incremental model (ii) RAID model

UNIT – II

3. A) Write a detail note on requirement analysis and specification.

(OR)

B) Explain in detail about object oriented modeling and class based model.

UNIT – III

4. A) Explain different design methodologies in software development with suitable example.

(OR)

B) What is the process of software testing? Explain different testing methods with suitable example.

UNIT – IV

5. A) Explain in detail about the following
(i) Software metrics (ii) Reverse Engineering

(OR)

B) Discuss about the Software Re engineering in detail.

UNIT – V

6. A) Explain about Seven core metrics of software process model.

(OR)

B) What is Project organization and automation? Explain in detail.

KRISHNA UNIVERSITY, MACHILIPATNAM -521003
MCA Semester: II
Paper Title with paper code: 20MCA203: OPERATING SYSTEMS
(w.e.f admitted batch 2020-21)

Time: 3 Hours **Max. Marks: 70**

Answer ALL questions (10x2 = 20 Marks)

1. a) Define Operating System?
   b) Explain Processor Modes?
   c) How to make a System Call?
   d) Discuss about communicating with Pipes?.
   e) What are the IPC related system calls?
   f) Define Process creation?
   g) What is Linking and Loading a process?
   h) What is Fragmentation?
   i) Define Page Replacement?
   j) What is a Working Set?

Answer Five Questions Choosing One Question from Each Unit. All Questions Carry Equal Marks. (5x10 = 50 Marks)

UNIT – I

2. a) What does an Operating System do?

   (OR)

   b) Explain I/O Devices?

UNIT – II

3. a) Explain the Process Concept?

   (OR)

   b) Explain UNIX-Style Process Creation?

UNIT – III

4. a) Explain Implementation of a simple Operating System?

   (OR)

   b) Discuss Flow of Control through the Operating System?.

UNIT – IV

5. a) Explain Dynamic Memory Allocation?.

   (OR)

   b) Explain Noncontiguous Logical Address Spaces?

UNIT – V

6. a) Discuss First In First Out Page Replacement Algorithm with Example ?

   (OR)

   b) Explain Approximations of LRU?

KRISHNA UNIVERSITY, MACHILIPATNAM -521003
MCS Semester: II
Paper Title with paper code: 20MCS204: DATABASE MANAGEMENT SYSTEMS
(w.e.f admitted batch 2020-21)

Time: 3 Hours **Max. Marks: 70**

Answer ALL questions **(10x2 = 20 Marks)**

1. a) Define Data?
   b) List any five advantages of Database Management Systems
   c) What is a weak entity?
   d) What is a Primary Key?
   e) Define Normalization.
   f) What is functional dependency?
   g) List out the properties of transactions.
   h) What is concurrency control?
   i)Define Hashing?
   j)Define Indexing?

Answer Five Questions Choosing One Question from Each Unit. All Questions Carry Equal Marks. **(5x10 = 50 Marks)**

UNIT – I

2. A) Explain the three tier architecture and Data Independence for DBMS

(OR)

B) What is DBMS? Explain the characteristics of the DBMS approach?

UNIT – II

3. A) Discuss in detail about the concepts of E-R model with suitable examples

(OR)

B) Describe various operations of Relational Algebra?

UNIT – III

4. A) What is Normal Form? State 1NF, 2NF and 3NF with examples.

(OR)

B) Consider the following relational database:

Employee(employee-name,street,city) Works(employee-name, company-name, salary)

Company(company-name,city) Manages(employee-name, manager-name)

Give an expression in SQL for each of the following queries:

a) Find the names, street address and cities of residence for all employees who work for 'First Bank Corporation' and earn more than Rs. 10,000.

b) Find the names of all employees in the database who live in the same cities as the companies for which they work.

c) Find the names of all employees in the database who live in the same cities and on the same streets as do their managers

UNIT – IV

5. A) what is a Transaction? Explain various desirable properties of transactions.

(OR)

B) Explain two phase locking techniques for concurrency control?

UNIT – V

6. A) Explain in detail about B+ trees

(OR)

B) Explain the storage management using RAID.

KRISHNA UNIVERSITY, MACHILIPATNAM -521003
MCS Semester: III
Paper Title with paper code: 20MCS 301: COMPILER DESIGN
(w.e.f admitted batch 2020-21)

Time: 3 Hours **Max. Marks: 70**

Answer ALL questions **(10x2 = 20 Marks)**

1. a) What are the different types of Language Processors?
   b) What happens in Analysis and Synthesis phases of compilation?
   c) Define an ambiguous grammar?
   d) What is three-address code? Give an example?
   e) What is syntax-directed definition?
   f) Advantages of Parser.
   g) What does heap and stack areas of run-time memory store?
   h) What is CISC machine?
   i) What is Code generation?
   j) Define Dead code elimination.

Answer Five Questions Choosing One Question from Each Unit.
All Questions Carry Equal Marks. **(5x10 = 50 Marks)**

UNIT – I

2. a) Explain the Structure of a Compiler.

(OR)

b) Explain Applications of Compiler Technology.

UNIT – II

3. a) Explain the role of the Lexical Analyzer.

(OR)

b) Explain the role of the Parser.

UNIT – III

4. a) Explain Applications of Syntax-Directed Translation.

(OR)

b) Discuss about Type checking.

UNIT – IV

5. a) What are the limitations of Access Links? How displays solve those issues?

(OR)

b) Generate code for the following three-address statements assuming stack allocation, where register SP points to the top of the stack.

```
call p call q
return
call r
return return
```

UNIT – V

6. a) Discuss Issues in the Design of a Code Generator.

(OR)

b) Discuss about copy propagation and dead code elimination.

KRISHNA UNIVERSITY, MACHILIPATNAM -521003
MCS Semester: III
Paper Title with paper code: 20MCS 302: COMPUTER NETWORKS
(w.e.f admitted batch 2020-21)

Time: 3 Hours **Max. Marks: 70**

Answer ALL questions **(10x2 = 20 Marks)**

1. a) What are the different types of networks?
   b) What is flow control?
   c) What are the responsibilities of data link layer?
   d) Discuss about bridge and router.
   e) Advantages of Ethernet.
   f) Define Bluetooth.
   g) What is OSPF?
   h) What is multiplexing?
   i) Define Berkeley socket.
   j) What is SMTP?

Answer Five Questions Choosing One Question from Each Unit. All Questions Carry Equal Marks. **(5x10 = 50 Marks)**

UNIT – I

2. a) Discuss about OSI reference model.

(OR)

b) Describe the guided transmission media.

UNIT – II

3. a) Explain error correction and detection method with an example.

(OR)

b) Explain IEEE 802.11 protocol stack and Frame structures

UNIT – III

4. a) Explain Distance Vector Routing algorithm with example.

(OR)

b) Discuss about IP protocol.

UNIT – IV

5. a) Explain TCP protocol Header format.

(OR)

b) Explain transport service primitives and TCP connection establishment.

UNIT – V

6. a) Discuss about DNS.

(OR)

b) Explain video compression and audio compression.

KRISHNA UNIVERSITY, MACHILIPATNAM -521003

MCS Semester: III

Paper Title with paper code: 20MCS 303: PRINCIPLES OF PROGRAMMING LANGUAGES

(w.e.f admitted batch 2020-21)

Time: 3 Hours **Max. Marks: 70**

Answer ALL questions **(10x2 = 20 Marks)**

1. a) What is a programming langugae?
   b) Define internet.
   c) Explain Parse trees and Abstract syntax trees.
   d) Difference between syntax and semantics.
   e) What is overloading?
   f) Explain explicit polymorphism.
   g) Explain parameter passing mechanism.
   h) What is Abstract data type?
   i) Define Recursive function.
   j) Define Threads.

Answer Five Questions Choosing One Question from Each Unit. All Questions Carry Equal Marks. **(5x10 = 50 Marks)**

UNIT – I

2. a) Describe the structure of Context free grammars with an example.

   (OR)

   b) Discuss criteria for design of programming languages.

UNIT – II

3. a) Discuss in detail about function overloading and operator overloading with suitable examples.

   (OR)

   b) Show the working procedure of the type checker for the expression in C a[i]+I in detail.

UNIT – III

4. a) Discuss about handling of exceptions in Object Oriented programming languages.

   (OR)

   b) Write about the modules of abstract data type.

UNIT – IV

5. a) How to create classes and objects in Java? Explain with suitable examples.

   (OR)

   b) Discuss the problems of Logic programming with suitable examples.

UNIT – V

6. a) Explain in detail about Bounded Buffer Problem.

   (OR)

   b) Compare and Contrast shared and Distributed memory systems.

KRISHNA UNIVERSITY, MACHILIPATNAM -521003
MCS Semester: III
Paper Title with paper code: 20MCS 304: ARTIFICIAL INTELLIGENCE
(w.e.f admitted batch 2020-21)

Time: 3 Hours **Max. Marks: 70**

1. **Answer ALL questions** **(10x2 = 20 Marks)**
   k) Define Artificial Intelligence.
   l) What is the relevance of search and control strategies in problem?
   m) What is Heuristics?
   n) What is state space search?
   o) Define Constraint Satisfaction.
   p) What is an expert system?
   q) What is a frame problem?
   r) Distinguish between fact and Predicate.
   s) Define Semantic net?
   t) What is non monotonic reasoning?

Answer Five Questions Choosing One Question from Each Unit. All Questions Carry Equal Marks. **(5x10 = 50 Marks)**

UNIT – I

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

(OR)

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

UNIT – II

8. A) Explain Resolution in predict logic with suitable example.

(OR)

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

UNIT – III

9. 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

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

(OR)

B) Explain different steps in Natural Language Processing.

UNIT – V

11. 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.

KRISHNA UNIVERSITY, MACHILIPATNAM -521003
MCS Semester: IV
Paper Title with paper code: 20MCS 402.1: BIG DATA ANALYTICS
(w.e.f admitted batch 2020-21)

Time: 3 Hours **Max. Marks: 70**

1. **Answer ALL questions** (10x2=20 Marks)
   u) Define Big Data.
   v) Describe any five characteristics of Big Data.
   w) What is HDFC? List and explain all the components of HDFC.
   x) Explain different Challenges of big data.
   y) What is MongoDB.
   z) Write differences between RDBMS and Hadoop?
   aa) What is MapReduce?
   bb) What is data serialization.
   cc) What is YARN?
   dd) Explain the need of big data analytics?

Answer Five Questions Choosing One Question from Each Unit. All Questions Carry Equal Marks. **(5x10 = 50 Marks)**

UNIT – I

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

(OR)

B) Explain Need and Challenges in Big Data Environment?

UNIT – II

3. A) What is Business Intelligence? List different business Intelligence applications with a suitable example.

(OR)

B) Explain Classification of Analytics with suitable example.

UNIT – III

4. A) Describe characteristics of a NoSQL database.

(OR)

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

UNIT – IV

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

(OR)

B) Explain the essentials of Hadoop Ecosystem.

UNIT – V

6. 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.

KRISHNA UNIVERSITY, MACHILIPATNAM -521003
MCS Semester: IV
Paper Title with paper code: 20MCS 402.2: MACHINE LEARNING
(w.e.f admitted batch 2020-21)

Time: 3 Hours **Max. Marks: 70**

1. **Answer ALL questions** **(10x2 = 20 Marks)**
   a) Define supervised learning.
   b) Define Machine learning.
   c) Define Information Gain.
   d) Define Back Propagation.
   e) What is Reinforcement Learning?
   f) Explain Regression with an example?
   g) Define Bagging
   h) What is a Density estimator? Give an example?
   i) What is Subset Selection?
   j) Define Q-learning

Answer Five Questions Choosing One Question from Each Unit. All Questions Carry Equal Marks. **(5x10 = 50 Marks)**

UNIT – I

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

(OR)

B) What are the elements of Reinforcement learning?

UNIT – II

3. 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

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

(OR)

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

UNIT – IV

5. A) Explain in detail about the following
   (i) Linear Regression (ii) Polynomial Regression

(OR)

B) Discuss about the K-nearest neighbor estimator.

UNIT – V

6. A) Explain about Model based learning with Example.

(OR)

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

KRISHNA UNIVERSITY, MACHILIPATNAM -521003
MCS Semester: IV
Paper Title with paper code: 20MCS 403.1: CLOUD COMPUTING
(w.e.f admitted batch 2020-21)

Time: 3 Hours **Max. Marks: 70**

1. Answer ALL questions **(10x2 = 20 Marks)**

a) Define cloud computing.
b) What is Grid computing?
c) Define Virtualization.
d) Explain Database as a service.
e) Explain cloud application requirements.
f) Define Service oriented Architecture.
g) Explain ESB.
h) Explain Malware and Internet attacks.
i) What is a Synchronous cloud application?
j) Explain the benefits of Mobile cloud computing.

Answer Five Questions Choosing One Question from Each Unit. All Questions Carry Equal Marks. **(5x10 = 50 Marks)**

UNIT – I

2. A) Explain virtualization mechanisms.

(OR)

B) Write about peer-to-peer network families.

UNIT – II

3. A) Explain cloud computing services.

(OR)

B) Explain open-source Eucalyptus Cloud Architecture.

UNIT – III

4. A) Explain NOSQL system.

(OR)

B) Explain fundamental requirements for Cloud Application Architecture.

UNIT – IV

5. A) Explain Authentication management in the cloud.

(OR)

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

UNIT – V

6. A) Explain how to manage a Cloud Application.

(OR)

B) Write about Mobile Cloud Computing Challenges.

KRISHNA UNIVERSITY, MACHILIPATNAM -521003
MCS Semester: IV
Paper Title with paper code: 20MCS403.2: DNA COMPUTING
(w.e.f admitted batch 2020-21)

Time: 3 Hours **Max. Marks: 70**

Answer ALL questions **(10x2 = 20 Marks)**

1. a) Define Cell?
   b) Define Cloud Computing?
   c) What are Purines?
   d) What are the differences between DNA and RNA?
   e) Define Codon?
   f) Define PCR?
   g) Watson Crick Automata?
   h)What is DNA Computing?
   i) Define Cryptography?
   j) Define Public Key Cryptography?

Answer Five Questions Choosing One Question from Each Unit. All Questions Carry Equal Marks. **(5x10 = 50 Marks)**

UNIT – I

2. a) Explain the components in Cloud Computing?

(OR)

b) Explain the Computing Paradgims?

UNIT – II

3. a).Explain the concept of Protein Synthetization?

(OR)

b). Explain the structured Codon Table

UNIT – III

4. a). Explain the theoretical model of Hamiltonian Path Problem solved by Adleman?

(OR)

b). Explain about NP Hard and NP Complete Problems?

UNIT – IV

5. a). Differentiate between Traditional Cryptography and DNA Cryptography?

(OR)

b) . Differentiate between Quantum Cryptography and DNA Cryptography?

UNIT – V

6. a). Explain the concept of Public Key Cryptography?

(OR)

b). Explain about the implementation of DES using DNA?

KRISHNA UNIVERSITY, MACHILIPATNAM -521003

MCS Semester: IV

Paper Title with paper code: 20MCS404: WEB TECHNOLOGIES

(w.e.f admitted batch 2020-21)

Time: 3 Hours **Max. Marks: 70**

Answer ALL questions **(10x2 = 20 Marks)**

1. a)What is WWW?
   b) Explain Meta Elements.
   c) Explain embedded style sheet with an example.
   d) What is Event Handling?
   e) List out built in functions in jQuery.
   f) Define Array. How to declare arrays in jQuery?
   g) How to set element width and height in JQuery?
   h) Explain Arithmetic operations in PHP.
   i) What are DDL statements?
   j) Define cookies.

Answer Five Questions Choosing One Question from Each Unit. All Questions Carry Equal Marks. **(5x10 = 50 Marks)**

UNIT – I

2. A) How do you add Tables and Images to HTML page?

   (OR)

   B) Distinguish Client side scripting versus Server side scripting.

UNIT – II

3. A) Write short notes on user style sheets.

   (OR)

   B) Explain control statements in java script with example.

UNIT – III

4. A) What are jQuery Selectors? Give some examples.

   (OR)

   B) Explain jQuery DOM attributes with an example.

UNIT – IV

5. A) Explain jQuery CSS methods with an example.

   (OR)

   B) What are the effect methods used in jQuey?

UNIT – V

6. A) Differentiate between SQL and MYSQL databases.

   (OR)

   B) How to read data from a database in PHP? Explain with an example.